

MAINE STATE LEGISLATURE

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PUBLIC DOCUMENTS OF MAINE

1909

BEING THE



ANNUAL REPORTS

OF THE VARIOUS

DEPARTMENTS AND INSTITUTIONS

For the Year 1908.

VOLUME I.

AUGUSTA
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1909



Agricultural Hall, University of Maine, Orono

AGRICULTURE OF MAINE.

SEVENTH ANNUAL REPORT

OF THE

COMMISSIONER OF AGRICULTURE

OF THE

STATE OF MAINE.

1908.

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DEPARTMENT OF AGRICULTURE.

To the Honorable Governor and Executive Council of Maine:

In compliance with chapter 204 of the Public Laws of 1901, I hereby submit my seventh annual report as Commissioner of Agriculture of the State of Maine, for the year 1908.

A. W. GILMAN, *Commissioner.*

AUGUSTA, January 1, 1909.



ANNUAL REPORT OF THE COMMISSIONER OF AGRICULTURE.

In briefly reviewing the agricultural conditions of our State for the past year, while there have been some discouraging features, we see many indications of an upward trend in our farm life. The farmers are more alert, more anxious to learn new and improved methods, and are placing their farming on a broader and more intelligent basis. They have had to contend with some serious obstacles during the past year, such as unfavorable weather conditions which materially affected some of the crops, unusual insect depredations, etc.; but those who have learned to anticipate these conditions by providing supplemental crops, by a system of rotation and fertilization which tends to produce vigorous, drought resisting plants, and by intelligent methods of combatting insect pests, have kept the margin upon the right side.

FARM CROPS.

The short hay crop of 1908, the light yield of grains, and the scarcity of feed occasioned by the severe drought and the unusual infestation of grasshoppers, have emphasized the necessity of providing more supplementary crops to meet this emergency. This led the Department to issue a Bulletin on "Supplementing the Pastures and the Hay Crop," in September, which contains many valuable suggestions. The personal experience of the farmers who contributed to this Bulletin is worth much, and the special articles by Prof. W. D. Hurd, Orono, B. Walker McKeen, Fryeburg, and F. S. Adams, Bowdoinham, are full of instruction.

The corn crop was of good quality, and the yield was above the average. A special effort is being made all over the country

to increase this industry. It is estimated that during the year 1908 there were produced in the United States 2,643,000,000 bushels of corn. There is no other crop in this country or any other that is worth so much. Not only the grain itself is the corner stone of our prosperity, but an advance is being made in the development of the valuable by-products.

New England practically abandoned corn raising many years ago, when corn was raised so abundantly on the cheap lands of the West, and was sent to the East and sold at a very low figure. Then it seemed to the average farmer that he could buy it cheaper than he could raise it, but the day of cheap corn from the West has passed. There is no cheap corn land and the farmers of Maine will do no wiser thing than to give more attention to this industry and create a new interest in it. The corn plant has two feeding values, one as grain and the other as fodder. An acre of corn fodder is generally worth as much as an acre of good grass. In a rotation, with a cash crop like potatoes, this crop is of great value. The premiums offered by Dr. G. M. Twitchell at the State Dairy Conference at Dexter, for the best exhibit of corn raised by a boy 18 years of age or under, resulted in a large display of good corn, and we are confident stimulated a new interest in the growing of this valuable crop. The indications are that the acreage of corn planted in Maine the coming year will exceed that of 1908 by more than one-third. The constantly increasing price of corn has aroused the farmers, and they are becoming convinced that they can produce their corn to better advantage than they can purchase it. Another thought that encourages the farmer is that the possibilities of improving the corn crop through careful seed selection and thorough culture are large. Experiments show that an advance in yield of ten bushels per acre has been gained as the result of selection of seed. This would mean three to five million dollars added to the value of the corn crop in the United States. Maine should be doing her part. If by careful breeding a variety can be obtained which will mature earlier as well as yield more abundantly, it will mean much to the corn industry of our State.

Plant breeding through seed selection is a line of work which has been too much neglected. In recent years results are being

worked out which show that it is of as much importance for the farmer to practice scientific selection of seed of plants as it is to breed his live stock according to principles of selection. We believe some work in this line could be profitably carried on by the Department, if funds were provided.

With the potato crop there is also a promising field for seed selection. Prof. Webber of Cornell University states that 40 or 50 good sized potatoes per hill have been grown by right seed selection and methods of culture. The farmers of Maine have been giving potato culture special attention for several years past, and each year we are doing more in this line. By a careful selection of seed, by thorough preparation of the seed bed, and by the use of improved methods of cultivation, this industry has been largely developed. Only that seed should be planted in which the eyes are strong, and indicate the growth of a strong, vigorous plant.

The crop of 1908 was the finest and largest crop of potatoes ever raised in Maine. More than ninety per cent of the entire crop were merchantable potatoes, free from rot and practically free from any skin disease. The price was above the average early in the season, and gradually increased until the close of the year, with indications that the spring prices would be exceedingly high. The average yield through the State has been advancing.

The promise of a full crop of apples as indicated by the bountiful blossom of the trees was not fulfilled, as blight prevailed to a large extent, and in some sections the crop was very light. The orchard industry is one of our main branches of farming, and in spite of the fact that unfavorable weather conditions and depredations of insects have depressed this industry somewhat, it is slowly but steadily increasing in extent, and we are firmly of the opinion that it is to be one of the most profitable industries of the State. In order to accomplish this result, however, the individual fruit grower has a personal work to do. The orchard is too largely neglected. A better system of pruning, cultivating, fertilizing and spraying should be adopted. The Department has given this subject much attention during the past year. Prof. Hitchings, the State Entomologist, and other interesting speakers have delivered many lectures along the line

of a better system of orchard management. Personal appeals have been made to the orchardists, but many are not yet aroused to the full importance of cultivating, fertilizing and pruning their trees, and keeping them free from insect pests.

The past dry season has been particularly favorable for the increase of all kinds of insects, and some of our common insect enemies, which have not usually been very troublesome, have appeared in large numbers, not only in the orchards but in the forests.

THE GYPSY AND BROWN-TAIL MOTHS.

The work for the suppression of these pests has been carried on during the year on the same lines as in the previous year. Through the persistent efforts of our special field agent, Capt. E. E. Philbrook, and his efficient assistants, with the aid of the general government, the gypsy moth has been kept in check to a large extent, although some new infestations have been discovered, and the situation is still a grave one. We believe that unless new territory is found to be infested, beyond the limits that have been scouted, the spread of this pest can be checked.

The brown-tail moth has spread over the State to quite an extent, and a determined effort is needed, on the part of each individual owner of fruit and shade trees, as well as on the part of towns and cities, to keep this insect under control.

OUR DAIRY INTERESTS.

The dairying industry is growing in importance as the demand for dairy products increases, and the Department has made an earnest effort, during the past year, through the State Dairy Instructor, to raise it to a higher plane. An increased knowledge of the business is necessary in order to secure the best results. The two cow testing associations organized in December, 1907, have been continued and another has been added, and the results obtained thus far are very encouraging. It is our opinion that this movement will do more towards developing and extending dairying than any other effort that has been put forth for years. The dairyman, by the aid of these associations, is enabled to learn more nearly the value of each individual cow, and the cost of production. The official tester, employed by the association, weighs and tests the milk of each cow every

month, and ascertains the amount of butter fat she is producing and the cost and value of the daily ration. Thus the farmer can know the profit from each individual cow, and the cost of producing a pound of butter fat, and with this knowledge he can select out his best cows and breed up his herd. . Every man in the association is also familiar with what his neighbor is doing, and is stimulated, by comparison, to more economic production. This work will be extended as much as possible.

We believe that the organization of breeders' associations in connection with the cow testing associations would be of much advantage. The value of these organizations is well illustrated by the fact that in Wisconsin, where many of them are in operation, from one county last year \$600,000 worth of dairy stock of recognized excellence was sold. The basic problem of dairying is the breeding of better animals, animals of higher productive capacity and stronger constitutions, from which better returns may be obtained for the feed consumed. Dairymen should give more attention to this line of work.

The work of inspection of creameries, and of dairies as far as practicable, has been very thoroughly carried on, with beneficial results, and will be fully reported in the report of the State Dairy Instructor, in this volume.

FARMERS' INSTITUTES.

Forty-five regular farmers' institutes have been held during the past year. Ten of these meetings were held in March and the remainder in the late fall and early winter. A list of the dates and places is as follows: March 17, Lovell; March 18, Denmark; March 19, Kezar Falls; March 20, Poland; March 21, East Auburn; March 23, Greene; March 24, Freeport; March 25, West Falmouth; March 26, White Rock; March 27, Bridgton; October 27, Calais; October 28, Lubec; October 29, Cherryfield; October 30, Orland; October 31, Bluehill; November 2, Center Belmont; November 4, Springfield; November 5, Winn; November 6, Kenduskeag; November 7, Guilford Center; November 10, Perham; November 11, Fort Fairfield; November 12, Westfield; November 13, Ashland; November 14, Milo; November 16, Hartland; November 17, Norridgewock; November 18, Madison; November 19, North

Chesterville; November 20, New Sharon; November 21, Farmington; November 23, East Dixfield; November 24 and 25, Gardiner; November 27, Winthrop; November 28, Limington; November 30, Hollis Center; December 1, York Village; December 2, Woolwich; December 3, Richmond Corner; December 4, Nobleboro; December 5, South Newcastle; December 7, South Jefferson; December 11, South Warren; December 12, Appleton; December 18, Thorndike.

Several special meetings have also been held, in connection with granges. The attendance at the institutes has been fully as large as in past years, and the interested and intelligent audiences show the appreciation of these meetings. Never in the history of the work in this State have the farmers been more credulous in regard to the improved methods presented to them and more ready to accept them. Subjects of practical interest have been discussed, and the stimulation resulting from the contact of the farmers with each other and the discussion of their work, as well as the information gained from the speakers, have been productive of much good. The speakers from out of the State who have attended these meetings are as follows: Prof. J. M. Trueman, Storrs, Connecticut; E. Cyrus Miller, Haydenville, Mass.; Forest Henry, Dover, Minn.; Andrew Elliott, Galt, Ontario; and Prof. J. W. Sanborn, Gilmanton, N. H.

AGRICULTURAL FAIRS.

The past season was a successful one for the greater part of the agricultural fairs. The weather was very favorable and in general the attendance at these fairs was large. In many instances the excellent quality of the exhibits and the prominence of the educational features were especially noted. The Department has called the attention of the officers of the agricultural societies to the statute which governs the fairs, during the past year, and has urged the secretaries to see that the societies which draw aid from the State do more for agriculture by increasing their premiums on agricultural products, and making a special effort to secure a more intelligent, progressive agricultural exhibition.

It is our opinion that a revision of the premium lists of some of the fairs might be beneficial. Those having charge of this

should study the local conditions and give premiums which would best encourage the lines of agriculture adapted to that section. An interesting and valuable feature which has been introduced in some of the fairs in other states, and which, it seems to us, is worthy of the consideration of our fair managers, is a practical demonstration in some line of farm work.

The business of these societies in 1908 is given by the following figures:

Number of horses and colts exhibited,	1,777
Number of neat cattle exhibited,	6,267
Number of sheep exhibited,	1,160
Number of swine exhibited,	442
Number of poultry (coops) exhibited,	2,967
Amount of premiums and gratuities awarded,	\$30,090.28
Amount of trotting purses,	\$22,005.21
Per cent of premiums and gratuities to total awards,	58

AGRICULTURAL EDUCATION.

The Department has continued its efforts to impress upon the people of the State the importance and necessity of agricultural and industrial instruction in the public schools. These schools should fit for a vocation. The population of this and other states is continually increasing, and in order for the farms to meet this increase there must be a more intelligent system of agriculture. This can best be brought about by teaching the principles of agriculture in our public schools.

The farmer has a business to be studied and learned. It needs a trained mind as much as any other occupation. Let us educate our boys who are to be the farmers of the future, for that work. Specific training of a practical kind is a necessity for the coming occupants of our farms, as well as those engaged in the mechanical industries. The most valuable asset of the State is her children. They should be trained to high ideals of everyday living, and to high efficiency in their respective vocations.

The Educational Departments of some of the states have already introduced the teaching of agriculture into the public schools, and others are making strong recommendations in this line. Maine must keep in the front ranks, if her agriculture

is properly developed. We are convinced that agricultural and industrial education must be carried on side by side with general education by our school authorities. We believe that the State Department can care for this form of education as successfully as it has cared for the older forms, and that it can do it without great expense by eliminating some of the other branches that are not so essential.

INSTITUTE PAPERS.

THE DAIRY STABLE.

By Prof. J. M. TRUEMAN, Storrs, Conn.

A great many men have tried to solve the problem of furnishing clean milk by building expensive barns, and attempting to carry on every detail of the dairy work much as a surgeon would prepare his operating room and his instruments for a delicate surgical operation. This method produces the clean milk all right, but at much too high a cost. Such operations can not be carried on without a comparatively large force of men, and demand expensive supervision. The retail price of 12 to 15 cents charged for this milk places it beyond the reach of ordinary well-to-do laboring people, as well as the poorer laborers that need clean milk for their children. We are interested in furnishing clean milk for all who can use it and not for a selected few only.

It no doubt requires care to make clean milk, but it is not necessarily an expensive operation. The man who will study the condition of his herd and will take pains to furnish the things necessary for the health and comfort of his animals, will secure greater returns from them, and in this way more than pay for the extra time and care required to produce clean milk.

The production of clean milk does not require an expensive equipment. It does require certain definite things in barn construction, and careful methods of work. The necessary equipment, as far as the stable is concerned, may be specified under five heads: (1) Light, (2) Ventilation, (3) A tight properly constructed floor, (4) A comfortable convenient tie, (5) Smooth walls and tight ceilings. All these things can be obtained in

most barns without rebuilding the whole barn, or spending a small fortune to build a new one.

Sunlight is the great disinfectant and cleanser of nature. Direct sunlight is sure death to all kinds of germs. It is claimed that direct sunlight will kill the growing tuberculosis germ in 10 minutes. A building in which the sun shines freely, furnishes a healthful place in which to keep animals, and a cheerful place in which to work. Glass is cheap. Cut holes into the side of the old barn, set in window frames and glass sash. Windows will not cost more than they will return each year in the health and vigor of the animals. Therefore it is economy to let in the light.

Furthermore, light shows the dirt. It is easy to keep a light barn clean. It appeals to the pride of the owner. It is worth all it costs in pleasure derived. A clean, light, healthful barn, with happy, well-fed, contented cows, fills a farmer with pride and satisfaction. It pays to let in the light.

If the windows are made about three feet square, or so as to measure eight square feet at least, there should be half as many windows as there are ties in the stable. In other words there should be a window containing eight square feet of glass for every other cow. It is better to have a large number of medium sized windows than to have a few large windows. The smaller ones distribute the light better and are more useful for ventilating purposes. If the ceiling of the barn is low, the windows will work better for ventilating purposes if they are made 2 x 4, and set the long way, horizontal, in the wall; or for convenience of handling they may be made 2 x 3 and set closer together. If the stable can only be lighted from one side, as is frequently the case, then windows from 2 1-2 to 3 feet in height should extend along the whole side of the barn, set as closely together as possible, only leaving room between windows for posts.

It is possible to have a light barn and yet have poor ventilation. A close over-heated tie-up, and one that is cold and draughty are both objectionable. The value of fresh air cannot be over-estimated, but its admission to the barn, especially in our cold northern winters, should be properly controlled. The danger is that we will shut the barn up too closely in an attempt to keep out the cold. Air that has been breathed over

and over again loses its oxygen and gains in poisonous gases. Breathing this kind of air all winter weakens the cows and lessens the milk flow. The same thing happens if they are exposed to draughts and excessive cold. Therefore batten over the cracks, make the barn tight and provide a system of ventilation. The King system is probably the best that has been worked out. Space does not permit its description here, but it provides for an inlet of cold air near the ceiling, where the air is warmest. The cold air as it descends mixes more or less with the warm air and a direct draught on the cows is avoided. The stale air is drawn off through chutes opening near the floor and running up through the barn to the roof.

The next best method is to have the windows hinged at the bottom and open inward at the top. They may be fastened with an open-link chain that will permit them to be set open at any angle. A large number of windows opened an inch or two will furnish a fairly uniform inflow of fresh air. On mild days the windows may be opened wide. By this method ventilation and light are both produced at one cost and will be found satisfactory. The expense when divided in this way is comparatively small. In order to give the best results the windows should be placed at frequent intervals and not made too large.

The stable floor is preferably made of cement. It is durable and easily kept clean. The objection which many people have to the cows standing on cement is not well founded. It may be overcome, however, by laying plank over the cement where the cows are to stand. A sound, tight floor of wood will give good satisfaction; but it is not durable, and must be renewed whenever it begins to fail. The dropping of liquid through the floor, either into a manure cellar or on the ground close to the floor must not be allowed. If the stable is over a cellar the floor should be tight in order to prevent odors from rising and keeping the air foul. The cellar should be thoroughly ventilated by windows close to the barn sill in order to keep down odors and to keep the underpinning, sills and joists of the barn dry and free from rot. It is preferable to build the manure shed away from the barn and thus avoid any of the dangers above mentioned. The floor upon which the cows stand should be from four to five and a half feet long. Small Jerseys and

young stock will not need more than four feet while large Holsteins should have five and a half. The gutter should be deep and not too wide. From 8 to 10 inches deep and from 12 to 14 inches wide will hold the manure and be deep enough so the cows will not stand or lie in it, and narrow enough so they will step over it without danger of slipping.

The construction of the floor has much to do with the comfort of the cows, and also with their cleanliness. Cows standing on a platform too long for them can only be kept clean with the greatest difficulty. On the other hand if the platform is too short they are continually standing down in the gutter, and when lying down are extremely uncomfortable. The easiest way to regulate length of standing-way is, to have the tie made four feet from the gutter at one end, running to five or five and a half at the other. The cows can then be arranged in order of their size. There are a number of patent stalls on the market that can be set at a proper length to fit any cow, but these are relatively expensive and are not always satisfactory.

There are many ways of tying the cows. The ideal method is to put each cow in a box stall. That requires too much room and too much work for the average barn. The patent stalls on the market of the Bidwell and Drown type are likewise too expensive for most farmers and are not perfect in their results. I believe that the best all round tie, every thing considered, is a well made swing stanchion. It is cheap and durable. It keeps the cow where you want her, and it is comfortable. A chain around the neck, attached to an upright post on which it can slip up and down, does very well.

Smooth walls and tight ceilings keep out dust, and are easily cleaned. The open ceiling is a fertile source of dust on the cow's back and in the air, and consequently in the milk pail. You must have a floor for your mows. It is very little more expense to have one made of matched lumber than to have it rough and loose. It is much better to work on as well as to save dust from falling into the stable.

The barn is made lighter and cleaner and more healthful by the liberal use of whitewash. It should be used twice a year, and may be put on with a brush or with a spray pump. If the whitewash is well made and carefully strained it will not clog up the spray nozzle, and will stick to the ceiling very well.

None of the equipment described is necessarily expensive. Given the things we ask for, and a careful man, interested in doing his best, and milk good enough for any one to drink can be produced in a barn costing a moderate sum as well as in one costing \$10,000.

HOME GROWN DAIRY FEEDS.

By B. WALKER MCKEEN, Fryeburg.

For many years this branch of dairying has seemed to me to be of great importance, and if such has been true in the past it must be pre-eminently true in the present, with its high prices for grain and scarcity of help.

While Maine dairying has increased in its profits and in the general intelligence of the people who are engaged in the business through the use of purchased feeds, and while there may be many reasons for continuing their use, it does appear that with the increased intelligence to be found in dairy circles, there should be a turning of attention more and more to the possibilities of our own farms for the production of food, and the conserving of our natural resources through better farming, both in the raising of crops and in the saving of fertilizers.

In the first place, a proper rotation must be selected and such a choice of crops, and methods of growing them, made as shall tend to place every acre of the farm in some productive crop, eradicate all old grass fields, and give a large variety for feeding. Coupled with this should be the knowledge of the proper feeding of stock, the saving of all waste, the best methods of applying manure to the land, and the proper use of all tillage implements. And, however the details may be mastered, all must remember that no one can afford to feed otherwise than liberally. Poor feeding impoverishes the soil and the owner, while generous feeding brings ample returns in more income from the animals and in more productive fields, besides that indirect source of gain, the pleasure and pride which come from the handling of well-fed animals and in gathering abundant harvests. A well known writer has said that he who would practice true economy in feeding farm animals should have

lettered upon the walls of his stables and indelibly stamped upon the tables of his memory the ancient and wise saying, "Withholding doth not enrich thee, nor giving impoverish."

CORN AND THE SILO.

Of all the home grown dairy feeds, not even excepting the hay crop, I believe corn to be the most important. This grand crop should receive royal homage as well as scientific attention. As a producer both of roughage and of grain it is unexcelled. It is an ideal and an effective tillage plant. It is of great value in a rotation. In total food nutrients from a given area no other crop can compare with it. In digestibility it excells them all, while it is eaten with great relish by all animals. Even with all these favorable attributes, it is capable of much improvement, both in yield and in quality. The selection of seed may add much to the former, and intelligent fertilization and culture to the latter. Corn is truly an American plant, and thrives over a large area of her territory, but in no place better, from the dairy feeder's standpoint, than in Maine, with the exception of her most northerly portions. It may have two separate and distinct values. It may be made a money crop and a fodder crop, yielding a cash value per acre second only to potatoes, and a feeding value per acre of practically double the average yield of hay. The cash returns may be used to purchase protein supplementary feed; but if large quantities of this feed can be raised they may be made to directly swell the credit side of the farm account. If the location of the farm or the tastes of the owner do not warrant the planting of sweet corn for canning, a still larger amount of fodder value may be grown from the larger varieties of yellow corn, and the ears will furnish much valuable grain, which can be fed ground into meal, on the ear, or without removing from the stalk, from the silo.

During the many years that we have fed cows, corn has filled a most important place in our work. In winter it forms at least one-half of the roughage and in summer, with but scant pasturage, it does far more than this. There have been years when a single day has not passed without corn being fed from the silo in summer until the early varieties were mature enough

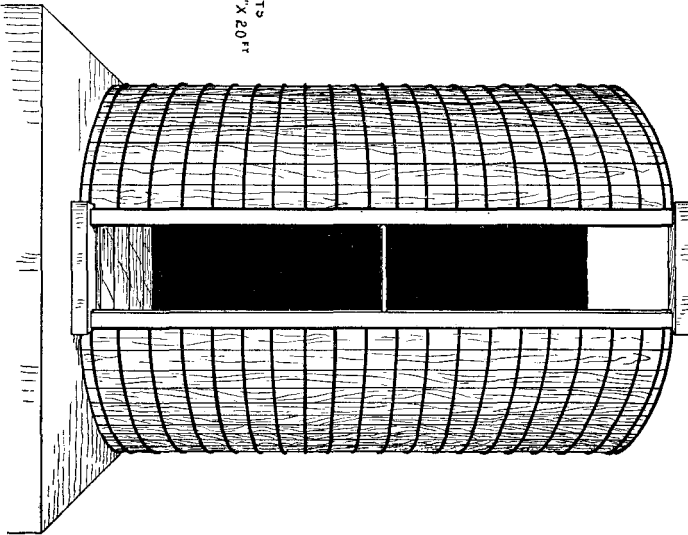
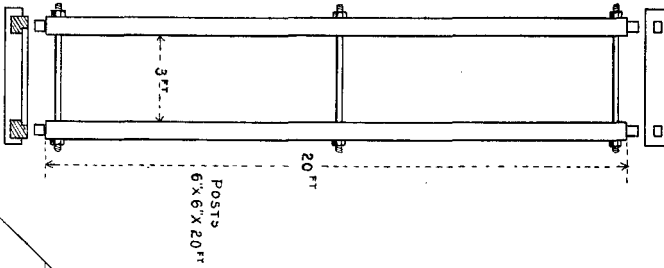
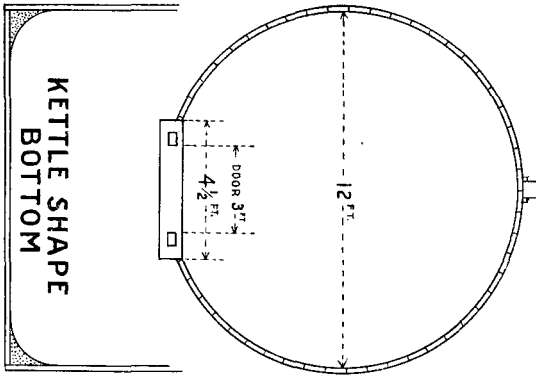
for feeding; and those were the years when our farming paid the best and when we could carry the most live stock.

Corn comes in on the dairy farm as the first crop in the rotation. The land, after having been in grain one year and in grass two years, is plowed about six inches deep either in spring or fall as is most convenient, plowing a rolling furrow which mixes the farm manure spread upon the green sward well with the soil from top to bottom of the furrow. In preparing the land for planting, the disk harrow is indispensable. The land should be stirred deeply and thoroughly, and worked until a fine seed bed is obtained. It may be, however, on the driest of corn soils, that the lower portions worked should be kept firm, but on the clay loam at "The Pines" every effort is made to keep the mellow condition as deep as possible. If sweet corn is planted for canning, the packers require that the seed used be furnished by them and they usually have several varieties, some maturing much earlier than others; the earlier the variety the smaller its growth. The dairy farmer will therefore choose as large a variety as he dares to risk in his locality.

If corn for grain and for the silo is wanted, then the same rule as to selection of variety should hold. If most or all of the ears are to be removed, the largest variety that has matured in the vicinity should be chosen. If the crop is to be ensiled whole, and that course is preferable, in my judgment, the Sanford or Leaming, and varieties of that class, should be chosen. The Sanford, a white flint corn, grows best on a somewhat heavy clay loam, and is to be preferred for farms containing such soil. The Leaming thrives best on the lighter soils and requires heavier fertilization. In planting, the distance apart for hills and rows will be regulated by the size of the variety, but I would plant no thicker for the silo than for the field crop. From six to twelve hundred pounds of high grade fertilizer may be used per acre, the former amount where land is in good condition, and where barn dressing is used. The latter quantity will be found to pay well on worn land, or where no manure is used. If the land is badly infested with witch grass, or weeds are exceptionally troublesome, planting in checks is much to be preferred. For two years we have followed this plan, and last season the hoe was not taken on to a four acre piece of our

corn, and although there was a plenty of witch grass in the spring, the ground was reasonably clean in the fall. By the cross cultivation, which is done deeply in the early part of the season, the land is more thoroughly pulverized and tillage is advanced.

On farms where much live stock is kept, or where it is desired to increase the number or to extend the work through intensive cultivation, the silo is a pre-requisite. Through its use the entire corn plant may be fed without waste. Because of the succulence and the palatability of silage, it helps in the digesting of other foods and is a direct conserver of production from the poorer roughages of the farm, as all animals will relish them better and consume larger quantities of them to good advantage when fed silage. Quite a few years ago, when building our second silo, we conceived the idea of having a circular stave silo with all the advantages of the square silo, and finally hit upon a plan which works nicely and which has been copied by all who have seen it who have since built silos. It may be briefly described as follows:



SILLO OF B. WALKER MCKEEN, FRYEBURG.

In the first place, a solid, level foundation is laid a little larger than the silo itself, only high enough to avoid any danger from surface water. The staves are sawed from any good lumber

(mine are hemlock, others are built of pine) two by four inches and of the length it is desired to have the height of the silo. Then three posts the same length are sawed six by six inches. Two of these posts are framed together, three feet or thereabouts in the clear by dropping them onto a sill of the same size and no longer than from the outside of each post. A plate of the same size and length is dropped onto the top of the posts, both sill and plate being secured by tenons and mortices. A groove, two by two inches, is cut on the outside corner of these posts, into which the boards used double for the door will securely fit, resting on each post two inches and coming just flush with inside of posts. If the silo is to be twenty or more feet high, the posts can be further secured by running rods through them just above the sill and below the plate. By using these posts in this way, a continuous door is secured, thus avoiding the disagreeable man holes found in most stave silos. Before beginning to build the silo holes are bored through these posts at points where it is desired to place the hoops, making them one-eighth of an inch larger than the hoops used. The first hoop should be within six inches of the bottom of the staves, the second eighteen inches above that, the third two feet above the second, and so on, extending them toward the top, using ten hoops in a twenty foot silo. The other post receives as many holes as both the door posts, bored in pairs as near as may be and allow of the turning of nuts on each. A circle is now drawn on the foundations, of the same diameter as the proposed silo, and the door posts set up on it at a point where it is desired to have the door, and securely staid. Then staves are placed around the circle, each one securely staid by nailing old barrel staves across and fastening to the posts and the staves behind it. Do this until one-half around the circle, then stand up the other post, which is called the binding post and which takes the place of a stave. Then continue until the opposite door post is reached. The hoops, usually of one-half inch round iron, are made in halves, with broad, level head on one end and threads, washer and nut on the other. They are put in by thrusting them through the door posts from the inside, then drawing around the silo and through the building post. Then, when they are turned up securely, a tight, durable silo

results, with a continuous door into which a man can walk without stooping. The door is made of any short pieces of one inch boards of even thickness and with straight edges, laid in double, with joints broken, and with light building paper between. This is the only paper used in its construction. As a finishing touch, take some thin cement mortar and bank up the staves about six inches on the inside, letting the cement come out a foot or so along the bottom. This insures a perfectly air-tight joint between the ends of the staves and the foundation, and prevents lateral pressure against the staves. A silo can be built in this way of the best of lumber for about one-half the cost of a patented silo of equal capacity.

It is too late in the day of silo investigation to make any argument in regard to best methods for filling. A simple statement will suffice. If sweet corn stover is used, it is best cut with a corn harvester and put in as soon as convenient after picking; if silage corn is used, it should mature so the most forward ears might grow; then in either case, it should be cut fine into the silo, without using undue haste or additional expense for labor, and with no more tramping than is required to keep it level while filling. If these general directions are followed, a light colored, dry, sweet silage will result, which will be a delight to the dairy herd and a source of pride and profit to the owner.

THE CLOVERS.

No part of the country is so well equipped for the home growing of dairy foods as New England, and particularly Maine. Each crop is made to supplement and feed the other, and, in the end, a great quantity and variety of foods result. The clovers are especially at home here, and because of their peculiar habits of growth and their richness in those classes of foods lacking in other crops, they should have great prominence on every dairy farm. The tillage and heavy potash fertilization given corn and other hoed crops fit the land for the use of the clovers, and when they follow these in the rotation they may be made to add materially to the value of home grown foods, and at the same time leave the land better than they found it. To use a homely phrase,—they work for nothing and board themselves.

Modern investigations in dairy feeding, by which we have learned that a wider ration may be fed than was formerly supposed, should give a great impetus to the production of home dairy feeds. The mow of early cut, well cured clover hay, properly blended with the corn silage in feeding, takes the place of grain, increases the amount of protein, and adds fertility to the land. But there are certain conditions necessary to the successful growing of the clovers. They never grow in the old grass fields. They do their work quickly and get out of the way for other crops. They are at home on farms where intense cultivation and short rotations are the rule.

I doubt if, under average Maine conditions, clover should be sown alone; but combined with the grasses, and sown early in spring, with a light amount of some nurse crop, it comes to its best quickly and makes a fine summer or winter feed. My judgment now is that the silo is the place for the corn and the mow or the paddock the place for the clover. As a soiling crop it fills an important place, when joined with corn and the grasses. This is particularly true where complete* soiling is practiced and where the close cropped pasture does not enter into the feeding.

In choosing varieties of clover one should be governed by the condition of his soil and the uses to which it is to be put. For the silo, or for soiling, the mammoth will be found useful, while for close clay soils, or for pasturage, the smaller red, the alsike and the white, are of great value. In a paper of this kind it would not be wise to go too much into detail as to cutting and curing clover. Suffice it to say that under all conditions and with all varieties, early cutting should prevail. But few of the heads should be allowed to turn brown. The curing should be done as much as possible in the bunch, always cutting it when the dew is off, tedding or stirring it, and then pitching it into bunches, there to stay till fit for the mow, except, possibly, once pitching over.

OATS OR OATS AND PEAS.

Of all the cereals that thrive on New England soils, oats are most to the manor born. They grow over a wider area, care less for frosts or floods, and fill an important place in a modern system of rotation. Their principal uses on a dairy farm are

as a nurse crop for the grasses and clover, to add variety and bulk to the hay mow, when cut for feeding green, and as a grain to take the place of wheat bran in the ration of the cow and the growing heifer. Many careful experiments have shown them to be more valuable, pound for pound, as a milk producer or as a promoter of growth, than bran. They are uniform in their content, and taken either as a fodder or as a grain, they form a link between the corn with its high starch content and clover with its richness in protein. If peas are added, for soiling, a larger amount is secured and a higher protein content results, but with the prevailing high prices of peas for seeding, and the fact that they have to be continually renewed in a mixture, together with the difficulties of harvesting, I very much doubt if there is much gained by adding them for the mow or the grain bin.

THE GRASSES AND THE MILLETS.

It might at first be supposed that a crop of so much value as the grasses should have been considered earlier in a paper of this kind, but I think a careful study of the situation will convince otherwise. Dairymen are constantly striving for a larger milk or butter production per cow, but it has truly been said that they should go further and strive for a larger production per acre. This is, I think, eminently true, as the per acre food production of a farm determines its value. If we observe closely, we shall see that in countries where the grasses are made, in any great measure, the basis of food production, the per acre capacity of land is small and the number of farm animals limited. It is only in countries where tillage is active and where the larger growing cereals are extensively cultivated, that we find the milk or butter product large per acre. Grasses are to be encouraged, but not to the extent of keeping them growing on a large proportion of the farm. A field newly seeded to grass, yielding from two to four tons per acre, adds much to the value of home produced dairy foods. The old grass field yields no profit, is a constant spot for the depredations of insects and the ravages of drought and, each year, pumps available plant food and organic matter from the soil.

The millets are drought resisting plants and on farms with light, sandy soil, they may be made to form a valuable addition

to the home grown foods. They thrive best in the heated portion of the season, taking their food when nitrification is most rapid. They may be used to supplement the hay crop, or as a partial insurance against drought, and for a short period they make a valuable soiling crop. Not differing particularly in kind or proportion of food nutrients from Timothy, because of their palatability, when well cured, they take a place in dairy feeding that the latter can never fill.

ROOTS AND TUBERS.

We are now approaching what may, in New England, almost be said to be an unknown quantity in dairy feeding, but which I believe may be made to play an important part in the dairy ration of the future. I am inclined to the opinion that, here, the practical feeder has been too prone to follow, blindly, the results of chemical analyses and the teachings of those who value food by its content of nutrient alone. That any article may have an indirect value, over and above its true feeding value, when used with other feeds, has long been a settled fact; that palatability and ease of digestion may bring results from it when fed alone that no chemist can measure, seems certain. A study of the rations of those who are feeding for records, discloses the almost entire absence of heavy concentrates, and the presence of succulence in roots, silage and other home grown articles. Neither is it to be assumed for a moment that the presence of roots in a dairy ration lessens the amount of milk solids or injures the flavor, or that butter made from cows so fed is in any way inferior in flavor, color or texture. With these principles settled, it may be well to treat each of the common roots and tubers briefly, in detail.

The potato has the greatest proportion of dry matter, and the largest amount of digestible nutrients, and because of the prominence of potato growing as a specialty in Maine, it assumes special importance. It compares favorably with good corn silage, although it contains slightly more nutrients. The small and generally unmarketable potatoes may be made to be worth more, fed on a dairy farm, than they bring on an average, at starch factories. This is particularly true on farms where corn is not raised extensively. They may be fed to cattle when tied

in the barn where nothing is liable to disturb them, without cutting, with no danger of choking.

Mangels are particularly desirable as a dairy feed as they have a high content of food nutrients and a narrow nutritive ratio, which is practically the same as pasture grass. They are very palatable and may be fed in large quantities, with the effect of narrowing the ration when much corn is fed, or in winter when the grasses and millets form a large proportion of the roughage. They can be raised cheaply and in large quantities on small areas, and as a crop to aid in making a farm largely productive in dairy feeds, they should be cultivated extensively. Rutabagas, for young cattle, fill a large place on many farms where but little heavy concentrates are fed. They narrow the ration when fed with ordinary farm roughage, add relish to the dry feeds, increase growth and promote health.

There are other succulent feeds, like squashes, pumpkins, etc., which may be used to good advantage in the fall, to bridge over from the flush feeding of one crop to another. They may form a part of the continual round of home produced foods and should not be overlooked.

EXPERIMENTAL CROPS.

While I have no faith in the wisdom of running after strange gods, and trying to exploit those crops whose value is yet to be worked out, I do believe that in the matter of experimental dairy crops, there is a field for large research. While we already have a great variety, and may produce each one of them in abundance, I would not sit down content, with folded hands, but while making the most of what we have, would have an eye for those which, by careful selection of seed and by thorough cultivation, may become adapted to our climate and our conditions.

Alfalfa is one of these experimental crops, and I expect to see the day when a start shall be made in its profitable production in Maine; a start from which shall spread a general cultivation upon our lighter soils, through which a vast addition may be made to our home grown dairy feeds.

Cow-pea hay, with practically the same nutrients and nutritive ratio as alfalfa hay, may in some systems of rotation and on

some soils, prove of value, either in itself or as a means for promoting the growth of other plants. The vetches have already got quite a hold in northern Maine, and rape may make a valuable pasture plant for the young stock of the dairy.

Maine is to become more and more independent of outside sources in dairy feeding, as her own resources are developed, and as her dairymen are brought into a fuller appreciation of their value, through the teaching of her Agricultural Department, the researches of her Experiment Station, and their own intelligent reading and thinking.

"My father left me no money, but he gave me an education and taught me to think," said an eminently successful man. The forces that make for education along these dairy lines now, have struck the key note of the situation and are bending their efforts toward that thinking on the part of our dairy people that shall bring them up from the role of empiricism, with its narrow horizon, onto the summit of broad thinking, intelligent working and grand results. May Heaven hasten the day!

MODERN METHODS OF ORCHARD MANAGEMENT AS THEY MAY BE APPLIED IN MAINE.

By E. CYRUS MILLER, Hillside Orchards, Haydenville, Mass.

OPPORTUNITIES FOR COMMERCIAL ORCHARDING.

As the result of a life-long interest in and study of horticultural matters, as well as being associated with my father in establishing and developing one of the largest orchard propositions in New England, I do not hesitate to affirm that the apple is not only the safest and most profitable orchard crop in New England, but that it is also, because of its wonderful adaptability to succeed on so many types of soil, next to the dairy cow, the most valuable asset to our New England agriculture.

In no state that I have visited do I find greater opportunities for orcharding than in Maine. There is an abundance of cheap land, thousands of locations that have the atmospheric and surface drainage that is so essential in establishing our modern orchards, and soils and climate that develop a product of fine appearance and high quality. Also the gateway to the export



Harvesting Apples in Orchard of E. Cyrus Miller, Haydenville, Mass.

market is on your own coast, while the home markets of the eastern section of the United States are made up of the most discriminating and appreciative class of consumers in the whole country.

I verily believe, that as a broad and general proposition Maine offers greater advantages for apple growing and larger financial returns for the capital and time invested than does California with its oranges.

RENOVATION OF ORCHARDS AND REDUCING NUMBER OF VARIETIES.

As the result of an orchard survey in your state it is most evident that apple growing, in common with most other lines of agriculture, has suffered greatly from the development of manufacturing industries and the consequent immigration of people from the country to the large towns and cities; hence, as in many other sections of New England, one finds many old orchards in various degrees of physical condition; by reason of neglect, associated with starvation and natural decay. Some of these orchards may be renovated by the use of some judicious treatment but many of them are beyond hope.

Whether the orchard may be renovated profitably will depend on (a) its age and physical condition, (b) location or site and (c) the variety. The apple tree is such a wonderful tree and has such great recuperative powers that almost undreamed of results may be accomplished by intelligent treatment. This treatment consists in pruning,—removing all dead and broken limbs, and native sprouts. As few large limbs as possible should be removed, and wherever they are cut, the wound should at once be healed with lead and oil. Let this process of pruning be extended over a season of three years before it is hoped to get trees back into proper shape and form. The trees should be sprayed and all loose and shaggy bark should be removed. This will make spraying more effective and likewise add to the physical appearance of the tree and of the orchard.

Plant food must be provided or the physical condition of the soil about the trees must be improved so that the latent fertility of the soil may be available for plant food. In no known way can plant food be made more available than by plowing and

harrowing the ground about the trees, though if the roots are found near the surface very shallow plowing should be practiced. Spraying must be regularly practiced. If the trees are infested with scurfy, oyster shell or San Jose scale, they should either be sprayed when dormant with "Sculecide" or given the lime-sulphur treatment. This treatment which I have suggested has been fully tested in many sections and has never failed to bring satisfactory results when persisted in until the effect of previous neglect has been overcome. In these old orchards the trees are frequently too closely planted. In such case *every other* tree should be removed. Where the orchard is found to be badly located as far as surface drainage is concerned, one of two things is necessary, to properly drain the land where the trees are located or to at once cut them down. Forest trees may flourish in a swamp but profitable apple trees, never.

Varieties are largely a matter of locality and of individual taste. Too close planting, and the planting of too many varieties, were two of the most serious mistakes formerly made. For the best results the average orchard should not consist of over four varieties and those of the kinds that are the best adapted to that particular locality.

STARTING THE ORCHARD.

In starting an apple orchard it is of prime importance to have it well located; that is, on land that is well drained, either naturally or artificially, likewise on such soil as may be depended on to produce reasonably good crops of either corn or potatoes. It is as a rule economy and good wisdom to take one's best land for the establishing of an orchard, for such land may be more easily tilled and it is the tillage or cultivation that is to create an environment in which the trees may more quickly grow and become able to produce profitable crops of fruit. This, I believe, is the one great problem our eastern fruit growers have got to solve, surely before outside capital may be influenced to invest money in apple orchard propositions. When we can get better results in ten years with a more intensive method of treatment than our fathers have gotten in twenty or thirty by their method of semi-neglect, then we shall have solved a

most vital problem in apple growing as it applies to New England. Orchards may be planted upon newly cleared timber tracts, the trees being planted carefully among the stumps and the stones. One portion of our orchard is located on such a piece of land and the trees are growing finely. I may say that they have been mulched heavily with stable fertilizer and are dug about frequently during the growing season. Good nursery trees are imperative. Buy of a good reliable dealer either at home or abroad. Buy of one who raises his own trees for the chances are thus better for grafting good healthy trees, true to name and variety. Get two-year-old trees, straight, moderately low headed, healthy and vigorous. A little money saved on fruit trees is sometimes dearly spent. For varieties for winter use I can suggest nothing better than the Baldwin, Spy, Greening and King, and for fall, Wealthy, Duchess, Wolf River and McIntosh. Winter varieties should be planted at least 40 feet between rows and 35 feet between trees. This will be found fully near enough in twenty years if the orchard has the best treatment. Early bearing varieties may be planted twenty-five feet apart each way. Interplanting early sorts with standards is entirely feasible when operations are conducted on a large scale, but for the average farmer fruit grower the planting in separate block is the most desirable method. The young trees should be carefully planted, all broken and macerated roots should be removed and the holes for the trees should be sufficiently large so the newly planted tree may have its root system extended in a perfectly normal manner. The upright on the young tree should be cut off, likewise all lateral branches to within two or three buds of the main stem.

SECONDARY CARE OF A YOUNG ORCHARD.

This secondary care consists in keeping the young trees properly shaped and heading back about one-third of the growth each year as long as the upper branches may be comfortably reached. The general form of a young tree should be almost vase-shaped. The borers should be looked after sharply. They must be dug out, either with a sharp knife or a flexible wire, or with both. If mice or rabbits are present the young trees should

be protected by tin, wire netting or even old newspapers. However, don't have any of these too close to the trees.

Spray young trees with "Sculecide" or whale-oil soap emulsion. This will invariably add to the vigor of the tree. Above all, make your trees grow, which can be done, either with the cultivation or manure mulch system.

CULTIVATION VS. OTHER METHODS.

This topic implies a controversy. While I know full well that the natural condition of much of our New England orchard lands is such that it may not always be feasible to till constantly, nevertheless, as an apple grower striving for methods which shall bring the most profitable results, I am fully persuaded both through experience and observation that cultivation should be the rule and all other methods, such as manure and grass mulch, are but substitutes to be used wherever cultivation is not possible or feasible.

Hogs are good cultivators in orchards where plowing may not be feasible, likewise pasturing an orchard with sheep is beneficial, but in every case the orchard should be the first consideration and the stock the second. As food for thought for those who may be interested in this vital question, I would quote literally the objects and aims of tillage as set forth by one of the leading living authorities on the subject, Professor F. H. King.

(1) "To secure a thorough surface uniformity of the field, so that an equally vigorous growth may take place over the entire area.

(2) To develop and maintain a large effective depth of soil, so that there shall be ample living room, an extensive feeding surface and large storage capacity for moisture and available plant food materials.

(3) To increase the humus of the soil through a deep and extensive incorporation of organic matter, so that there may be a strong growth of soil micro-organisms and the maintenance of a high content of water-soluble plant food materials.

(4) To improve the tilth and maintain the best structural condition of the soil so that the roots of the crop and the soil organisms may spread readily and widely to place themselves in the closest contact with the largest amount of food materials.

(5) To control the amount, to regulate the movement, and to determine the availability of soil moisture, so that there shall never be an excess or deficiency of this indispensable carrier of feed materials to and through the plant.

(6) To determine the amount, movement and availability of the water-soluble plant food materials present in the soil, so that growth may be both rapid, normal and continuous to the end of the season.

(7) To convert the entire root zone of the soil into a commodious, sanitary, living and feeding place, perfectly adapted to the needs of the roots of the crop and to the soil organisms."

PRUNING. THE TWO ESSENTIALS.

There are really but two things to keep in view in pruning, viz., to properly shape the tree so that it may be more of the modern type of low headed, open center tree, and to let in the sunlight and air. With these objects accomplished we have done practically all we should aim at in pruning a tree. Some have thought that pruning renders a tree more fruitful but the fact is that a tree that is well nourished will bear well if never touched by knife or saw. It is however true that the type of fruit which nature produces on the unpruned tree is not what the apple dealers desire in their commercial operations. Fruit of good size and of attractive color is the fruit that should be striven for. To get this size, color and quality we must let in the sunlight. The sunlight must reach all the leaves as well as the fruit, for the leaves cannot transform the sap into the necessary ingredients to make luscious fruit unless there is sunlight. Hence, any country that has a great amount of cloudy weather cannot produce the highest grade of fruit; likewise is this an important reason why our uplands are the most desirable for orchard lands. Our own orchards have but an elevation of a few hundred feet above the Connecticut valley but many a day in the summer season when it is perfectly clear upon our hill tops it is foggy and hazy beyond in the valley.

From the first planting of the tree we must train it so it will have an open top when loaded with fruit. That will be the vase or goblet-shaped top. As I have before mentioned, to secure

this we should, at the time we plant the trees, cut the main stem off where we want to form the head of the tree. From three to five limbs should be allowed to start out on different sides of this cut-off trunk. These limbs, when loaded with fruit, will not bend together, as in the straight central stem top but will spread apart, thus exposing a larger surface to the sunlight. Also, these limbs must not be allowed to grow one above the other. Pruning is more of an art than any other part of apple growing and mere words cannot teach the art any more than painting may be taught by words. It is surely a most fascinating part of orchard work, for it is here that the hand of man steps in and completely changes the natural tendency of the apple tree. Instead of producing seeds and a minimum amount of edible matter, the tree is made to produce the smallest amount of seed and the largest amount of the fleshy part of the fruit.

SPRAYING; THE NECESSITY OF THIS OPERATION.

Those who may be acquainted with the success and prominence of the potato industry in the State and likewise know what a prominent part spraying has played in developing that industry, ought to be most easily convinced of its merits when applied to the production of fine fruit. Cultivating the ground, feeding the trees and pruning them so that they may have an abundance of God's glorious sunshine are most essential in apple culture, but today with the great prevalence of insect and fungous pests, spraying is most necessary and it is, in fact, one of the prime essentials in producing fruit of a high grade. I would assert that spraying will add fifty cents per barrel to the value of one's crop, besides the greater pleasure in handling fruit more free from apple worms and fungous blemishes. To many the operation is a bugbear, but it is like many another mental and physical problem, as one gets close to it the mountain becomes a mole hill. Accept the premises that no operation involved in fruit growing adds so much value to the product, also that with the relatively cheap and efficient spray pumps now on the market and with the bulletins of experiment stations so easily available, there is not much left but for the apple grower to go to work and spray his orchards. Two sprayings, where orchards are located on high ground ought to entirely eliminate

fungous troubles and reduce the ravages of the codling moth to a small per cent of the crop. Bacteria troubles and the "railroad worm" are about the only things that are not amenable to spraying. Use "Sculecide" for all scale insects and for cleansing and invigorating trees, and use Bordeaux and arsenate of lead for apple scab and all kinds of chewing insects, amongst which are the apple worm and all leaf-eating caterpillars. The apple maggot or railroad worm is in many sections a bad pest. The apple maggot hatches from a small fly which deposits her egg under the skin of the fruit at almost any time during the growing season. The little worm hatches and mines or railroads through the apple in every direction and practically ruins the fruit. This insect is peculiarly difficult to fight. It cannot be poisoned hence all fruit must be quickly gathered and fed to stock or destroyed. I think the trouble can be somewhat controlled by withholding nitrogenous food from a variety of trees infested with this pest and adding potash and phosphoric acid. The reason for this is to make the fruit more firm. Ravages of this insect pest are more prominent some seasons than others. Fire blight or twig blight is a disease of bacterial origin and the only known remedy is the removal of the blighted wood.

HARVESTING APPLES.

This is largely a business proposition. Today it is pretty generally conceded that the method used in harvesting the crop is almost as important as the method of producing the same. One of the fundamentals in the proper harvesting of apples is to be ready with an ample supply of packages, either boxes or barrels, likewise a proper supply of equipment in the shape of ladders, picking baskets or bags and a corps of the best pickers available, so that when the picking season arrives the work may be done in the easiest, cheapest and quickest manner. When to pick is a question each grower must determine for himself. It is a good rule for the average apple grower to follow, to pick one's apples when a little underripe, rather than to leave them on the trees until fully or over ripe. When fruit is of a good size and fairly well colored it may be considered the proper time to begin to pick. There are some very important reasons why it is desirable to pick as early as possible. Early picking

reduces the danger from heavy rains and wind storms that frequently occur at this period of the fall season. Early picked apples will keep longer than those that are more mature, and again, a grower who begins operations early usually has the choice of the best pickers in that neighborhood. I would not underestimate the importance of having the fruit nicely colored and ripened when picked, but I believe that before we can attain the best results we must pick over our trees two or three times. This is the method followed in the far West and is the one we must adopt when some of our other methods more closely resemble those practiced in these noted apple producing sections. Apples should be handled carefully. The fruit spurs should not be broken, likewise care should be exercised in placing ladders so that the trees may not be injured. In my opinion apples should be placed in packages as soon as taken from trees and then removed to some cool, sheltered place where they may at a later time be graded and packed in a more leisurely manner. Nothing is gained by too great haste in handling fruit. A little may be saved in expense but this will be more than overcome by the lessened value of the fruit.

Dealers are becoming more critical as to the manner in which fruit is handled and the best way will be found to be the cheapest.

SORTING AND MARKETING APPLES.

The grading of apples is very important from every point of view. For many reasons it is better not to sort and pack fruit until it is sold; then the buyer may do this work and relieve the owner of all responsibility in the matter. The buyer frequently has a crew who have become expert in handling fruit. A sorting table or tables should be provided. The same should be about waist high, four feet wide and six or eight feet long. There should be a ledge around the top of the table to hold the apples and also to hang sorting baskets on. Such tables will accommodate from two to four barrels of apples each and six men may work comfortably at one of them. Six men sorting, one facing up and a header should put up from 120 to 150 barrels per day. Proper grading requires good judgment and considerable experience, and the question as to whether a certain apple should be put into the first or second grade is largely a

matter of personal opinion and judgment. As a rule it is more important that a package of apples should be uniform than that they should be of any certain size.

In my opinion a well drawn apple bill to regulate the grading, packing and marketing of fruit would be of distinct advantage to the apple industry of the State. The object of such bill should be largely educational and fines and penalties should be only the last resort. The successful marketing of fruit calls for quite a high order of intelligence. Any one may hit the market right on one particular season, but to be uniformly right in forecasting conditions and prices calls for a generous knowledge of the extent and quality of the crop at home and abroad as well as a thorough understanding of the business and economic conditions that prevail, which enter into the making of price in this commodity of trade. The average grower would better sell his fruit at the very first opportunity and thus be relieved of all responsibility in the matter. The careful, painstaking orchardist should use every effort to get a good price for his product, being entitled to the same for the extra care and attention that he has given to it. A storage building in proportion to the size of our crop is a good investment and will be called into use three years out of five. Sometimes it will pay for itself in the saving of the profits on one year's crop.

CONCLUSIONS.

The modern methods of orchard management as contrasted with methods either formerly used, or unfortunately too much in use at present, are simply methods which appeal to the common sense of every investigating and inquiring mind. They are methods that must be adopted in order to conform to the changed condition of things. The growing of apples is a special line of work, and in the final analysis is an art, a science and a business. A fair measure of success may be attained by combining the growing of fruit with the dairy business or with the growing of other farm crops, but the marvelous success that our western fruit brethren have attained ought amply to demonstrate to us that the best results are to be secured when our attention is concentrated on one line of work and thus we may learn to do that one thing well. I believe that each of our New

England States should do even more than they are at present doing to promote and foster the development of the apple industry. I believe that each state should establish and maintain a series of demonstrations showing the practical feasibility of renovating old orchards, also a series of demonstrations showing the profitable nature of present day orcharding by up-to-date methods. My own faith is intensely strong in the possibilities of apple growing, and in my orchard work and with my pen and with the spoken word I would use all the enthusiasm, sincerity and common sense to demonstrate this fact that a minister would in preaching the gospel of religion.

A PECULIAR APPLE SITUATION.

By D. H. KNOWLTON, Farmington, Maine.

MAINE IS GROWING APPLES.

Little by little, not as they are booming the industry in the newer Western states, the farmers of Maine have been setting fruit trees. In a recent trip across the country, it was a surprise to learn the extent of the industry. Everybody was growing apples, some having a hundred trees, some two hundred and from this up to two thousand trees. Not a farm did I pass where there were not apple trees in the orchard, in the pasture, by the roadside—apples, apples everywhere. A large proportion of the trees were in bearing while many were just coming in. Almost without exception these farmers were setting more trees year after year, so that for years to come we may look for an increase in the quantity of fruit produced in the State. This increase will not be rapid, but just the same as in the past it will be a steady increase. Putting it in other words, Maine is growing apples. The fact has also been established that Maine is growing the best of apples, though it is often difficult to find them in the New England markets.

The industry is now well established. It is full of promise for the future, since with the steady increase of the orchard there has been a corresponding increase in the care of the trees, the culture of the soil and the handling of the fruit. Under

these favorable conditions other matters seem to demand our attention, and more and more they will be coming before us until they are settled in a practical way. To perhaps the most important of these, attention is now invited.

DIFFICULTIES AND LOSSES FROM THE PRESENT SYSTEM.

Good authorities on the subject claim that the State in 1907 produced as many as 2,000,000 barrels of marketable apples, although it is not claimed by any one that anywhere near that quantity of apples were sold from that crop. Anyway, it is safe to say that as the young trees come into bearing there will be still more fruit in the future. Our seasons are short for the picking and no end of difficulty was found in securing help enough to harvest the immense crop. In many instances it was not possible to get it harvested before injurious frosts came. Much fruit was lost in consequence. The growers were met then by the need of good storage of some kind. Few of them could safely store more than one or two hundred barrels of apples. The remainder of the crop was stored in sheds and out-buildings and much fruit was injured for market after the farmers had been to the expense of harvesting, while many permitted the apples to remain on the trees. Putting it in another way, there was probably safe storage for less than one-half of the crop grown that year. The only other outlet was to force the fruit upon a dull market, from which many proved to be sufferers.

So large has the industry already grown that the farmers at the present time are not in a situation to handle the crop economically. At present the larger part of the fruit crop must be sold before the cold weather sets in or it will be frozen up and ruined. Forced upon an unwilling market at this early season the farmer is obliged to sell at a low price. The buyers know the fruit must be sold before the cold weather and the farmer is helpless. There are so many apples the buyers can get all they can take care of. If they can not find them in one locality they can go to another, where fruit is found in abundance. This condition keeps the price down and the farmers are competing against themselves very much to their disadvantage.

This condition is made still worse by the fact that a large part of the marketable fruit grown is of the late keeping varieties

and not in edible condition for several months after it is offered for sale. There are Baldwins, Ben Davis and other late keeping varieties that under these circumstances are forced into the market before the first of December. Thousands of barrels of these were sold in 1907 and sent forward to the markets, either somewhere in the states or to some foreign port. They were unripe and not fit for consumers for two or three months later, and somewhere all this time it was necessary to hold them in storage. Storage around the cities is expensive to the growers, for the cost of that is sure to affect the price of fruit at the farm. It is a ruinous way of doing business, and if it continues will grow worse for years to come.

LOCAL STORAGE WILL PROVIDE A REMEDY.

It seems to the writer that the great need in the present case is in some way to provide for local storage. The individual farmers may do this, but we very much doubt the wisdom of this, though some are doing it successfully. Some have advocated the erection of large storage houses at Portland where the fruit would be nearer the market. Theoretically this all seems very well, but a storage house there would have to be operated very differently than one situated in the interior of the State where ice may be had at a nominal cost, and in many cases would not be needed at all. Some years ago at a Winthrop fruit meeting the writer proposed the erection of large storage houses in the fruit growing sections of the State alongside of the railroad tracks. The plan then proposed was in a way to make them co-operative affairs, yet controlled by a stock company. Properly made it is believed that the use of ice would not be found necessary, but if it should be it could be obtained at a low price, so as to make its use comparatively inexpensive.

It is a well established fact that the sooner fruit can be cooled down after it is picked and put into storage the better it will be. When fruit is stored in sheds and outbuildings the shrinkage is considerable and its keeping qualities are somewhat affected thereby. The best plan therefore would be, as soon as possible after the fruit is picked, to take it to the store house, cool it down and have it stored. The best time to do this would be at the picking, as the fruit would then have to be handled but once.

This cost of handling fruit in quantity makes quite an item of expense to the farmer, of which he is hardly conscious, since it has always been done in that way. If the team is used in the early morning for this work it would not materially interfere with the picking, and at the end of the season would cost the farmer less than the usual way of storage and then sending the fruit to the station for shipment.

This plan would involve the expenditure of more money than most individual growers would have, but collectively there is money enough for any such enterprise. A stock company, organized particularly to aid its stockholders could be made to pay liberally, for when the storage house is not needed for fruit there are other crops from the farm for which storage would be needed. In other words if it was not needed for fruit the building would be worth all it cost for other storage.

OPPORTUNITIES OFFERED BY THIS PLAN.

Better Packing. No one at the present time is satisfied with the way in which our fruit is packed. There are some who are doing nice work in this direction, but the fact that leading men interested in the industry have considered it necessary to ask the legislature to pass a law requiring good packing of fruit under heavy penalty, clearly points to something that is wrong. The storage plan proposed would afford the employment of expert packers. Of so much importance are they considered in the far West that all the apples of the Hood River region are sorted and put up by them, and they are held responsible for the quality. The immense price these apples are selling for even in Maine tells us plainer than words that before our fruit can hold in our own markets the place it should, more attention must be paid to skilful packing and sorting. Apples brought to the storehouse could be sorted and packed to meet the demands of the consumers.

Placed on the market when ready. Most growers have several varieties of apples. In some cases it would be wiser if they had more but in most cases they have too many. The different varieties are maturing at different times. Collected in storage in large quantities, it would be an easy matter to have the fruit forwarded when it was in the best condition for market.

In this way the fruit would often bring more than when a hundred or two barrels of different kinds are offered at the same time. The Wealthy and McIntosh the buyer could sell at once, but the Ben Davis and Roxbury Russets he would have to hold in some way until the market was ready for them. The holding of these costs and reduces the market value of the entire lot of fruit offered.

Buyers come to our State for apples. They have found it necessary to employ local agents to drive around and buy the fruit as needed. In some cases these agents have been paid ten cents a barrel and sometimes more, and a large part of the apples are sold in some such way. This ten cents would go very far towards paying the storage and packing of the fruit. We do not realize how much it costs to sell our fruit crop, and if we can do anything to save this cost to the grower it would be a great help in handling the fruit. Where quantities of the fruit are stored by the growers in a single storage house, the manager could be reached by a message from the commission man or shipper, and there would be available enough Baldwins or other varieties for a carload any day. They are stored by the track and it is but a small job to load a car. In this way the dealer gets the variety he wants, he gets it without sending a man out for the fruit, and he is sure of getting good fruit. To secure this now he not only has to have his man buy the fruit but he must have immediate charge of the packing as well.

The care of the inferior fruit. In recent years there has been a great waste of fruit which was hardly good enough to sell. The evaporated fruit that is sold in the State comes from New York state and our waste fruit is fed out to the stock or allowed to rot on the ground. At a storage house, such as that under consideration, this class of fruit could be evaporated, canned or made into vinegar. In New York state the growers find this sort of work profitable and we do not see why the same thing done in Maine, where we have the fruit, the brains to use it and the money necessary to do it, would not be profitable.

Barrels and boxes. The cost of these has been an important item in the fruit business the past few years. More than this, part of the time it has been impossible to provide barrels. The storage corporation could help the farmers by handling these so

as to make the cost as low as possible. It would do no harm if there was something made from doing it, for the growers would be the company and the profit would go to them instead of to the man who now makes or furnishes the barrels.

There are still other advantages from this way of handling and selling the fruit. The situation, however, calls for serious and active thought, if apple growing in the future is to give the farmers the profit they deserve from their industry. The situation is before us, and among the other plans that may be presented we commend the local co-operative storage by the growers themselves. In this way they will offer the market the best there is available; they will offer it when it is ready for the market; they will offer it in the most attractive form. Last, but by no means least, it will drive inferior Maine fruit out of the markets, because all the time the best will be there to take its place.

METHOD AND COST OF RAISING THE DAIRY CALF.

By Professor J. M. TRUEMAN, Storrs, Conn.

Mr. Chairman, Ladies and Gentlemen:

For a number of years I have travelled across your State to visit my old home in New Brunswick, but this is the first time I have had the pleasure of attending one of your Institutes and speaking to a Maine audience. I feel at home here, and am pleased to be here, because your soil and climate and your type of agriculture are similar to those of New Brunswick with which I was familiar as a boy and as a young man.

I am to discuss with you today the rearing of the dairy calf, from birth to maturity. Every year the need for good dairy cows is becoming more imperative. There was a time when it was possible to buy cows at a moderate price, but of late years the price has steadily increased until it is difficult to buy a first-class cow. Under these conditions the most wide-awake dairy-men have found it pays them best to raise the heifer calves and keep up their herds by their own breeding. Having decided on this method of keeping up the herd it becomes extremely impor-

tant that the proper sire shall be used for breeding purposes, and that strong and vigorous calves shall be dropped.

The sire to be used must be carefully selected. He should be not only a "pure bred," but a *good* "pure bred." It is not enough that his name is written in a book and that he has a herd book number. The producing power of his dam and his grandam should be known. Of what value is registration unless it stands for production? We keep animals for the money we can make out of them, and not simply to breed long lines of fashionable families. We have spent too much money buying pedigrees that did not stand for anything. The various cattle associations are to be praised for the introduction of advanced registry systems whereby the buyer may know what has been accomplished by the ancestors of the stock he wishes to buy. Get a bull then whose dam has been a good producer of milk or butter, and whose grandam on his sire's side was a great producer. Don't go back over three or four generations of *registered scrubs* to find a famous animal in the pedigree. Look for excellence close up to the animal you are buying, or the one you are going to breed from.

In order to obtain vigorous calves the cow should be well fed before the calf is dropped. The common practice of stopping all grain feed when the cow goes dry is not a good one. The cow must be well fed if she is to develop a strong, vigorous, and healthy calf. The feed may be of the same nature as when she is milking, a good protein ration. Two weeks before calving, feed liberally on wheat bran. This is cooling to the system and furnishes excellent material for building bone in the young calf.

After the calf is dropped it should be given new milk from its dam for the first few days and preferably for two weeks. If the cows are Jerseys or Guernseys it is well to limit carefully the amount of milk given the young calf, as the rich milk of these breeds frequently gives the youngster indigestion. The milk from Ayrshires or Holsteins is better to raise calves on than that from the Jerseys or Guernseys. If the cow has been well fed before freshening, the calf is more likely to be vigorous and to withstand the ills of calthood.

The calf may be fed from six to ten pounds of new milk per day for the first two weeks. After that gradually replace new

milk with skimmed and give fine hay and a handful of grain after each feeding with milk. By this method the calf will eat at six weeks old about 10 pounds of hay, 10 pounds of ensilage, 2 pounds of grain and 120 pounds of skimmed milk per week at a cost for the week of 35 cents. The table below shows the amount eaten by an average sized Jersey heifer calf in three months.

Week.	New milk.	Skimmed milk.	Hay.	Ensilage.	Grain.	Cost.
1st.	30	.....	.....	.....	.....	\$0.60
2nd.	75	.....	.....	.....	.....	1.50
3rd.	80	.....	.....	.....	.....	1.60
4th.	40	45	5	.....	.....	0.93
5th. . . . .	.....	100	10	.....	2	0.31
6th. . . . .	.....	120	10	10	2	0.37
7th. . . . .	.....	120	15	10	3	0.43
8th. . . . .	.....	125	15	15	4	0.46
9th. . . . .	.....	125	20	20	5	0.53
10th. . . . .	.....	125	20	20	5	0.53
11th. . . . .	.....	150	25	20	5	0.62
12th. . . . .	.....	125	25	20	6	0.58
13th. . . . .	.....	100	25	25	7	0.55
Totals	225	1135	170	140	39	\$9.01

The fourth month the food eaten amounted to. \$3 15
 The fifth month the food eaten amounted to. 3 30
 The sixth month the food eaten amounted to. 3 50
 The seventh month the food eaten amounted to. 3 60
 First three months. 9 01

Total for seven months. \$22 56

Allowing five months on pasture, and feeding some grain all summer, the cost for the first year will be about \$30.00. If the calves are born in the spring they must be fed in the barn or in a field close to the barn where they can be given some extra attention. It will not do to turn calves out when less than one year old and expect them to grow properly on ordinary dry pastures, without feeding them some grain.

The second year's feeding of heifers is costing the Connecticut Agricultural College about \$30.00, making the heifers cost for feed alone at two years old \$60.00. This figure is arrived at by allowing \$16.00 per ton for hay in the barn, \$4.00 per ton for silage and \$30.00 per ton for the grain mixture. The new milk was charged up at 3 1-2 cents per quart and the skimmed milk at 20 cents per hundred weight.

If we figure the heifer to be worth \$5.00 when dropped, and consider that the manure has paid for the labor of taking care of her she costs us \$65.00 at two years old. This does not take account of the money invested in buildings and equipment. This seems a high price to pay for a two-year-old, but it must be remembered that the farm crops have been sold to her at a good price, and that she is well bred and has been well developed and is likely to be worth more than the ordinary scrub heifer. If the heifers do well and are large and vigorous, they may be bred so as to freshen at from two years old to 30 months; probably the latter age would be better as a general rule. In that case six months extra feed will be charged to the heifer before she begins her life work.

It is important now to know what would be expected from such a heifer in order that she may prove a profitable investment. If she gives 5,000 pounds of milk during her first year of milking and it is sold on a butter fat basis it would have to test 5% in order to give 250 pounds of fat. Two hundred and fifty pounds of fat at 30 cents per pound equals \$75.00; 4,000 pounds of skimmed milk is worth \$8.00, and her calf is worth at least \$2.00, making her total product for the year worth about \$85.00. If she should give 6,000 pounds of milk testing the same, her product would be worth \$101.00. Seven thousand pounds of 3.5% milk would be worth \$86.70 on the same basis, and the same amount of milk at 3 1-2 cents per quart would be worth \$115.00, and adding the calf at \$2.00 would make the product worth \$117.00.

By this method of figuring it is easy to see that we must get pretty good heifers if they are to pay for the cost of raising them by the time they are five or six years old. A heifer that costs \$65.00 to raise to 2 years old will need to give pretty close to \$100.00 gross income each year for the first three years she

milks in order to pay for what she eats each year and leave enough over to pay in three years for what it costs to raise her. It will cost pretty close to \$75.00 per year to feed her, leaving \$25.00 each year to go toward paying for her. All of the heifers raised will not turn out well, and some of them will have to be sold to the butcher at a loss. This will add something like \$10.00 to the cost of those that do turn out well, so that the figure kept in mind for raising good heifers to 2 years old should be \$75.00.

Having reared our heifers and milked them for three years we should find that they stand clear on our books at five, or at the most, six years old. We then have strong, healthy cows that are producing an amount of milk that makes them profitable. They have paid us a good market price for all we have fed them of our farm products. They have been producing fertilizing material to keep up the farm and enabling us to raise more and larger crops. We are doing a safe, permanent business, that is improving the farm rather than depleting it.

The cows that have paid for themselves by the time they are six years old are just coming to maturity and will be able to do their best for the next five or six years. They will produce from forty to sixty dollars each year more than it takes to feed them, and are worth \$100 of any farmer's money.

The feeding of dairy cows has become a serious matter in these days of high prices for feeds. Too many farmers seem inclined to cut down the grain ration because they cannot afford to pay the price. It would be better to cut down the number of cows; get rid of all that will not pay well for extra grain and then feed the remainder liberally. A large part of all food eaten by the cow goes to keep up her physical system and to do her work, and it is only the excess that is returned to the farmer in the form of milk. It pays therefore to feed only such cows as will return the excess in milk and not lay it up on their ribs in the form of fat. Having secured such cows, the more feed they will eat the better.

The medium sized cows in the Connecticut College herd this winter are being fed about as follows: Silage, 35 pounds; hay, 12 pounds; corn meal, 2 pounds; gluten feed, 2 pounds; bran, 2 pounds; cottonseed meal, 2 pounds.

Good clover hay is much more valuable than timothy or red-top. Clover cut early and well cured will materially decrease the amount of grain used to keep the cows up to a full flow. The proper amount to feed each cow is largely determined by a study of the weigh sheet, which records the amount of milk given each day. If a cow eats her feed up clean and increases in milk flow as the amount of feed is increased it is deemed safe to feed her more grain. If the milk flow does not increase the grain ration may be carefully reduced. When the cow begins to dry off preparatory to dropping another calf the grain should be kept up to five or six pounds per day in order that the fœtus may have proper nourishment and the cow be in good condition when she begins her new year's work.

REPORT OF PROCEEDINGS
OF THE
State Dairy Conference
AND
ELEVENTH ANNUAL MEETING
OF THE
MAINE DAIRYMEN'S ASSOCIATION,
DECEMBER 8, 9, 10, 1908.

The annual State Dairy Conference, held at the Opera House, Dexter, Tuesday, Wednesday and Thursday, December 8, 9 and 10, was one of the most successful and interesting conferences ever held. A large and appreciative audience was present at every session, and the exhibit of dairy products and appliances, especially the large display of market milk and cream, was very attractive and instructive.

The meeting was opened Tuesday evening at 7.30, with President F. S. Adams in the chair.

ADDRESS OF WELCOME ON BEHALF OF THE
BOARD OF TRADE AND CITIZENS OF DEXTER.

By E. L. PALMER, Dexter.

*Members of the State Dairymen's Association; Ladies and
Gentlemen:*

It is my pleasant duty this evening to extend to the visiting association, for the Board of Trade and citizens of Dexter, the more formal words of welcome. I am not skilful in the coining of happy phrases for such occasions, and I would hardly dare undertake this were I not aware of the very cordial reception and welcome that will be extended to you by our citizens wherever you meet them. You come to us actively working for the common good, and because of your progressive spirit we gladly welcome you to our town. You are a branch of that greatest industry of our country, agriculture, and, fortunately, that branch which during the past decade has shown the greatest work for progress. Our country for a century has been too busy to study very closely its surrounding conditions and to look very carefully to the future. The great abundance of our natural resources overwhelmed us for generations and forbade us to see that those very resources, enormous as they were, must sometime fail. You know that our forests have been largely cut over and the timber sold; that the natural fertility of the soil has to a great extent been exhausted and many of our farms abandoned; and those public utilities of inestimable value are now in the hands of a very few. Now that these things have taken place, we are beginning to sit up and take notice. Our fathers of the past generations were very prodigal of the natural resources of the country, and today we are face to face with that strange paradox that the very things that have enriched us have at the same time impoverished us. But with our awakening we are beginning to realize that we must work and work intelligently. While in the past our wit and our great natural resources have made vast fortunes, in the future only intelligent work and untiring industry will win a competency.

And your organization comes to us at this time banded together to advise ways and means by which it may better carry on one of the industries which must furnish sustenance to the great mass of the people of our country and coming in this progressive spirit, and representing the interests that you represent, we most cordially welcome you to our town. It is peculiarly pleasing to us also that you meet here for your deliberations, because it affords such a splendid opportunity for our own citizens, with no expense, to hear and to see the latest things in this industry. We have in our community, we believe, some of the finest farmers in the State, some of the most progressive farmers. We have model places of business and most excellent business men. We have manufacturing industries of which we are very proud, and our schools rank well. To all these we most cordially welcome you, and if while you are here time affords, we trust you will visit some of them. And last of all, we welcome you to our homes, where you will find, we believe, some of the best housewives in the State of Maine and in which bodily comfort and inner pleasure will be ministered unto you. We most cordially welcome the State Dairymen's Association at this time to the town of Dexter, and we trust that you will have very pleasant memories of it when you leave.

ADDRESS OF WELCOME IN BEHALF OF DEXTER
GRANGE, AND THE AGRICULTURAL AND DAIRY
INTERESTS OF DEXTER.

By F. O. ADDITON.

Mr. Chairman, and Members of the Maine Dairymen's Association:

After the able words to which you have listened, of course you do not wish or expect a stated speech from me. Neither do I rise for the purpose of adding any emphasis to the words of welcome which the gentlemen that preceded me has just uttered. We know him to be amply able to voice the sentiment of our citizens in welcoming you to our town and its hospitalities. But in behalf of Dexter Grange, which helps make up that great organization of the Order of Patrons of Husbandry, of which I am a member, and its representative, I would bid you welcome. What grand thoughts, what great possibilities cluster around our order! We know what it has been in the past and is today, to the farmers, and its scope is ever broadening along the lines of usefulness to our fellow men. When a little over two score years ago the National Grange was organized in the city of Washington it was spoken of by the press only for purposes of ridicule; but now, with a membership numbering nearly as many souls as did the thirteen original colonies when they met and rolled back the waves of tyranny upon Old England, it has just closed a session in the city of its birth, and its honors are as broad as the nation itself. Its members were given a reception by President Roosevelt at his council board, and listened to in the affairs of the nation. Dexter Grange with its 500 members is only a mite in this great organization, but it is striving to do its part in the great work that stands for higher and better manhood, better intellectually and morally, higher as our teachings bring us into closer relationship to the great Creator who sends us both rain and sunshine, and whose teachings are, "As ye sow so shall ye reap." But why explain all this to you members of the Maine Dairy-

men's Association, when I know that many if not all of you are members of the Order of Patrons of Husbandry, and as such, as well as members of the Maine Dairymen's Association, Dexter Grange bids you welcome, knowing that this meeting will be of mutual benefit. The value of the dairy products of our country for 1907 was in round numbers \$800,000,000. And in 1908 there is a great increase over the preceding year. This industry is becoming a great factor to successful agriculture. Especially is this true of Maine, and in no section more so than in this and the surrounding towns, which furnish the products to supply the two creameries located in Dexter. Successful dairying means successful agriculture, and successful agriculture means greater prosperity along all lines of business. It means better homes and a higher standard of living, and tonight we that are engaged in the dairy industry welcome your association, realizing the great work it is doing in educating the farmers in the science of dairying, and teaching them to put their products upon the market in such form and condition that the consumption is constantly on the increase, with an increased value to the producer. We know that from such men as you have to speak to us at this meeting we shall receive great benefit. And there is another reason why we should welcome you tonight, as you bring with you a member to respond to these feeble words who has done much for the dairy interests of Dexter and the State, rounding out a long, successful life in imparting useful information to others. Brother Gilbert is the Godfather of one of Dexter's dairy industries, the Enterprise Creamery Company. This is purely a co-operative creamery, organized and maintained by the farmers, thus illustrating the true principles of co-operation. Before we were organized Brother Gilbert was asked to come here and give us words of advice. He did so, and while he told us all the pitfalls and obstacles we might encounter, he said that he firmly believed in the principles of co-operation and advised us to go ahead; and that advice had much influence in the organization of the Creamery Company, which, under the efficient management of William Bradford has ever done a safe and increasing business.

In closing I will say, as president of that corporation, I feel tonight like ignoring the other members of the Maine Dairy-

men's Association and extending the hand to Brother Gilbert alone; for I know that the advice that he gave us at that time has been of great benefit to the dairying industry of Dexter. But I will not be so exclusive, for I believe there is not one of your members but that would have been as willing to do all in his power for the dairy interests of our State. And now in behalf of the grange and the agricultural and dairy interests of Dexter, let me say to you that we appreciate the work that your association is doing for the farmers. By your efforts and those of kindred organizations, including the grand work that is being done by the University of Maine, agriculture has taken on the dignity of a profession, which belongs to her as a right. And we hope that through this meeting all may be benefited, and that you may receive some pleasure in coming as we do in having you with us. I also see tonight representatives from the University of Maine. We are glad to have you with us. The University of Maine is dear to the hearts of the citizens of Dexter. We have had many bright boys go out from that University to successful manhood. We have had others go out at the call of their country to lay down their young lives on the altar of duty; thus showing that you are teaching the principles of true citizenship and patriotism, the assurance of safeguard to the nation's welfare. I am sorry tonight that I do not see with us Brother Elliott, as advertised on the program, to represent the agricultural interests of one of the colonies of our mother country whose interests are identified with ours. I would have gladly extended to Brother Elliott the same words of welcome that I have extended to the members of the Maine Dairymen's Association; and in his absence I still trust that mutual and pleasing relations may ever exist between the two countries and that no boundary line will ever prohibit the clasping of hands of universal brotherhood or working together for the uplifting of every good cause, whether it be under the stars and stripes or the flag of old England.

F. S. ADAMS. In behalf of the Maine Dairymen's Association, I want to thank you, very briefly, for your cordial welcome to us here tonight, and not only for your words of welcome, but for your actions, and for this large attendance. While I have attended at least ten Dairy Conferences, in different parts

of the State, some in the largest cities, I never remember of so large an audience being present the first evening as we have here tonight, and that speaks more than words. Brother Additon, representing the grange, has spoken of the pleasure it gave him to have Brother Gilbert with us. I am very glad, for the Dairymen's Association, that we have with us one of our old members, one of the pioneers in this work. I can remember of being in this section with Brother Gilbert twenty-five years ago. He had been preaching the doctrine of dairying, and we started to drive into Dexter one cold night, and got lost somewhere about 11 or 12 o'clock at night. I stopped to inquire the way. And I remember how good the lights of Dexter looked to me that night, as we were nearly frozen. We appreciate the hospitality which the good people of this town are offering to us, and feel confident that we shall have a very successful meeting. I am glad to introduce to you Brother Z. A. Gilbert, who will respond more at length to the addresses of welcome to which we have listened.

RESPONSE.

By Z. A. GILBERT, North Greene.

Mr. President, Ladies and Gentlemen:

It is a pleasure to grow old so long as you have some friends left behind who can speak a good word for you, such as I have heard this evening. It is a pleasure to me to be called upon, in behalf of the members of this Dairymen's Association and what it represents, to extend thanks to you for the cordial reception you have given us here tonight; not only in the words spoken but very largely in the interest you manifest by your presence here on this occasion. You may not realize the importance of a cordial reception of an organization devoted to such work as we have in hand, an association organized expressly for the promotion of the interest that it represents and having no other motive in view than to promote this interest. I say you may not be aware of the force, the influence, the importance and the results that may come from a reception such as you are showing us here tonight by your words of welcome that have been pronounced, and further also, and more emphatically by

the presence of so many interested citizens as are here with us. It is a pleasure to work for the public good, for the promotion of an interest in which the public are all concerned. This Dairymen's Association represents an interest of vast magnitude. When you stop to think of it, every individual person, man, woman and child, is more or less deeply concerned with this industry of dairying. And when you think of this, then you may realize something of the importance that is felt in connection with this work. It is true I had a hand in the introduction of modern dairy work in our State at large, and that I found in all of those earlier years of that effort a warm appreciation of the industry. I felt to encourage that industry from what I had learned of its importance from a financial standpoint in my own work, and what I felt was involved in connection with the general public interest. I am pleased to learn tonight of the endorsement of that work that I have heard from this platform. It gives me a great satisfaction to know that that work was placed in a good cause, and that it has borne bountiful fruitage in all these years. And I am pleased in behalf of this association here tonight to again thank you for the interest that you are manifesting, and to impress upon your minds that in your efforts to aid this association and by your presence here you are building better than you know; you are encouraging the work of this Association in promoting the interests of the dairy work of our State. We have an intelligent class of dairymen in Maine. They have given close study to the technicalities of the business. They have made good progress in that direction, as results have shown, and as the demand for our products in other states and in the general markets have proven, and this gives courage to the association and gives importance to the organized effort to carry the work on to higher results. There is no limit to the progress in any of the branches of our agricultural industry, and especially is this true in the line of dairying. Very much more is demanded today than was the case fifteen or twenty years ago, when this organization was first started in its field of work. Very much more is demanded and a great deal of progress has been made in connection with it, and there is a vast field of progress still ahead, and as we climb one step towards a higher quality of product and a more

complete satisfaction in the realization of the quality of the product that we are taking into our families, there goes on a still further demand for something better, something higher, and it is catering to this demand that this organized effort has been put forth and that we are here with you in an important dairy center of our State to encourage you to study these problems still more and carry your work up to a higher standard, and the reputation of our State as a dairy State and its products in our markets to a higher degree of perfection. Since the starting of associated dairying in our State there has grown up the great creamery industry, and a wide market for the product of the dairy in the cream form, and we are finding that there is scarcely any limit to the demand for a choice article in this direction. At the present time it may be said that the leading idea in dairying in and throughout New England, is the use of the products of the cow in the cream form in its perfection, and it is a problem that we may study and study closely, how this may be put into the hands of the consumer in a still more perfect condition than at the present time. It is a credit to the intelligence of our dairymen that we have taken the lead in this direction and stand at the front in the great markets of New England. The time is close at hand when the demand for this product and all the products of the cow is going to be still greater than at the present time, and especially so in the form of milk. I am ready to predict that the years will be few that have passed before Massachusetts cities will call upon our dairymen for a very much larger supply of milk and cream than is now the case, and there is at present a large amount of milk going into Massachusetts. It is to vastly increase in the near future, and with it must be the very highest standard of perfection in order to put that product into the hands of the consumer in the purest, cleanest and most attractive form that is possible. The nearer we can get to putting these products into the hands of the consumer in their absolutely perfect form, the greater will be the profit to the producer, and the greater the demand of the market. We are glad indeed that you show this interest. We wish to encourage the investment of capital to a larger extent in connection with this as one of the branches of our farming. And this reminds me that one of the greatest needs at the present time in connection with our farming operations

and especially in connection with this dairy business is the encouragement of the public, financial, leading men; that the leading officials, men high in authority, should encourage the investment of capital. What are we doing at the present time with \$80,000,000 that is deposited in our savings banks, half or two-thirds of it coming from these farmers, and a goodly measure of it from the farms represented here tonight? What are we doing with that money? It goes into our savings banks and goes into the great enterprises in connection with outside states and distant states, with scarcely an investment in our own home State and in our own business. It is difficult today for one of these farmers who has made a share of this money and deposited it in the bank, to get that bank to loan it back to him, and it requires wide security to do it. Now that sentiment is wrong. We want a sentiment that will encourage the investment of that money here upon our own farms, in our own homes, and keep them with such of the conveniences of life, such of the privileges as they may easily have, such as are equal to those in the larger towns and in the cities, and thus add to the pleasure of farm life. And in closing I wish to say here that my observation, my experience, and my claim is at the present time that nowhere in business life can so much be gotten out of life that is desirable, that we are all after, that we all wish for, that we all need, as on one of these independent farms; a country home where with our children, and our relatives, our friends and our acquaintances, we can carry on this business and enjoy every privilege that is vouchsafed to intelligent people. You do well, ladies and gentlemen, to come here tonight to encourage us and show by your presence that you believe in this country life, that you believe in the work that this Association is engaged in, that you believe in our beloved State, that you believe in this town, in this vicinity, and that you know there is much to reward us for the honest effort put forth intelligently in the direction of this and other associated industries. We thank you heartily for this reception and for your presence, and we trust that this meeting may leave a good impression that will have a tendency to encourage you to go on to still greater effort to build up this community still more prosperously and give to country life such a measure of appreciation as we firmly believe it should have.

THE DAIRYMEN'S ASSOCIATION, ITS AIMS AND
PURPOSES.

By F. S. ADAMS, President of the Association.

*Members of the Maine Dairymen's Association; Ladies and
Gentlemen:*

I know that I ought to apologize to you tonight for not taking the time and trouble to write something for this occasion. My excuse is that I have been so very busy in the last few weeks that I have not found time. Perhaps it might be well to give you a brief history of the Maine State Dairymen's Association. I want you to judge after we have given you this little history whether we have accomplished anything, and whether we are worthy of your assistance and co-operation. I do not care whether it is organizations or individuals, if they have not accomplished anything in this world and are not accomplishing anything, it makes no difference to the world whether they are dead or alive, and that is true of the Maine Dairymen's Association. If we cannot show you that we have accomplished something, that we are accomplishing something now, and that we are going to accomplish something in the future, it does not make any difference to the people of Dexter or of the State of Maine whether we are dead or alive. This is a matter in which we are all interested, whether we are producing milk or not. You are all interested in the production of milk; if you are not producers you are consumers and next to the milk of human kindness in this world comes the milk of the woolly cow. I very well remember when this Association was organized, ten years ago this last month. Brother Alden, Brother Gilbert, and some of the other older dairymen in this State who had faith in Maine and faith in the Maine dairymen, got out a call for those who were interested in dairying and wished to organize a dairy association to meet in Winthrop at the Grange Hall, and we met there the next day after that terrible storm which will always be remembered as the storm in which the "City of Portland" went down and very many lives were lost. We met

there and organized the Maine Dairymen's Association. Its aims and purposes were to advance the dairy interests of Maine. We elected our officers, Mr. Alden being the first president, and very soon after that, in the same year, the legislature met and we went down to the legislature to see if we could not get a little appropriation. We realized the fact that without money we could not do very much, and we knew that in other states these associations were doing much more than we were here in Maine, because they were assisted by the state. The associations in New Hampshire, New York and Vermont received assistance from the state, and they had inspectors and men in charge of various departments along dairy lines. I had the pleasure of attending a dairy convention in New York two years ago, and it seemed to me that every man present had some office. He was either a cheese inspector, or a cream or milk or butter inspector. And that is why the state of New York has made such strides in dairying. We had nothing then except a Board of Agriculture, which was doing a good work in its line. We went down to the legislature and very humbly and modestly knocked at the door and asked for a little appropriation, that we might put in the field, to co-operate with the Board of Agriculture, a Dairy Instructor. The Senate looked us over, and the House of Representatives looked us over, and they said, "You look like a little, feeble child. We think we will let you alone and you will die yourself. It is better to let you die than let you live to be 21 years of age and be able to vote." The result was we got no appropriation. We went home and lived along, and later we did get an act of the legislature. We had been holding dairy conventions in connection with the Board of Agriculture, and the next year that the legislature was in session an act was passed that mentioned the Maine State Dairymen's Association in connection with the Commissioner of Agriculture, stating that they might hold a State Dairy Conference, and the sum of \$500 was appropriated to defray the expenses of that meeting. In 1902 when the Dairy Convention met in Waterville resolutions were adopted very strongly and very emphatically asking for a Dairy Instructor, a man who should familiarize himself with the dairy work in Maine and seek to promote a better relation between the farmer, the producer, and

the creameries and butter factories. Conditions then were somewhat bad in our State. There was no co-operation on the part of the creameries. If I were producing cream and sending it to Mr. Jones' factory and it was not of good quality, Mr. Jones might say, "I will not have your cream," but Mr. Smith would send his cart up and get it. So I would say to Mr. Jones, "I do not care whether you take my cream or not, Mr. Smith will take it." That was the condition that existed then. There was no co-operation on the part of anybody, and we wanted a Dairy Instructor to go around and preach this gospel of co-operation and get the creameries to co-operate so that if a farmer produced filthy cream he could not sell it to any creamery, without taking a reduced price. We adopted this resolution and a committee was appointed to go down to the legislature. We went down there with more confidence than four years previous. When we appeared in the Senate and House of Representatives they beheld us a strong, sturdy boy, almost old enough to vote, and they listened to our plea and we got our appropriation. The Commissioner of Agriculture appointed a Dairy Instructor, Mr. Thompson, who was succeeded by Mr. Merrill, and you know the work they have accomplished in the past. There is now co-operation on the part of the creameries and if I am not producing cream up to the standard and Mr. Jones refuses to take it, Mr. Smith will not take it, except at a reduced price. That is an incentive for me to produce better cream, and as a result we have raised the standard of the quality of cream that is produced, and the quality of butter.

What are we doing at the present time? In my judgment one of the greatest hindrances to dairying in the State of Maine is the want of good cows, and right here has been a great change and a great reform. We have a different breed of cattle in Maine, a breed of cattle that require different handling and different care from those we had here a few years ago, and the farmer has not been educated up to taking care of these finely bred cattle as he should have been, and that is the work we are trying to accomplish, trying to show the farmer that he should give his cows better care and better feed, and there have been organized three cow testing associations, and you understand the lines on which they are working. The farmers

co-operate and pay \$1.00 per cow, and a man is employed who visits every farm once a month; the milk from every individual cow is weighed and tested for butter fat, and at the end of the year by a little sum in addition this man is able to tell the farmer just how much it is costing to produce a pound of butter fat, from each individual cow, and the farmer can tell which are his good cows and just how much they are producing. I think this is the greatest boom to Maine dairying since butter factories were introduced into the State.

Another thing is confronting us: The public are getting more fussy, and are demanding better milk, and that is right. No article of food that we consume has been produced under such filthy conditions as milk. We have got used to it in a way, but the matter is being revolutionized and the public are getting alive to the fact that milk may contain some bacteria, and that is something we knew little about years ago. When milk soured or went wrong, when cream would not come, there was more or less superstition. Perhaps somebody would tell you to put a horseshoe into the cream, and some people might tell you it was on account of the thunder and lightning, or it might be on account of the excessively hot weather. It is only in recent years, comparatively, that we have known anything about bacteria. The Maine Dairymen's Association is trying to remedy these conditions. This last year the Dairy Instructor and his assistant have been going around using the score card on the stables, showing the farmer wherein he failed and urging him to produce a better quality of milk. We may perhaps go to the legislature and ask for a little more money, as we want more men in the field. The State of Maine is a large State, it is pre-eminently a dairy State, and we want to encourage the industry. We are going to keep along the lines in which we have been working, only broaden out.

These are some of the objects of the Maine Dairymen's Association and these are what we ask you who are not producers but consumers to co-operate with and assist us in carrying out.

A committee on resolutions was appointed by the president of the Association, as follows: R. Alden, E. E. Harris, John M. Deering.

A. W. GILMAN. I want to say just this one thing,—that I am exceedingly pleased with this royal reception that you have

given us. In all my connections with the Maine Dairymen's Association, although we have held the State Dairy Conference in some of the largest cities of this State, in no single instance have the people by their numbers given us such a royal reception as we have had here this evening. I am exceedingly pleased to know that we have with us, and that he has been able to reply to this address of welcome, a man for whom I have great respect, a man who has done more to develop the dairy interests of this State than any other man.

WEDNESDAY, DECEMBER 9.

WHAT OF THE CORN CROP OF MAINE AND
HOW TO IMPROVE IT.

By Dr. G. M. TWITCHELL, Auburn, Me.

It is a familiar phrase running through all agricultural literature that success in agriculture rests upon successful stock husbandry, yet the lesson of the century is so imperfectly accepted and appreciated that there is today urgent need of its being emphasized over and over again. At the same time we must not overlook the fact that success in stock husbandry rests upon the ability of the individual owner to produce in largest measure the feed stuff for his animals, having always in mind the maximum growth or product and the minimum of cost or waste to the farm. The day has come when we must accept as sound doctrine that the one thing to be sought is reduced cost of production rather than a higher price for our products. Granting that this is not an attractive field for speculation, yet upon this rock must the work of future years be grounded, and to its importance individual attention directed. Detracting nothing from the necessity for co-operation in disposal of farm products and the increased benefits sure to follow any well organized, consecutive movement, the lesson still remains, and will remain, that he only who critically counts the cost of production is sure of standing ground in the financial field. The greatest check upon Maine farm development has been the assumption on the part of so many that feeding stuff could be

purchased cheaper than it could be produced. This spirit of dependence upon the western grain store has been a positive block in the pathway of progress. That condition *must* be broken before there can be that spirit of enthusiasm permeating our rural sections which will attract young people to the farm. It is not that individuals are not able to realize in spite of the burden of grain bills but that the unconscious influence of this practice checks the promotion of the industry. When the impression is made that a finished product is possible only by the use of raw material brought from a distance, the effect is to divert attention towards the seat of production of that raw material. If, in the case of our stock husbandry, this is necessary we could face the situation and prepare to do the best that is possible, but it is not, except in the case of a restricted amount of feeding stuff. Better knowledge of food elements, the valuable demonstrations by scientific investigators and the low price of western feeding stuff in the past have combined to turn attention away from New England farms, but with this knowledge coupled with the demonstrations and backed by the fact that the day for low prices of western grain has passed, never to return, the lesson presents itself in different form. Maine farms *can* and *must* produce in larger degree the feeding stuff wanted for the perfecting of any stock or making of any product. Deny this proposition and you bar the further progress of our agriculture, admit its truth and the lesson is self-evident. If the development of agriculture rests upon stock husbandry, or milk production, success in stock growing can be insured only through increased dependence upon the home grown crops, corn, next to grass, being our chief reliance.

Very close to the heart of this problem of agricultural development, so important to the State and Nation, lies this question of the corn fields. Upon the success of the corn crop in New England, more than any other, rests the future of the industry. Nowhere does the flint corn perfect itself more completely than throughout southern and central Maine and nowhere is greater yield per acre possible.

Sixty bushels of shelled corn per acre is far and away beyond the yield of the corn belt of the west, but not the limit on Maine fields. There is great danger today that public attention may

be diverted from this to other profitable cash crops and its place in a complete system of rotation overlooked. So much for underlying facts. What then of the crop? I regret that no reliable statistics are available as to the value of this crop to the State, so large a per cent being in the stalks, and so many farmers utilizing the whole by means of the silo. If adequate figures could be given they would but suggest the possibilities when fully appreciated. One fact is well established,—that neither by the common methods of selection of seed or growing the crop can its greatest value be insured. One lesson bears heavily upon every producer today, no matter where his field of labor, that there can be no profit in half a crop. It is the maximum of output per acre or machine which pays, provided the minimum cost of expenditure has faithfully been sought. No man can fix the limit of production with acre or animal and until that is finally determined the whole problem forces itself upon the critical attention of him who seeks for profit. In every industry the possible per cent is reduced by failure to intelligently apply well known business principles.

Whether intended for the silo or not there must be the certainty of full maturity for the crop to command full attention. Beyond that, the question of yield forces itself year by year, more and more, upon the student. We want a corn of great vitality, giving a strong, stout, vigorous stalk of reasonable height, maturing in one hundred days, one if not two ears to a stalk, twelve to fourteen inches in length, well filled to the tip. What does this mean? If an acre of corn is planted in drills three and one-half feet apart and the seed dropped nine inches apart in the drill there will be 16,594 stalks, assuming that every kernel germinates. Allowing one ear to a stalk and six ounces of shelled corn per ear, the average with nine inch ears, and the yield would be one hundred and four bushels of shelled corn per acre, allowing 60 pounds to the bushel. If the ears be increased to ten inches, the yield would be one hundred and fifteen and two-thirds bushels, and if allowed to drop to eight inches, we must be content with ninety and one-third. This production is beyond present attainment and may be in the future, but this we know, that the average of the State today is altogether too low. The whole problem revolves around the

centre of seed vitality. Is the lower level of production a necessity or the result of failure at some critical point?

With these facts before us, it may not be out of place to emphasize certain well recognized facts underlying successful corn production. Fortunately the hillsides of Maine, lying in the corn belt, are peculiarly adapted to the crop, and the soil, whether of a clay loam or rocky formation, calls only for thorough preparation to do its best. That thoroughness may well be emphasized, as the radical changes in farm machinery are likely, unless guarded, to lead to superficial preparation for cropping. Not alone the releasing of plant food but that deep stirring of the soil, to admit air and sunlight, become necessary when full crops are desired.

The more thorough the work in the beginning, the greater the harvest. Those who criticise what they call extravagant claims are usually those who gloss over their work. A smooth surface may not indicate a well worked field. A full crop requires a hearty meal every day until perfected and no man can afford to stint his corn field when fertilizing. Not how little will answer but how much will be profitable must be the rule. Everywhere those who grow the largest crops are the most liberal, and at the same time, most intelligent feeders. No man should be satisfied with a yield of fifty bushels to the acre. The line of profit is above and it must be found and complete fertilization is as necessary as thorough cultivation.

The seed must be that which for years has been grown under the eye of a painstaking man, taken from the most vigorous stalks, thoroughly cured and when shelled saved from the centre of the ears, leaving at least one inch of tip and butt. The average corn crop of the country is placed at 24.2 bushels per acre, not because more cannot be produced but because men will not meet their part of the contract. In one experiment, seventeen bushels of fine ears were selected from good stalks just after ripening. After a closer examination of these ears and the testing and measuring of a few kernels from each, enough very choice ears were selected and used the next spring to plant 10 acres in the corner of a 63 acre field. The remaining 53 acres were planted with the remaining best ears of the 17 bushels. Other similar fields surrounding the 63 acres were planted in

the same manner with seed taken in accordance with the usual custom on that farm, from the cribs in which the best corn had been placed the previous fall. All the fields were given the same treatment.

The ten acres yielded 96 bushels per acre; the remaining 53 acres of the field, 94 bushels; and the other fields 80 bushels per acre. This shows an increase of 16 bushels per acre in favor of ears selected for a single season with much care from good stalks as compared with seed ears selected in the spring from a crib. When continued year after year the well-selected seed increases in superiority over that taken from the crib. What then would have been the increase had the seed been marked in the field from the strong hills and best developed ears.

I have seen men dip their seed corn from the bins, pick their potatoes from the pile in the cellar and select their cows by the one standard of pedigree, but I have yet to find one of this class making a permanent success. Critical seed selection alone can prevent seed deterioration, and only the honor of the seedsmen saves from disaster those who do not and will not protect themselves.

One who is reckoned a good farmer last spring purchased a lot of sweet corn, saved for seed by a neighbor, ran the whole through his corn sheller and planted ten acres for the factory. If he was satisfied with the yield, what might it not have been had he taken time to select his seed and then used only from the centre of the ears. His field while looking well from a distance, disclosed a large per cent of shorter, weaker and non-bearing stalks upon close inspection. This is not to be the business standard of 1909. For ensilage purposes the stalk should be tall, rich, succulent, leafy and remain green and tender until the ear has reached considerable development; but if ear corn is the chief product desired, the qualities of the stalk should be such as will best lead to the proper development and support of one or more good ears. The productiveness of a stalk is, of course, the point of most importance. A stalk great in circumference near the ground and tapering gradually to the tassel, with sufficient foliage of vigorous appearance, free from diseases and bearing a good ear or ears at a convenient height, is a desirable stalk from which to select seed. All seed should be

tested in early spring to determine its germinating power, before being put into the ground. If fully matured, properly cured and handled, practically every kernel will come. This is the experience of those most critical in growing. I was surprised the past season in attempting a little work with yellow corn to see how rapidly it changed when the suckers were cut out, and this I believe to be an important step in profitable corn growing where yield of grain is the objective point, surely when seed is wanted. Not once but thrice at least should every hill marked for seed be visited and all off-shoots or false shoots removed. It is the weak stalks which reduce the yield both of stover and mature corn and to eliminate the largest possible per cent of these is both a duty and privilege with the grower. An authority says, "Before the corn comes into tassel, or even earlier, a few rows may exhibit marked weakness. Such rows should have the tassels pulled from all the stalks as soon as they show plainly in the top of the stalks and before pollen is discharged. In the same manner the tassels should be pulled from all the undesirable stalks in all the rows. Undesirable stalks consist of barren stalks, stalks with many suckers, feeble or very slender stalks, smutty stalks, etc. If detasseled in time, the transmission of these characters to the next generation will be prevented."

The one object is to mature the largest quantity of seed, stronger in germinating power than that planted in the spring, and stronger also in power of resistance to possible injurious influences and diseases. To insure this, as well as to hasten complete maturity, every obstruction must be removed. A far too common practice in selecting seed is to save the ears from the largest, stoutest stalks at cutting or husking time, but this will hardly suffice under conditions prevailing today. The tallest stalks do not mature the largest or best formed ears, but those of medium length, stout at the base, and with abundance of broad well developed leaves. Such stalks should be marked, the suckers or false shoots removed, and any tendency to excessive setting of ears checked, the one object being the production of seed likely to increase yield and value of future crops.

To emphasize frequent light cultivation, the removal of all weeds and non-bearing stalks, and the conservation of moisture

throughout the season is but to repeat what is urged from every platform, yet the average crop yield of the State, both of yellow and sweet corn, is greatly reduced because these homely lessons will not be observed. No man gives too much cultivation, and the great majority far too little. Until thorough work marks every step there is no justice in a criticism against any seemingly extravagant claim. We know not the value of the corn crop to the State of Maine. The corn shock is not the best place to mature seed. Those marked stalks should be topped when the ears begin to glaze and left until well hardened, then the ears plucked and spread in single layers where the air can circulate all about them, and not traced until the cobs are well dried. A damp, mouldy cob will injure the seed value of the kernels. Everywhere it is the same, success hinges upon seemingly trivial details. Trifles make perfection but perfection is no trifle.

Corn breeding like stock breeding offers returns not to be obtained in any other way and if the demands are exacting the results will surely be satisfactory to the critical grower. "Corn bred for several years for increased production will produce, with exactly the same treatment, 10, 20, or even 40 bushels more per acre than unselected seed. Counting the increase at but 10 bushels per acre, when corn is selling at 80 cents per bushel well-bred seed bears a money value of \$48 per bushel and the profit on the corn crop is increased \$8 for every acre grown." This estimation is very conservative, the profit being often four times as great. The law of reversion holds as tenaciously in corn culture as in stock breeding and the slightest neglect opens the door to failure. Seed runs out through neglect; it runs up in proportion as skill is manifested in its growth and care.

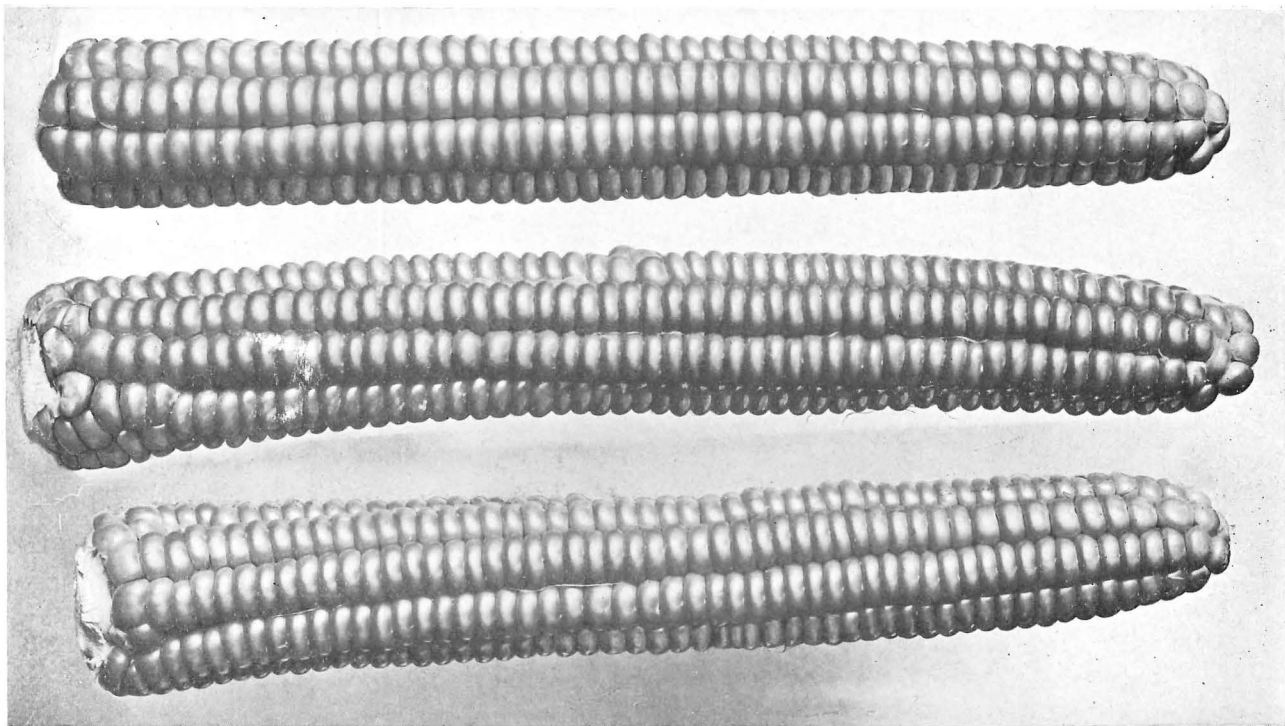
This association came into existence because of the conscious need of strengthening our dairy interests. Today that need is greater than ten years ago, but it is specifically along the line of encouraging increased production of less expensive food products, and chief among these is the corn plant. Profitable dairying hinges on the feeding of silage and to meet conditions certain to arise during every year, and prevent shrinkage of the milk yield, the dairymen are coming to feel that they can find profit only by a full year's supply of ensilage. If the experi-

ence of the past year has taught any lesson it is that of greater reliance upon the corn crop. Droughts will come and cows will shrink unless the farmer is prepared at all seasons and the lesson is obvious.

Throughout Central Maine the growing of potatoes is claiming increased attention yearly and we are learning that the more thorough the cultivation of the land the better for succeeding hay crops, but before that field is seeded there should be grown the corn crop to balance conditions and insure that wealth of plant food for the large hay crop to follow. Every acre must produce more than the labor item may be minimized. The day has gone for a man to mow twenty acres for a ten acre crop.

I consider the recent work of the Station in developing sweet corn seed of inestimable value to that important industry, eliminating as it has and will, to a large extent, the element of chance which has been so dominant a factor in the past and insuring a quality of seed nearly or quite as resistant as our yellow corn. You cannot put a cash value upon the possible good certain to follow such experiments. Another step equally important is the proposed perfecting of the dent corn, grown for so many years by a farmer in Maine, making of it a most valuable ensilage crop, richer in protein than many of the flint varieties and promising a larger yield of shelled corn per acre. This is the work which taken up and carried forward by our farmers in harmony with the exact methods of the experimenters will greatly enhance the value of the corn crop to the State and insure a degree of profit to the growers not otherwise to be obtained.

With this good work I want to enter my plea for more attention to our native yellow corn, for where the corn tassels rear their spires and the stalks rustle in the autumn breezes there is sure promise of lasting prosperity. This native product of New England has not yet been developed to its full capacity either in stalk, yield of corn, or food nutrients, and no man dares today to set the limit along either line. In this field of experimentation the live farmer finds the one chief source of satisfaction, for out of the desire for mastery, there is sure to follow the determination to know more of the life history of the plant or animal and, following this, that ambition which alone can



Northern Flint Corn, Winn's Hybrid. Grown by G. M. Twitchell, Auburn. Protein test, 11.88

develop positive, aggressive, well balanced manhood. No field is more inviting today than that of flint corn production and improvement. It has been a source of great satisfaction to find men in every part of Maine, where the corn crop matures, who have for years been working out the problem and to learn that in every case, they were obtaining results far in advance of their neighbors. From some of these I have secured sample ears which I assure you it is a pleasure to bring for your inspection.

With these I desire to present the very complete methods of seed selection followed by representative farmers. One grower in Eastern Penobscot, Mr. S. T. Mallett of Carroll, sends sample ears from seed grown by him the past eighteen years, originating in Lee, and selected at husking time, taking the most vigorous ears only, smallest in cob, with kernels of uniform size, the result being a marked increase in size of ear and yield of shelled corn. Here is the evidence of that thoroughness which counts in the case of Mr. B. F. Clark, Kenduskeag, Maine, whose story makes good reading.

"I moved to this farm eleven years ago this month and the seed from which this corn was raised was here when I came and for many years prior. I can give only ten years of its history under my care. I found the original seed uneven and very much 'zigzag' on the cob but very early, so I determined to try and better it by selecting the best and giving good culture. My method in selecting seed is to note the first ears that show on the stalk by marking them and following the marked ears through the season, then at husking time, I reject all that do not come up to a certain standard which standard with me is as follows: First, I select the longest ears with large grains; second, taking care that every row is snug together from tip to butt, allowing no slack spaces between rows at butt; third, I select the smallest cob possible; fourth, I try to have every row straight on the cob; fifth, I want the cob as small as possible where it breaks from the parent stalk. This method I have followed for ten years and if you could have seen the seed I started with, you would be surprised at the change. You will see two or three places on the ear where the kernels are a little crowded. When I shell my seed I reject these seeds if I find any and when shelling for seed I discard about two inches of

the tip, the rest of the ear goes for seed. Culture: I like a warm soil well drained, well manured, and well tilled, for then I find no trouble in raising corn. I prefer old ground for corn but have had good success by planting on sod land. I use about ten cords of stable manure per acre with 600 pounds commercial fertilizer in the hill, and start the weeder about the third day after planting and keep at it once each week until the plant is about three inches high, then I put the spike tooth cultivator to work and keep them both at work each week until the corn shows signs of spindling. I also use the hand hoe, going over the piece twice during the season.

To free a field from ravages by crows, take a pair of old pants or overalls and an old coat and hat and make the scarecrow; then, take three light poles, 12 feet long, tie the top ends together, raise them in the form of a tripod; tie a small cord around the neck of the image, raise it up inside the tripod about six inches from the ground, so that any light breeze will turn it and the crows will give it a wide berth. It is a good plan to put on a mask under the hat. Two scarecrows are enough for an acre, one near the end on opposite corners; place them on the side of the piece and they will not hinder cultivation."

The following letter carries a good lesson, both of work done and faith in the possibilities of the future. These 19 1-4 rods gave 15 3-7 bushels shelled corn or practically 124 bushels per acre. Young men who stop and question may well pattern after Mr. Winn's methods and surely grasp a measure of his faith.

WEST FALMOUTH, November 27, 1908.

Dr. Twitchell:

DEAR SIR:—As you are to discuss the corn crop and how to improve it at the coming Dairy Conference, I send you a sample of my improved seed raised the past season.

From 19 1-4 square rods of sandy loam planted May 23rd and ready for harvesting the first of September I raised 24 bushel market boxes of corn on the cob, each box containing 45 pounds of ears. By September 15th this corn was all in the corn house. This was originally the Canada Early but by crossing and selection I have increased its size and still retain its earliness. There is no trouble in raising one hundred bushels or more of shelled corn per acre. From some experiments

made this year I think I can do better another season if my life and health are spared. I am now 91 years old. I have no seed for sale.

Yours for a bigger and better corn crop.

IRA WINN.

I might present many more but these will suffice to indicate a standard of work which insures improvement. Believing firmly that a little encouragement, for a few years, will be followed by a decided increase in acreage devoted to this important crop, I shall be glad to cooperate with this society in promoting that much desired interest, and, if thought best by the officers, continue the prizes for 1909, under the same conditions as in 1908, supplying each contestant with one pint of pedigree seed. This seed was grown by me the past season from seed furnished me by Mr. Winn of Deering, who has for forty years been seeking its improvement. With just fair cultivation and fertilization I obtained yield at the rate of more than 100 bushels of shelled corn per acre. In selecting seed for next year only strong, vigorous ears were accepted, from which all suckers and false shoots were removed, and from these one inch of both tips and butts were first shelled for grinding, so that the seed is uniform and represents only the centre of the ears. Touching its ability to mature, will say that the 95th day from planting the husks were dry and the ears stood out clear and well hardened. When well dried in the cob, the average weight was between seven and eight ounces per ear yielding 6 to 6 1-2 ounces shelled corn.

I leave this matter in your hands, gentlemen, for such action as may be deemed best by the Association, suggesting that if these premiums are not to be continued, this Association outline a more complete and effective method of reaching the desired result. That result is too important to be neglected, for if by any means the young men on the farms of Maine can have kindled within them a love for stock and crop production and be helped to find the larger results possible through skill and insight, the future of Maine farms will be solved and increasing prosperity assured.

What Maine needs today, in spite of the great progress of the past few years, is more enthusiasm for the farm and a stronger

faith in its ability to produce the crops wanted for home consumption. The years are bringing their lesson and it is one calling for consideration. Certain signs point to a surrender of the dairy and a specializing on other single crops. Just as sure as this becomes general, rural life and conditions will suffer within the next quarter of a century.

Somehow contact with animals balances a man as no crop production can. There is that innate relation which the stock feeder holds towards his animals which gives a quality of mental fibre, a standard of citizenship and an atmosphere in home life, never to be obtained by hard work in crop production six months in the year.

God has ordained that animals shall be the companions as well as servants of man and in diversified agriculture, with stock husbandry as the chief reliance, there has followed and will follow a type of manhood differing materially from that relying upon specialized efforts. Success is not to be measured by dollars and cents but by mastery first over the realm of nature and later over one's self. Wisely has it been ordered that stock husbandry shall be at the foundation of permanent success in agriculture and justly may we claim that true success in stock husbandry is to be found only in fields covered with waving grain and glistening with the ripening corn. Today above all else let us exalt our northern corn crop.

To still further enforce the lesson of quality the result of selection, Dr. Twitchell secured from the Director of the Experiment Station an analysis of different samples of flint corn. The average of 68 samples of New England grown corn figured upon the same basis gives the following analysis: Ash, 1.6; protein, 10.7; fiber, 1.7; nitrogen-free extract, 71.9; fat, 5.1.

A comparison with those given below indicates clearly what may be accomplished in breeding yellow corn and increasing the per cent of protein.



Flying Fox's Ardora. Property of H. M. Moulton, Elm Hill Farm, Cumberland Center.
Grand Champion Yearling Heifer at Brockton Fair, 1908

ANALYSES OF MAINE FLINT CORN.

NAME OF GROWER.	Water.	Nitrogen.	Protein.	Ether extract.	Crude fibre.	Nitrogen, free extract.	Ash.
B. F. Clark, Levant.....	9.04	1.75	11.94	4.48	1.30	71.65	1.59
S. T. Mallett, Springfield.....	9.11	2.03	12.69	5.01	1.52	70.05	1.62
G. M. Twitchell, Auburn.....	8.88	1.90	11.88	4.66	1.30	71.61	1.73
Ear grown in N. H.....	8.81	1.62	10.15	4.34	1.24	74.06	1.42
Same seed as used by boys for special premium, 1908.....	8.60	1.72	10.75	4.37	1.25	73.63	1.40

IMPROVEMENT OF THE DAIRY COW.

By Prof. P. A. CAMPBELL, Orono.

Within the past few years phenomenal records have been attained in the production of milk and butter-fat from a few individuals among our dairy cattle, but the number has been small and is but a drop in the bucket compared to the twenty million or more cows doing duty in our dairies. Individual herds here and there make good averages, but the general average is low. Probably not more than two or two and a half per cent are pure blooded or are registered in the herd-books and many of those would have to be discarded if anything except pedigree was considered. There is no definite data as to the number of grade animals; that is, an animal having one pure blooded parent; but the percentage is far too small. The rest belong to the class commonly called scrubs. What is a scrub? A scrub is an animal with an ancestry so mixed that it cannot be traced. The scrub is the result of careless breeding; of mixing the various breeds indiscriminately for generations until each breed has been lost in the mixup and the result is an unknown quantity.

The science of breeding we know but little about. Much information has been gained; great progress has been made; but there is a much longer distance to travel. Theories have

been set up, defended, and apparently proven true, but ultimately have been torn down, to be replaced by others as unstable. No definite rules can be laid down to the breeders of dairy cattle. Much data has been collected from fields sufficiently broad that point out to us the paths we should follow. They are guides that may bring the results desired, but there is no certainty. When two animals are mated there is no definite way of telling what the resultant off-spring will be like or of telling what its future performance in the dairy world will be. Even offspring from the same parents differ markedly sometimes. We are only able to estimate with a reasonable degree of surety somewhere near what class that animal will belong to from the type of its ancestors and the work they have done.

Today we are in an age of specialization; and it is an age of specialization with the dairy cow as well.

Formerly before she became known as a dairy cow her sole work was to maintain herself and young. We have taken away from her some of the characteristics she possessed and have added others to her embodiment until now she is what man has made her. We must carry her on to do that specialized work which we demand of her in the dairy and at the same time to perpetuate the breed.

Like does not produce like; it is the variations in nature which allow us to improve our dairy cattle and it is the variations also which may prove to be our stumbling block. Without variations no improvement could be made. Careful selection must always be maintained to make improvement. It is the results of the variations in the wrong direction and carelessness in selection to which we owe most of our unprofitable cows, commonly termed boarders. I believe there is not an owner of dairy cows but that secretly believes in selection and the use of better blood, but some of them will not admit it openly and many of those who do believe in it too often fail to practice what they believe.

The various breeds were evolved originally by taking the blood common to the district in which they originated and selecting the superior animals for breeding purposes. As time went on the selections were made more rigid until the animals commenced to take on type, form, and functions for which since

they have become known and distinguished by their breed names. This excellence in the various lines has been attained only by careful selection on the part of the breeders; and doubtless unwise selections at times have prevented the breeds from reaching that degree of perfection to which they might otherwise have attained.

The breeds have been formed and are at our command. It is our duty to carry on the improvement and to use them in such a way as to improve and grade up our common herds. The improvement is needed not only in production, but in form, constitution, and in reproduction. While the production end is the all important one from the financial point, the fact must not be lost sight of that the stamina of the animal and its powers to reproduce are just as important and if they are neglected bad results will follow.

It would not be possible to dispose of all the low producing cows or even a large portion of them without disturbing the supply of dairy products which is too low as it is. They can be gradually replaced with higher producers with a continuous grading up by the use of pure bred sires. The scales and Babcock test should play an important part in this work by pointing out to the breeder his best producers. Having found his highest producers and knowing the individual characteristics of each animal he should be able to select those animals which he desires to be the mothers of his herd.

After the cows are selected fully as important a part is the selection of the head of the herd. The old saying that "The bull is half the herd" was never truer than it is today. With the dams and sire equally as well bred, this saying is true. But where the dams are of mixed breeding and the sire is pure-bred, he is much more than half the herd. The dams with their mixed breeding may be good producers because they are the selected ones from a mass. They have many types among their ancestors and very few of these types agree. The lines are weak and are not easily transmitted to the offspring. Those characteristics that are inherited by the offspring are as likely to be the undesirable as the desirable. The sire's ancestors have been of one general type, the blood lines are strong and are transmitted to the progeny. This is called breed prepotency

and is of great aid in grading up a herd. So marked is it that many of the first generation or half bloods will resemble the breed of their sire in color, markings, and conformation. When they are bred the progeny will be three-quarters pure blood and often are hardly distinguishable from pure-bloods. If this policy of breeding is carried out with each succeeding generation, the amount of alien blood is gradually eliminated until in the sixth generation less than one and a half per cent of the common blood remains. This amount is so small that it will but seldom show itself provided that on the sire's side a pure-bred animal is always used.

A mistake too often made in the process of grading up is to use one of the grade males as head of the herd. Improvement stops and fortunate indeed will be the breeder who is able to maintain the standard to which he has already reached. The young animal would have no more of the improved blood than its sire and dam, and the small amount of unimproved blood in each of the parents would stand a chance of being transmitted and producing bad results. The breeder would say that the animal was taking back, while in truth it was simply the latent characteristics showing themselves as the result of the breeder's carelessness.

The statement is often made, "I cannot afford a pure bred bull." That is not the question. It is, "Can I afford not to have one?" and the answer is most decidedly, you can not. With a herd of twenty cows, for instance, there is at least an investment involved of a thousand dollars. We have conceded that the sire is at least half of the herd. Does it seem right to balance it with an animal worth from twenty-five to forty dollars? An expenditure of a hundred to one hundred and fifty dollars will quite often procure a good individual and one whose breeding is good.

It would seem as if this was none too good an animal to become the sire of the heifer calves that are to be the future working herd. With the scrub bull as father of them, at least three-quarters of the heifers will prove to be failures, so those that do prove to be producers will be costly animals, and the class of boarders will be enlarged. With the pure-bred sire three-quarters of the calves will grow into cows at least as good

producers as their mothers, and most of them will excel her. The product will be increased and the value of the herd in general greatly enhanced. The money first expended will come back bringing a dividend with it.

Once the breed has been decided upon always stick to the same blood. The mistake is often made of jumping from one breed to another. If a change must be made, sell out and start at the bottom again. The results will be just as satisfactory, and as a financial venture the returns will be greater. Last summer I met one dairyman who had graded up a herd of Jerseys until he had a creditable herd returning a good profit annually. For some reason he had changed from selling cream to selling milk. The Jersey grades did not give as much milk as he desired, so he purchased a Shorthorn sire to head his herd; as he said, to increase the quantity of his milk and bring larger calves for vealing. It is quite easy to predict the future of that herd. Not only is the work of the past dozen years being obliterated but also two extremes are being brought together. They do not mix well, and the results are as likely to be a failure as a success.

In advocating the work of grading up, I do not under-estimate the work of the breeder of pure-breds. His work is the ideal which all are striving to reach. There is no true breeder but that has it in his mind to some day own a herd of pure-bred animals. Nobody should be interested more in the practice of grading than the breeders themselves. It forms a market for the male progeny of their herd.

There is no way to so thoroughly know a breed as through its grades. With a herd of grades a few pure-bred females can be purchased, be the number ever so small, and in a few years time the pure-bred animals will have replaced the grades and the goal will have been partly reached; but the work is not finished, it has just commenced,—the perfecting of the herd and the endeavor to reach the ideal which can be approached but never reached.

The selection of the sire, be it for the grade or pure-bred herd, should occupy the attention of the breeder. Right at this point serious mistakes can be made that it will take years to undo, unless they are discovered in season.

Good breeding bulls have a masculine appearance. The bulls with light jaws, narrow forehead and face, slim neck and light shoulders are seldom the sires of good milkers; the nostrils should be large to allow for the inlet of large amounts of fresh air, they should be full in the heart girth and show stamina and vigor throughout. This does not imply coarseness, as coarseness is unevenness, but rather uniformity is desired. The bull will be valuable as his breeding is valuable. A long line of producing dams and grandams is essential. A chain is no stronger than its weakest link, neither is a line of pure-blood. Some men argue that a bull should be judged by his conformation rather than by his breeding. It is true that many a herd and flock have been ruined by selecting the animals to head it merely from the pedigree. But thousands of herds have also been ruined by letting pedigree go and selecting from conformation alone. Both should be considered in selecting the animal.

If we canvass the country and learn the ages of the bulls in service among our dairy herds we would find many young untried bulls being used. It is a deplorable condition that prevails, that of breeding so much from young and immature sires. It is the custom with some dairymen not to think of keeping a bull after he is two years old or three at the most. By that age he is just beginning to get old enough to show whether he has any value as a breeder or not. Nothing can be told of a bull's breeding powers until his first crop of calves are matured and it is regrettable that a good bull has to go oftentimes when his usefulness is just beginning, while so many yearlings and two-year-olds that ought to have gone when they were skimmers are allowed to do duty. A good bull, one that shows prepotency and ability to get good calves, that become good cows, should only go when his power as a breeder is at an end. If a young bull is worth a certain sum before he is tried, he certainly is worth more after he is tried. A bull's calves will tell a truer story of himself than any man can tell.

Prepotency is the power which an animal has to transmit its own characteristics to its offspring. Marked prepotency is seldom found. When it is, it should be cherished and the greatest good derived from it possible.

Most of our breeds of live stock, including dairy cattle, come from across the water. Quoting from Kennedy in his article

“Animal Breeding in Europe” in the second volume of the American Breeders’ Report, he says, “Many of the most careful men, rather than to use a young sire, no matter how good the individual, or how fancy his breeding may be, prefer letting him to some other breeder for a couple of years or until they are sure of his stock, or to retain him in their own herd or flock, and use him on a few females until he has proven himself worthy of a place at the head of the breeding herd or flock. By the adoption of this method much time is saved and no small amount of disappointment is avoided.” If more of our young bulls were first tried on dams whose powers of breeding were known, there would be fewer disappointments.

The reason that many sires are sent to the butcher while young is probably to avoid in-breeding. The extent to which in-breeding can be carried with safety is always an open question. We can say that scarcely a breed has been formed but that somewhere in its history in-breeding has been practiced to fix and intensify the type. The need at present is not as great as formerly, but undoubtedly there are instances when it can be used to advantage in fixing some desirable characteristics. It is not to be recommended in general as it must be remembered that the undesirable as well as the desirable characters are intensified, and it is only the careful observer that will know when it can be applied. The fact that it is said to weaken the constitution of the animal is quite true in many cases from the fact that animals naturally weak are often used for the in-breeding, and this being an undesirable character is intensified and fixed with the rest of them. If in-breeding is to be practiced it would be better to use only a part of the herd, then if the results are not what are looked for, the rest of the herd is intact to carry on the former line of breeding. The breeding herd is a swift moving tide of life and the character of the entire herd will change in five years, although individuals live for years. If one entire season is a failure it leaves a gap which is hard to fill.

The question will probably be asked: What is to be done, if in-breeding is not recommended and sires that have proved worthy of keeping, if kept must be used to inbreed? There seems to be one solution of this; one that is used in other

countries and somewhat in this one with very satisfactory results, and that is local breeders' associations. Several bulls of the same breed are owned by an association and kept in different localities so that the breeders of each locality can have the use of one of them. As the time approaches when it is necessary to procure new blood to prevent in-breeding the animals are exchanged and thus the greatest good from the sires is obtained and each breeder has the benefit of good blood at a minimum cost, and furthermore sires of unknown breeding qualities are largely done away with except at such times as an animal's usefulness as a breeder comes to an end and he has to be replaced with a younger animal.

In Europe and Great Britain we find in certain districts that the whole attention is given to one breed of animals. There they reach their highest perfection and the whole world knows where to go when it wants that particular breed and type. More could be accomplished here if the breeders would co-operate. If an entire community would breed the same breed and type of animals, much could be accomplished. There are numerous details in the successful management of any business, more than most minds can contain and put into operation. All breeders working with the same end in view would accomplish more than a few working independently.

The methods of breeding, feeding, and general management would be talked over and the whole system would tend to improve the dairy conditions. In talking with a few dairymen about a method like this, the objection has been raised that it would lead to competition and comparatively few sales of stock. It may lead to competition but I also believe it will lead to more sales and better sales. The demand for cows of the right kind is unlimited. The buyers will go where they know there are large numbers to select from. They can afford to pay more where a carload of cows that are uniform can be bought and shipped from one station. We have seen this illustrated in sections of Wisconsin and New York in a small way and there is no reason why it could not be carried on successfully here.

In conclusion let me say that I believe co-operation among our dairymen in grading up the herds and keeping records of the breeding and production, together with intelligent feeding and

care will put our dairy industry on a higher level, do away with the boarder cows and change the dairyman and breeder into a prosperous and contented man.

ORGANIZATION AND MANAGEMENT OF A DAIRY FARM.

By Prof. J. W. SANBORN, Gilmanton, N. H.

The subject which has been given me is a very broad one with many phases. I shall not attempt to discuss all the features of the question.

I have had the pleasure and burden of organizing new buildings, as overflow buildings, within the last two years, and I adopted a somewhat modern line of thought, placing the barn by itself as an independent factor in the system of buildings, with an annex for the cows,—a wing with a double row of cows facing a wide central walk, and a silo at the other extremity, at the end of the walk. Thus there is a barn at one end of the cow stable, and a silo opening in at the other end, while at one corner is placed a cement-tight pit, cemented at the bottom and the walls laid in cement, to receive both solid and liquid dressing, and to conserve the same in toto. These buildings were built on the side of an incline so that the hay could go in at the top of the barn, which is nearly forty feet deep. Long experience and thought have led me to believe in gravity, so we built the barn with the force of gravity in view. It is a plank barn with a self-supporting roof. In that same barn we placed the grain, and from a common center the hay is drawn down by trucks straight through the central walk, to feed ninety odd cows, and from the other end of the walk the truck brings up silage easily for the same number of cows, fifteen pounds to the cow. So it goes loaded both ways. We find, as a matter of fact, that the excess of labor supposed to be required where the barn is at one end and the silo at the other, is very small. The labor is performed with nearly as much ease as in the old style barn with three stories,—a manure cellar, a central section for the cattle and an upper story for hay. I will say that the

central section of my buildings is as abundant in windows as this room. Light is death to the germs of disease and we put in all the light we could. Light also tends to increase physiological activity. A cow will eat more and do better in a light barn. The manure is run out with a miner's barrow which is self-dumping, and tipped over on end, emptying by gravity into a stone pit, and it is drawn out by gravity, so that the work is quickly done. On the whole I think the offal is handled as quickly and economically, the loading in a postless cellar and the backing into a square cellar being considered, as would be the case in the old type of barn. And by this system the hay is in no wise injured in its palatableness either by the odor of the offal or the carbonic acid that comes from below, each department being absolutely separate and economically handled. If I should build again I think I should follow this plan. My subject is so broad that I cannot discuss this matter further.

I have in the barn high grade Holstein cows. So far as the investigations and feeding experiments of America are concerned, I think I have found that a pound of milk is made a little cheaper from the Holstein than from any other breed, although the Ayrshire makes a pound within a small margin of the same cost; and if I were so situated that I wanted to move from milk to butter quickly I would select the Ayrshire cow, as a pound of butter is made almost as cheaply from the Ayrshire as from the Jersey or Guernsey, and she is a cow which you can move if you want to change your business from one product to the other. I am not a butter producer, but so far as I have secured the figures, a pound of butter is made very slightly cheaper from the Guernsey than from the Jersey cow. The larger animal might strike your fancy more, but either breed will make a pound of butter cheaper than a milk breed. I will not enter into the discussion of the dairy cow any farther than to observe that she must be bred for the highest limit of production; and this must not be a matter of guess work or accident, but of prolonged and careful research.

I turn now to the question of organizing crops for the farm, and I shall have to feel my way through this more rapidly than usual. I am pursuing, as was said, intensive farming. I am a very decided apostle of aggressive farming, and this view is

growing in favor with me as the days go by. Some of you have already heard me speak on this subject, but as it is to me the pivotal problem of farming, perhaps it will do no harm to repeat myself.

Crop production of the farm is the question of questions. It is the under girder of the whole superstructure of successful farming. The primary function of farming is crop production, and the measure of intelligence that is put into it is the measure of the crop output, and it is not only the measure of the possibility of farm success, but is the measure of the progress of the State itself, because upon it rests all wealth. I feel that in New England the fathers are not quite equaling the courage of the sons which they have sent to the West, who have learned to farm broadly. I feel that they are not the equal, in breadth of action, of their sons who go to the cities and become masters of great enterprises. I feel that they are not matching in broad purpose the farmers of the Old World, where, on the British farms, the renter handles sometimes as high as 400 acres and applies capital and energies on a broad scale, reaping often 45 and 50 bushels of wheat to the acre, and other crops in proportion. In my mind the farmer who is surrounded by the conditions that ought to call him out at his best, but who is at his poorest, is the farmer of New England. Our farms of 150 acres, at least, are not comparable with the farms of our sons in the West, of 160 acres, because every acre of these farms is farming land. Our farms measuring up to the western sections of 160 acres, contain really about 35 or 40 acres of actual tillage land. Our farmers are farming on the low level of a ton of hay to the acre, a crop far below the intellectual capacity of the men of New England. When I talk to our farmers in New England, I feel like saying with Carlisle, "The best that is in thee, in God's name, out with it!" I have asked many a farmer in the State of Maine during the last two weeks that I have been around with your very able Commissioner of Agriculture, what is the number of the cows of his herd. The answer has been ten or twenty cows, perhaps an average of 12 to 15, or generally not more than ten. Mr. Merrill tells me that the creameries of Maine average 167 pounds of butter per cow. That is getting down pretty definitely to the producing power

of the cows of Maine. At 30 cents a pound this would be a little over \$50, and the revenue from ten cows would be a little over \$500. You may add something more for collateral returns, but we may assume that the income of the man who has fifteen cows is limited to seven or eight or nine hundred dollars, and of the average farmer it is not more than \$750. By the time he has paid his help and his grain bills, and reckoned the depreciation of his animals and of his team, when he comes around to the balance it is not surprising that the sons from all over Maine have been willing to leave the farm for a \$2.00 job; those who have inherited the old homestead and the love of independence are taking a job on the electric road, or such low paying clerkships as may offer. We find that for the last ten years the index figures of prices of commodities indicate a change in values that shows that the products of agriculture are rising faster than any other single commodity on the markets, with one possible exception; meaning this to you and to me,—that the taking up of new land and the increase of production are hardly keeping pace with the consumption, and that we have reached that era when consumption is outrunning production. Though we have passed through a time of financial stress, farm products have held their level better than any other class of products, without artificial support. All of this means that we are on permanently higher prices. These prices are on as high a level as we need to have and, as I believe, as we ought to have; for the manufactories of the world are giving us cheaper goods and we are asking higher prices for our goods. It is up to the farmer to produce more and in methods that net a better profit. It is evident to me that there can be no final solution of successful farming in New England that does not rest upon an enlarged effort on the part of the farmer. I do not mean enlarged farms, but the concentration of intellect upon every acre of land until you have received from it its utmost possibility.

But this is generalizing, and I need to be as concrete as possible. To make you understand distinctly what I have in my own mind, I will do as I often do in Maine, approach this question by one or two roads. Take the line of butter production. I believe the farmers of Maine are concerned primarily not so much with the amount of butter an improved cow will produce

as with the number of pounds of butter they can force out of an acre, crops being the measure of farm possibilities. Now I shall outline to you, merely for illustrative effects, the line of rotation I am pursuing, and my practice is exactly along the line of production from the acre point of view. Still further to show you the possibilities, and not for any personal vanity I may have, I will say that on my own farm I have increased the productive capacity eight-fold in the last fourteen years. I have observed a Maine gentleman in the audience who drove up to my place, Mr. Blossom of Turner, and I speak in his presence when I say that this farm has increased eight fold in the last fourteen years under the most adverse conditions, being distant from market, etc., and he is free to challenge any statement I may make. I have an eight years' rotation and I fertilize every acre every year. I am going through an acre to show you what we ought to do. In the beginning, however, all that I have to say is based on the thought that every acre of the farm must be put at work to the utmost that is in it. Those acres should include that part of your woods adapted to tillage. That part of the woods with their valueless material for income purposes must be swept out, and the woods pushed over to non-tillable sections of the farm. Every acre of your pasture that can be so used should be forced into tillage. A acre of pasture land which makes a cow work hard all day for meagre results is not profitable, indeed is an embarrassment often as one is led to lean on it. Those acres ought to produce ten or fifteen fold their present returns. They are yielding just what nature gives you in New England, and that is a very small amount. Do you suppose that nature farming on the hard soil of this section will support the present civilization? It does not do it on the most favored areas of the world. It is art and not nature upon which successful farming rests. Let us make the pasture land field land, no longer repressed by a name, and get something from it. I am carrying every acre of my pasture that I can into field. I have put fifteen acres into field this fall, several acres of which cost me \$100 to fit for fields. In the last 14 years I have handled 140 acres. I know that out in Illinois land is selling for \$150 and \$200 an acre. Every acre of my farm is worth to me \$200 to use. It is better than money in the

bank at 3 per cent interest. An acre of land here is worth more than an acre in Illinois or Nebraska.

We understand, now, that every acre of the farm is to be put to work. Now, then, my first acre of the eight years' rotation is in corn. On that acre shall go six loads or ten tons of yard manure, coming out of my liquid-tight pit, all the liquid and solid saved together, and behind it will follow a corn fertilizer, 500 pounds broadcast and 150 pounds in the furrow. You see, my friends, I fertilize every acre every year and every acre is going up a yearly incline of yields. By your process of fertilizing once in six or seven years, possibly, you are going down yearly for six years. That is the wrong way to travel in this twentieth century. You note that I use six loads of barn manure per acre. You apply 40 tons to the acre, in one application. In this case you use 400 pounds of the costly plant food, nitrogen, which costs twenty cents per pound in your purchased fertilizers, and which is subject to leaching in the spring and fall rains and oxidation into the air. Is this good philosophy and good practice? No; better apply often and more moderately. In fact, the best way is every one to three years, accompanied with an annual application of fertilizers.

We will get from this acre an equivalent of five tons of hay. The second crop is oats and peas; peas because it is a leguminous crop, a nitrogen gatherer and protein crop, which with the oats in the winter forms a good feed to balance the ration as well as a good crop to enrich the soil. I apply for this crop five to seven hundred pounds of chemical fertilizers, after the grass order but not containing so much nitrogen. The yield should be three tons. The following crop is clover,—not clover and timothy but timothy enough to fill in, in case of winter-killing of the clover. I use half alsike and half red clover, and apply 500 pounds of a mineral fertilizer containing none of the costly nitrogen because the clover will take care of itself in this respect, drawing its nitrogen from the air. In two crops of clover you could get four more tons. Clover is a great fitting crop for potatoes, so we will let potatoes follow. For potatoes you may apply barnyard manure in the fall or winter on the unturned sod, 6 loads as before, and of course turn it under, but it should never be applied where it will come in contact with the seed

potatoes. Then add 1,500 pounds of special potato fertilizer. You should harvest 250 bushels of potatoes, at 50 cents per bushel, or \$125 for the crop. The following crop will be Hungarian, and we will apply now nothing but yard manure, receiving three tons more. The next crop is timothy, and as manure in high farming is now more abundant, I may if in hand apply yard manure, 6 loads in the fall with a manure spreader, or if not in hand use 500 to 700 pounds or more of a grass fertilizer. The seventh year we have timothy again, with the same amount this time of fertilizer. This gives us two acres to sell, at 3 tons to the acre, or 6 tons worth a little over \$100. I do not feed timothy hay as the market wants it at a fair profit. The eighth year I apply the same amount of fertilizer, and turn a field capable of yielding 2 1-2 tons to the acre into pasture. The cow will fill herself up in a short time, lie down and rest and get up to fill the pail. It will carry a cow or more to the acre. You have now three cash crops from which you will realize \$225, or a little more than \$28 per acre for the eight years. We started out with less than \$8 to the acre, and we have got cash out of that acre from three crops that average about \$28 every year for the eight years. But we have fifteen tons of foods unsold in the crops of the eight years, or nearly two tons per year. With your old fertilized pastures and your field pastures this food will keep 80 per cent or four-fifths of a cow the year round, and being varied, good foods will give you, from good feeding and good cows, \$75 per cow in butter. Then you will realize 80 per cent of \$75, or \$60 to the acre, and about \$28 from your sale crop. In other words, you have lifted that acre up from a ton to the acre, annual crop, to three tons, and by feeding these acres every year, as you feed your cow every year, you have lifted that \$8 per acre up to \$88. You may take off something from this fine showing to meet various seasonable and other drawbacks found in farming. While this is a little bit of book farming, yet there is not a figure that a man can successfully challenge. It is attainable as a separate possible attainable result, yet I am aware that the returns will not average that every year. As it will not cost over \$40 to the acre to handle this system, the result will be above the necessary and the great preacher might feel above the desirable, who would have man

possess "neither riches nor poverty." But it is to be remembered that the result comes from annual manuring and the best production of the annual crops, and the best feeding ones of the world for your dairy cow. If you have forty acres, you will have forty times the amount given above, and if you have 100 acres, you will have 100 times that. It is too large, so large that it will be said, "This is a professor farming in the clouds." I suppose that everywhere in an audience like this there are men who will say, this is romance in farming. I do not feel that way. It is simply an estimate of what intellect and ambition in farming ought to do when their disposition is to make of one's self all that is possible. High farming means capital, labor, tools, plant food, better social standing, for broad farming means broad men and better farming means better and higher thinking.

You want to build the man up,—begin by building upon the piece of nature that the good Lord has put in your possession. But you say I offer you the unattainable, as the plant food is not available. Let us see. I use six sources of plant food, the first being crop rotation. Crop rotation will give you more to the acre than non-rotation, but do not transplant my eight year rotation into different conditions. Form your own on foundation principles and follow out a system of rotation that rests upon the law of nature, your tastes and markets, and you will get more to the acre than in any other way. When you have fixed a good rotation you have cheapened the cost of farming wonderfully. In that rotation the crops should so succeed each other that you are never hurried in operations and never without an economic piece of work. Under my rotation seeding and harvest are almost continuous every day from the first day of April, when we get on to the land, until the ground freezes in the fall, and our horses are kept ever at work. What about the man who has two or three acres of plowed ground and the same amount of grain? He has kept two horses the entire year round, and before he has struck the plow the horses have eaten up often the gross income of the plowed area. But by this system of rotation that keeps your team at continuous work, the horse power cost on an acre of ground is reduced one-third from what it is under ordinary farming, perhaps still less. It

also settles the labor problem to a large extent. The hired men are kept busy all the time in labor that counts in dollars, not on those odd jobs over which they linger and from which no profit shows. We complain of the labor problem but give the laborer no steady work the year round. A right rotation and broader farming means that a little cottage house goes up and the wife of the laborer at home with her children relieves your own wife. Thus attached to the farm by family, his home and regular work, you come to have permanent help. I am not here to discuss the labor problem but when you develop right farming the labor problem in a large measure settles itself. When machine farming is rightly developed the price of labor will not be so material, as the labor cost will be in less ratio to receipts and depend more upon machinery. Manufacturers do not magnify so much the labor, as labor bears so small a ratio to total costs. Your labor cost will not be in so large a ratio to output when you perfect your methods and pay the laborer wages and can give him work steadily. The trouble is with ourselves in this matter as much as with labor. It is up to us to solve the problem.

Second, tillage is manuring; manuring because it opens the soil to air, oxygen, carbonic acid and other agents of decomposition. I till four years out of eight; not four continuous years because in that case the oxygen and carbonic acid would dissolve the soil and form soluble plant food that we should lose by leaching and volatilization. I alternate tillage with cover crops, so that one helps to form plant food and provides it for the next crop. I use irrigation because it carries plant food upon the soil and yields it to plants, as a third source of plant food. Muck, also, in connection with potash and phosphoric acid which are wanting in mucks, is used for the humus and nitrogen contained.

Then, too, fifthly, this fertilization is helped out very largely by the purchase of protein foods for stock. No better illustration can be given, perhaps, than the results which I obtained during my first year on the farm. My farm is a family inheritance and I am there because I believe there is no place in the world where the permanency of the family is so secure, morally, physically and intellectually, as on the farm. And I am applying a labor of love, if you please, pulling rocks out, draining land

and building up fertility, buildings and a farm, capable of maintaining a family of culture and opportunity, because I think that as a family property it is better than dollars in the bank. But this statement of motive is a digression, and I return to fifthly. On my return to the farm I found I could buy my nitrogen cheaper in cottonseed meal than in any other form. A ton of cottonseed meal contains 125 pounds of nitrogen. This material costs more than twenty cents a pound in the fertilizers on the Maine markets, making \$25 worth of nitrogen in a ton of cottonseed, and there are four or five dollars worth more of potash and phosphoric acid. You can buy a ton by the car and get it for \$29.50 per ton, and it is a good fertilizer to use directly on the soil provided you balance it with the minerals. The material nitrogen is there, and it is as cheap to use direct as a fertilizer, as a source of nitrogen and a partial source of other materials, as the fertilizers on your market, and I have so used it. The point is this: When I returned to the old farm I could not feed it fast enough, and so I used cottonseed meal, applying it directly to the soil, as a cheaper source of nitrogen than fertilizers. But the cow takes out only about 20 per cent of its value when she is well fed, and the rest is turned back to the soil in the fertilizer. You have 80 per cent of its value to use on the farm, provided you put the excrement in such pits as I have mentioned and save it all. I know some will question this, but my advice is to buy and bring on the farm protein foods, first of all cottonseed meal, then linseed, then gluten, brewers' and distillers' grains, bran, and last of all corn meal, which is way below bran in fertilizing value. If you come to my place you will very seldom see a pound of corn except in the horse stable. I am feeding the farm through the cow. The number of cows one keeps will depend upon the fertility of the soil, and feeding the farm is the first step in high farming. And so we feed the farm through the cow.

But, sixth, the corner stone of the system rests upon chemical fertilizers. Pardon me for speaking personally. I used 100 tons last year on my own farm, which is 15 miles from market. I speak of this as the measure of my confidence in them. There is no aristocracy of plant food to the plant. It must get its food in solution, it cannot get it in any other way. What cares the

plant whether the material comes from Germany or the stomach of the cow? Chemicals are plant food, and if bought and used right they are profitable plant food. Otherwise I should have been in the bankruptcy court long ago. That is all that I have to say along this line. But I stand everywhere as an exponent of a larger purpose and effort on the part of the splendid men of the farms of New England as the means to the higher and fuller life they desire to live; not for larger farms necessarily, but for a larger effort on the farms they possess, knowing that they can attain more wealth and live life on a higher horizon, one on the level of the very best class of workers in our cities, and when they accomplish this the drift of the boys will be towards the farms instead of from them.

Now I must turn hurriedly to the consideration of a few problems in the feeding of these cows. Over in New Hampshire where I reside, our crops were cut about in the middle by a tremendous drought and the problem arose, "What are you going to do about it? Are you going to sell all those young animals? Are you going to sell your cows or feed them low this winter and thus save your fodder?" I suppose you have the same problem here. Several experiments, notably one made in Missouri, have shown one truth that I think is a truth, that if you feed one growing animal very high and another one medium, not poorly (I am not talking about a starved animal but a medium fed one) the next summer on good pasturage the high fed animal will not grow as fast as the medium fed one; and the medium fed animal, just kept fairly growing, may nearly catch up with the well fed one if the pasture is a good one. I believe it to be a general law that an animal may be pushed by special effort to a point where the gain does not follow in the ratio of increased food fed. It follows, then, that those who have young stock should not starve them but may feed on a little lower level in emergencies like this than those men do who believe in pushing an animal to the utmost from the day it starts until it is fully grown. The same line of thought might be applied to an animal at rest,—a cow not in full milk or rather closing her milking period. If you have a cow giving 150 pounds of milk a year, get rid of her, especially in a year like this, but in no year has she milking value. But

profitable cows in full flow of milk, what of them? Shall they be fed low? A cow on maintenance ration will consume 15 pounds of fodder a day, to maintain her existence. But to keep her at her best as a producer of milk, she will average to consume 28 or 30 pounds per day. One-half of that ration is for maintenance, the other half goes to production. Now shall we cut down this ration of production, in order to carry our cows through the season? I say no, because after we have given so large a volume of food as is required in the maintenance ration, it seems folly to fail to give the rest that goes to profitable work. Now how far can you go with an increased ration and keep within the limits of profit? That question has been asked by Prof. Hills of Vermont, by the Canadian Experiment Station, and two or three others. I remember the day when the teacher of animal nutrition said that on account of the large amount required for maintenance the only practical policy is to give the cow all she will consume. As the quantity of food is increased, the ratio of that which is used for production is increasing; so they say, put into the cow all the fuel you can. But recent experiments have shown that there is a point after which you can feed a cow when that ratio of production shows a decrease. That is, if 24 pounds would give a pound of milk for a pound of food, a ration of 30 pounds might not show as well. The result of such experiments when first seen by the high feeding reader leads him to the reduction of his ration. Is that wise? There is one factor which these gentlemen who are carrying on researches do not mention. I do not know as it is their business to mention it. They give you facts and you do what you please with them. If a cow when she first drops her calf gives a large flow of milk she begins to decrease in weight, and trials have shown this decrease to be a pound a day for two or three months. Under high production and low feeding she may lose in a short time, in the course of two or three months, 100 pounds. Sir John Laws and others have shown that it takes ten pounds of food to produce a pound of growth. The man who takes that much off the weight of his cow will have to put it back again at the expense of 1,000 pounds of food. Now is this policy to feed low and seem to get good economical results, and afterwards have to put your hand into your pocket, or the

hay mow, and make it up, a wise one? I think it is better to feed the cow well during this first period. Keep her body up, keep up that reserve energy, and then you can hold her milk flow through months better than you would if you let her go down. But where to stop in your feeding no living mortal can tell you. I cannot, and I do not think any one else can. Just where the border line between profitable and unprofitable increase of food is I do not know. That is a question for your own study, and it is the beauty of farming that there are no absolute mathematical rules which can be laid down, but it requires always home observations and the use of the wits. After all, your own common sense and your keen observation of passing events must be drawn upon. I am down here at perfect ease away from my herd because my cows are handled in this way: I chalk up before every cow the amount of grain that she shall have, and that amount of grain is according to her milk flow. If she gives six pounds of milk she will get two pounds of grain, if she gives 12 pounds she will get three pounds of grain, and if she gives 45 pounds of milk she will get 15 pounds of grain. Now feed is very high, and when you see the grain going at the rate of 12 or 15 pounds a day you begin to shrink, but if you know that every cow that is getting that amount is making good, you have no anxiety about the matter. When it comes to feeding roughage I say to the man, feed your roughage as you feed your grain. The grain indicates what the cow is doing. If she is giving a small amount of milk as shown by the figures, do not let her gorge herself, if she has a good appetite. Your judgment must come in to quite an extent. The matter of feeding is a large question. I will close with the suggestion that I have found for myself another way out of this shortage of hay problem, and partly out of the problem of the purchase of concentrates. I found I could buy in Ohio and Indiana clover hay so as to land it at my place for \$13 1-2 a ton. I believe it would be good policy to buy this clover hay for two or three reasons: First, it is a better milk producer than timothy hay, and I am buying clover at \$13 1-2 and selling timothy at \$20. Second, clover is a rich fertilizer. It is nearly twice as rich in protein as timothy, and if I get the protein the cows must have part in clover hay, and I will not have to buy quite as much in concentrates.

Ques. What will timothy hay net at present?

Ans. Twenty dollars in our market. I feed but very little of it as we have corn, clover and hungarian.

Ques. Can you get hay through from the West now?

Ans. I do not know. I got mine through before the market went up sharply, and I see it is reacting. I presume clover hay can be taken from states where there is no infection. Clover hay at \$13.50 instead of making a loss with good fodder and good cows will give you a profit.

Prof. HURD. I would like to say that it is impossible to get clover hay through from the West. You can get it from Aroostook county for \$8 or \$9 a ton.

Ques. Do your oats and peas lodge?

Ans. Not very much.

Ques. What proportion do you sow, and do you sow them together?

Ans. I sow a scant bushel of peas and a strong two bushels of oats, and sow them together. It is held to be a better practice to sow peas a week ahead, but we cover a lot of ground and I let it go.

Ques. Are the peas and oats fed as hay?

Ans. They are. I have not husked an ear of corn for 30 years nor threshed a bushel of oats and peas.

Ques. Do you have any trouble with peas moulding when they are sowed at the same time?

Ans. There is nothing ideal. We get along very well; some years they are difficult to handle but nothing so difficult as to offer serious objections.

Ques. What would you feed the heavy milking fresh cow to make her hold her flesh?

Ans. I am feeding now one-third cottonseed meal, one-third bran, and for the first time for years I am feeding some corn meal. I have a very nice grade of corn meal. If you get your ration too large in protein I think it is helped by a little corn meal. I feed about 1-3 in weight.

Ques. What would be the limit in feeding cottonseed meal?

Ans. I feed as high as six pounds a day; anywhere from two to six pounds for the total day's feed. I feed only twice a day.

I might have said that the water for my stock is driven up a hill two-thirds of a mile by a hydraulic ram. We turn the water on in the morning and again at night, but do not keep it before them. I give them nothing whatever at noon.

Ques. Do you turn your cows out.

Ans. Not in the winter. I have a barn which is very light. It is 38 feet wide and has a wide walk and a wide passage and it is as light as out-of-doors. And while it is not according to my theory we grow lazy and do not turn them out much.

Ques. What is the cost of your chemical fertilizer?

Ans. We use one for clover and another for potatoes. It varies from \$23 or \$24 up to \$35 or \$36, according to the proportion.

Ques. What do you use for potatoes?

Ans. I use a 3.6 nitrogen, some over 4 of ammonia, and about 9 of phosphoric acid and about 8 of potash. That is not your Aroostook formula, but I am a firm believer that we have over-estimated the value of potash. We are putting too much in and too little phosphoric acid, and I want a little more nitrogen than the Aroostook people.

Ques. Do you ever get any bad results from phosphoric acid?

Ans. Yes; my farm is short of that and I began to use it very liberally and also used muriate of potash. I am discarding the muriate and the soluble phosphoric acid, and am using simply insoluble or partially soluble phosphoric acid. Those forms of fertilizer hurt my soil and I have cut them out.

Ques. Do you use any lime?

Ans. No, sir. My soil is slightly acid and I have used lime and it helps us some, but when I can get ashes at right prices I like to treat my clover with ashes, instead of the lime. Of late years ashes have cost too much and I buy a plain phosphate. The acid of the soil will dissolve this. Then we are using basic slag, and I think we are handling this problem so that we can have clover on the farm.

Ques. What is the analysis of the fertilizer you use for corn?

Ans. From memory, I should say that where I use it with manure I use 4 per cent potash (I put on more potash than any-

body else), phosphoric acid 10 and 12, and nitrogen about 2.6. Corn is more likely to need a rich potash fertilizer than potatoes.

Ques. What variety of corn do you use for silage?

Ans. I use the Leaming and the Sanford mixed. One is a rank grower and the other is rich in ears and the two together make a very good silage. Then we sometimes put in some Minnesota corn, Pride of the North, putting the three seeds into the hopper together.

Ques. How many quarts of seed to the acre do you use for your ensilage?

Ans. I want to get the ensilage to stand about a stalk to every six inches, anywhere from five to eight inches. You may increase the number of stalks to the acre and not affect the total yield very much. The stalk will grow larger if it is not a thick stand, and you can vary between certain points without affecting the total yield very much.

Ques. Can you get as good a catch with peas as with oats alone?

Ans. I can get a good catch almost invariably if the land is well manured and the soil is fine, and the dirt is rolled.

Ques. After you roll do you ever disturb the soil?

Ans. No, sir, though I wish I could. The roller presses the soil around the little seeds and gives the roots something to feed on; also when you press the soil together the water by capillary attraction comes up around the seeds more freely, and thus the presence of food and water is ensured. But after the seeds get started I would rather not have it rolled. For tillage crops we have a remedy, but after a grain crop is up I do not think it is advisable to harrow.

C. L. JONES. I feel a good deal as my Brother Gilbert expressed himself last night when he said it was a pleasure to grow old, especially when you have some friends who remember the work you have done. I have felt that way myself as I have listened to the speakers today. The subject upon which Dr. Twitchell has spoken is near to my heart and one in which I have been much interested since I began to do what I term progressive agriculture. The corn crop has had in my rotation a place, and a large place, for several years, and I think has done me a great deal of good. Next came the cow question, and I

have tried to improve my herd very much after the ideas advanced by the speaker. Then came Prof. Sanborn, with remarks just in line with the ideas which I have attempted to practice upon my own farm, the production not of the individual animal alone but of the acres, the value that may be reaped from the acres. Therefore, I have been very much interested. I believe the ideas that have been expressed, if put into practice on the farms of Maine, will place this State as one of the first states in New England, or the East, as an agricultural state.

C. E. TRIPP. I have enjoyed very much the addresses which have been given here this forenoon. Nearly all of them have coincided with my experience. I was particularly interested in the paper on the growing of corn, because I believe that the raising of yellow corn means much to the farmers of Maine. I believe it is possible for the farmers of this State to grow as large crops of yellow corn as have been reported by the speaker here this morning. In fact, I know it is, because I have grown them myself. I know that it is possible, with proper cultivation, for the farmers of Maine to raise 100 bushels of shelled corn to the acre, and I believe that when a farmer can do that it is better and cheaper for him to do it than to buy his grain from the West.

My experience has taught me, in accordance with what the speaker on the Breeding of Stock has said, that a herd of cows can be brought up to a high standard, even if you start away down, by using a pure bred sire. This is what the farmers who are not prepared to purchase full blood dams should do. Take the best cows that you have in your herd and by keeping a pure bred sire at the head you can in a very few years obtain a herd which will be nearly equal to a pure bred herd so far as production is concerned.

CORN.

By Prof. WM. D. HURD, Orono.

James G. Blaine once said, "Corn will yet be the spinal column of the nation's agriculture."

This seems to be a good year in which to boom corn in Maine, and the talk that I am to give this afternoon is one in which I hope to give you some information about corn. Perhaps some of you have not understood all that is necessary in the improvement of corn, and I hope what I may say will have some effect in booming the corn industry in our State. There opens today in Omaha a National Corn Exposition. This will be the largest exposition of the kind that has ever been held in the world, and as preliminary to what I am going to say I want to read from a premium list of this exposition which I hold in my hand. The first page is a sort of greeting from one of the leading corn breeders. "Corn is so common with the average farmer that he seldom stops to think of the possibilities that lie within the little germ or kernel that he annually plants in the ground. Adding one kernel of corn to every ear grown would mean an increase of five million bushels in the United States."

"Think of what all this means not only to the corn grower but to every merchant and professional man, in fact to every man, woman and child in the country."

Corn is the great American crop. Its history is interesting. Corn was unknown in Europe before the discovery of America by Columbus, but was no doubt grown by North, Central and Southern America since prehistoric times. The early American explorers found the Indians growing fields of maize. Squanto, an Indian chieftain, taught the Puritans how to grow corn in 1621. When Cartier visited the region which is now Montreal he found extensive fields of corn. Champlain found corn fields east of the Kennebec river in 1603. In the Pequot war (1637) the English destroyed over 200 acres of corn planted by the Indians. The Puritans harvested some one thousand acres at the time of King Philip's war, which had been planted by this tribe. La Salle on his trip of exploration to the Great Lake

region and what is now Illinois (1697) found large quantities of stored corn in a village of the Illinois Indians and took about 40 bushels with him. Columbus in reporting his discoveries to Ferdinand and Isabella speaks of fields of corn some 18 miles long. Indian corn is adapted to few other countries than our own, and while many attempts have been made by other nations to raise this crop, America still holds supremacy. While the region in which corn is principally produced has shifted from the eastern states to the central, yet it is a crop which is still and even better adapted to New England than it formerly was.

USES OF CORN.

The uses of corn besides those commonly known are diversified. It enters into the commercial life of the time more than any other of the farm crops.

The grain of corn affords wonderful possibilities. "There are thirty odd products made from it, as follows: Six kinds of mixing glucose, used by refiners of table syrups, brewers, leather manufacturers, jelly makers, fruit preservers, and apothecaries; four kinds of crystal glucose, used by manufacturing confectioners; two kinds of grape sugar, used by brewers principally and tanners; anhydrous sugar, used by ale and beer brewers and apothecaries; pearl starch, used by cotton and paper mills; powdered starch, used by baking powder manufacturers, cotton and paper mills; refined grits, used by brewers instead of brewers' grits; florine, used by flour mixers, without detriment; four kinds of dextrine, used by fine fabric, paper-box, mucilage and glue manufacturers, apothecaries and many others requiring a strong adhesive agent; corn oil, used by table oil mixers, lubricating oil mixers, manufacturers of fiber, shade cloth, paint and similar industries where vegetable oils are employed; corn oil-cake, used in gluten feed, chop feed and gluten meal for cattle feeding purposes; rubber substitute, used in the place of crude rubber, and extensively used; corn germs, from which oil and cake are obtained; British gum, a starch which makes a very adhesive medium, used by textile mills for running colors, as well as by textile manufacturers who require a very strong adhesive medium that contains no trace of acid; granulated gum, which competes with gum

arabic, and is used successfully in its place; distilled spirits, used in the manufacture of smokeless powder; fusel-oil, used in the manufacture of Bourbon whiskey; alcohol for commercial uses, in the manufacture of cologne spirits and high wines; corn meal for food purposes, corn down, the brown husk or outer coating next the cob, used in the manufacture of mattresses.

Of equal importance and value is the stalk. The following is a possible list of the products now being manufactured from what has been considered only a live stock ration of but small value: Cellulose, for packing coffer dams of battle-ships, preventing them from sinking when pierced by balls or shells; pyroxylin varnish, a liquid taken from cellulose, the use of which is practically unlimited; cellulose for nitrating purposes, smokeless powder, and other high explosives for small and great arms; cellulose for packing, being a most perfect non-conductor against heat, electricity, jars or blows; paper pulp and various forms of paper, alone and mixed with different grades of paper stock; live-stock food from fine ground outer shells and joints; leaves and tassels made into shredded baled fodder; mixed feeds for live stock, for mixing with blood, molasses, distillery, and glucose refuse, sugar beet pulp, apple pomace, etc.; poultry foods of two types. Each of the above may be subdivided into a variety of purposes.

Lastly, the cob is converted into several articles of commerce. Aside from being pressed into service as an emergency cork, its chief use is in the manufacture of pipes, known to the trade as "Missouri meerschaums." Three tons of cobs are equal to one ton of hard coal, and the ashes are easily convertible into potash. This is the experience of people living on the prairies of the West, where they have found them a valuable substitute for wood and coal. One hundred and ten commercial products made from corn were shown at the Paris Exposition.

Of the 3,886,183,000 bushels of corn produced last year, the United States grew 2,592,320 bushels, or approximately 70 per cent of the world's production. Corn in this country had a value last year of \$1,336,901,000. This amount is against \$554,437,000 for the wheat crop, \$334,568,000 for the oat crop, \$184,184,000 for the potato crop, and \$743,507,000 for the hay crop.

The principal corn producing states are Illinois, Iowa, Missouri, Nebraska, Indiana, Kansas, Texas, and Ohio. These produce on an average from 21 bushels to 36 bushels to the acre, at a value per acre of approximately \$15.00.

The New England States, while, of course, not producing a sufficient number of bushels to be ranked with the leading corn producing states, yet in yield and value of crop per acre outrank any of the other states. The yield per acre in New England ranged from 31 bushels in Rhode Island to 37 bushels in Maine, with a value of \$24.75 in Connecticut to \$27.75 in Maine, an average of \$26.30. The price per bushel in New England has steadily advanced from 44c. in 1898 to 75c. in 1907, and the increase in value per acre has been about 33%. Further statistics and figures need not be given to prove that there are great possibilities in corn growing for New England and especially for Maine.

Now the excellent corn that is being shown here has not been grown simply as a matter of chance, but it has been grown through a long period of careful selection. There are six types of corn in the world today. I happen to have samples of all six types here on the table.

1. Pod corn. If you will look back on the table you will find some ears of what is known as the pod corn. This is supposed to be the original type from which all our types of corn have come. In this each kernel is enclosed in a husk.

2. Soft corn. The nearest to soft corn we have today, perhaps, is the so called "soft corn" of the South. This was the kind which the Indians usually grew.

3. Pop corns. The third type is the pop corn of various colors and kinds, with which you are all familiar; the small, hard kernels.

4. Sweet corns. Those composed largely of translucent, horny material, and containing considerable quantities of sugar instead of starch.

5. Flint corns. The hard, flinty type, in which a thick corneous coat surrounds the kernel. It is early maturing and particularly adapted to northern latitudes.

6. Dent corn. That which has been developed in the great corn growing region of the country. It usually requires a

longer period in which to mature and has the advantages over the flint types of producing a larger amount of fodder and considerably more shelled corn to the acre.

The flint and dent types have undergone much change due to the breeding work on corn of the last half century. The dent type has come to be the ideal of corn production now. The flint corns have been grown in New England ever since the country was discovered, and the dent type is universally grown throughout the states that I have mentioned. There is not very much difference between the flint and the dent corn so far as composition is concerned. The cool weather and variable climate have tended to develop a corn with a corneous kernel, and more favorable corn weather has allowed to be developed the dent variety. The chief difference between these two is the fact that with the dent type there is produced considerably more shelled corn to the acre. Suppose you have the same number of ears produced on an acre, the weight of shelled corn from the dent will be considerably greater. The number of kernels on an ear of the dent ranges from 900 to 1,000, and sometimes 1,400 on extra good ears. On the ordinary eight or twelve rowed flint corn we find the number of kernels to be three or four hundred, possibly five hundred. The individual kernel of the eight rowed flint corn might weigh more than the individual kernel of the dent type, but in shelled corn per acre the smallness of the cob and the size of the ears give a considerably smaller production than with the dent corn.

I might say in this connection that in preparation for this address I have been making a special study of the flint type, and have weighed several ears, selecting those as nearly alike as possible, and it is astonishing to find the number of bushels of shelled corn to the acre. The standard for the dent varieties is 90 per cent. It used to be 86 but has been raised to 90. Of course the extra amount comes from the smallness of the cob and the number of kernels. The flint types being grown in Maine run from 80% to 85% shelled corn which is good.

I am sure you will all admit that there is need of improvement in the corns that are being grown in the country today. In this State, for instance, it is the too common practice to send to a seedsman of the surrounding towns and buy seed that has been

brought in from outside without any respect to what it produces or is worth. I want to devote the most of the time allotted me to a discussion of the methods that might be used by a farmer to improve the corn crop. Dr. Twitchell spoke of some of these things. I will try to explain them a little more minutely. The first thing necessary, when a man attempts to improve any crop or animal, is to understand something of the nature of the plant or animal. Just a word about the structure and the habits of the corn plant. It is a plant that varies from two or three feet up to 18, 20, or 24 feet in height, in some varieties. The original habit or intention of the corn was to produce an ear at each of the joints of the stalk, and if you will cut crosswise right above each of these you will find a small, undeveloped ear; so that if one ear is destroyed you often find another coming out. We have bred the corn for one or two ears to a stalk and the others have not developed. The ears in the beginning were small; now we have larger ears and fewer of them. One of the principal things to understand in the improvement of the corn plant is the method by which the ear is formed, or the method of fertilization. The corn plant is one which bears both male and female organs of reproduction on the same stock. The tassel is the male and contains the pollen. The silk is the female organ, and corresponds to the pistil of the flower, which is fertilized by having the pollen shaken down over it, and in that way the kernels of corn are formed. There should be one silk going down to what will ultimately be a kernel of corn, and if for any reason these silks are imperfectly fertilized, you get the nubbin or the imperfectly formed ear. For the reason that the pollen is produced above the pistil, there is a great chance for inbreeding in corn. There has been a great deal of dispute as to whether the pistil was in proper stage for fertilization when the tassel ripened or not. I believe scientists are still divided about this, but certainly self fertilization is a possible thing, and there is nothing that will run out the vigor and vitality of a strain of corn any quicker than this continued self fertilization. Inbreeding with the corn plant results exactly as inbreeding does in your dairy herds or with any other animals. In any effort to improve a variety of corn one of the first things to do, then, is to avoid this inbreed-

ing, and that is usually done by removing the tassels. Of course this could not be done in large areas, but in an attempt to improve a strain of corn only a small area should be used; an acre would be plenty, half an acre better. It should be planted away from any other piece of corn.

Dr. Twitchell told you about taking out the suckers or imperfect stalks. That is simply to avoid the fertilization of the ears with those that are not strong. One plan is to go through and detassel every other row. Another plan is to detassel one end of one row and the other end of the other so that you get ears and pollen on both rows. One of the first things to do in an attempt to improve corn is to prevent self fertilization.

Now another interesting thing about the corn plant is its root system, which has a great deal to do with successful corn production. Corn has two kinds of roots, the fibrous roots which are the feeding roots and fill up the soil to the depth of 8 or 10 inches, and the strong secondary roots that act as braces. They come out sometimes six or eight inches above the surface of the ground and hold the plant erect. A knowledge of the root system is useful in determining the kind of cultivation. If you will examine the soil in your corn field after the corn has been planted about six weeks you will find that the roots have passed each other in the rows, and if you cultivate deeply you prune off nine-tenths or at least three-fourths of the feeding roots. So that after the corn is well established nothing but shallow, frequent cultivation should be practiced. A great many experiments have been carried on by experiment stations in this direction and several of them indicate that a yield of 20 to 24 bushels per acre extra can be had where shallow, frequent cultivation is practiced, as against the deep cultivation of the corn. So remember in the cultivation of corn, that the root system is strong and fills the soil and cutting off the fibrous feeding roots is one of the worst things you can do.

In an attempt to improve corn in Maine a strain should be selected that is adapted to this region. For instance, a strain should be selected for Maine that will endure the climate and that will mature; one that under proper cultivation and with proper treatment will have possibilities in it for improvement.

After the individual strain has been selected, the first step is to get good seed. Other things are also important, but like produces like, and if you start with strong seed the chances are that you will have a stronger product in a year or two of breeding. Corn is one of the easiest things to improve. You can improve the yield, you can decrease the number of days it takes it to mature, you can increase the protein, you can increase the size of the ears, you can change their position, you can increase the amount of foliage, you can do almost anything you want to, provided you select for one thing at a time and have a definite ideal in your mind when you begin the selection. In this matter of seed, the first thing to consider is the vitality. The method of selecting corn from a crib, or potatoes from a bin, has gone by so far as successful breeding is concerned. I heard the other day of a man who went into his potato field and selected average hills, and he found that on an average about 7 hills out of 100 were producing six marketable potatoes. He selected the strong hills and the next year he found that 17 out of 100 produced six marketable tubers, the third year about 40 out of 100, and the fourth and fifth years he got it up to 65 or 70 hills. This will simply show the possibility in selection.

Now there is a great deal of individuality in ears of corn, just as much as there is in animals. If you will notice the exhibit of corn which has been brought in here, or sent here by the boys, you will find that while all the seed may have come out of the same sack, the ears are not of the same shape, the traces that come from the different farms are entirely unlike, the size of the kernels is different, and the exhibits are different in almost every way. So that the soil, the fertilization, the time of planting, and other similar things have a great deal to do with it. In the matter of selecting for vitality, we should go deeper than that.

RESULTS OF GERMINATION TESTS.

Indiana Experiment Station No. 110.

Lot No.	No. of ears tested.	Per cent perfect.	Per cent of 4's.	Per cent of 3's.	Per cent of 2's.	Per cent of 1's.	Per cent of total failures.
1.....	1231	22.7	28.7	23.6	15.4	7.3	2.4
2.....	1371	23.0	30.8	23.9	14.5	6.6	1.1
3.....	1298	69.0	22.5	6.7	1.5	0.2	0.07
4.....	1922	42.9	27.8	14.4	8.3	3.4	3.3
5.....	1279	35.7	31.8	21.3	7.7	3.0	0.4
6.....	1084	47.3	26.7	17.2	6.1	1.7	1.1
7.....	1006	49.7	29.8	11.7	6.1	2.1	0.6
8.....	1189	57.1	27.6	9.9	4.0	0.8	0.5
9.....	944	43.7	30.3	13.7	7.2	3.7	1.4
10.....	877	57.7	28.6	8.6	2.6	1.7	0.8
11.....	366	42.6	40.5	9.5	5.4	1.5	0.5
12.....	384	28.1	29.7	16.7	12.8	7.8	4.9
13.....	384	40.9	31.3	12.8	8.6	5.3	1.3
14.....	336	47.3	26.5	13.4	7.7	4.5	0.5
15.....	330	31.2	25.7	12.1	14.2	10.6	6.1
16.....	265	86.4	6.4	3.0	2.3	1.5	.....
17.....	223	91.9	4.9	2.2	0.4	0.4	.....
18.....	308	97.7	2.3	.....	.....	.....	.....
19.....	289	98.0	0.5	1.0	0.5	.....	.....
20.....	302	98.3	1.4	.....	.....	.....	.....

I have a chart here which shows the results of a large number of tests that the Indiana Experiment Station made to determine the vitality or prepotency of individual ears of corn. I took this experiment rather than one from some other experiment station because of the large number of ears under test. For instance, they took five kernels from near the middle of each ear, and in taking 1,231 ears they found that only 22.7 per cent of the 1,231 ears would germinate all the kernels. 28.7 per cent germinated four out of five. Let us glance at the chart. We will take, for instance, lot number 17; 223 ears of the test gave 91.9 per cent which would germinate. In lot number 20, of the 302 ears in that test, 98.3 per cent would germinate all of the kernels under test. That represents, as well as I have ever seen it, the individuality or the vitality of the single ear.

The first thing to do is to test out these ears of corn. We have some good traces of corn here, and if a man were to select ears to plant he could not do it entirely with his eye. He ought to take five kernels from each ear and germinate them, and notice the strength of the sprout. Perhaps some would germinate but would not have the strength to maintain the sprout. The method is easy and it pays many, many times. We take a box about two feet long and one foot wide inside

measure, and three inches deep. We stretch some wire or string across two inches apart each way. That makes little blocks or squares two inches on a side across the top. We fill the box with sawdust or soil, and we take the kernels out of these individual ears that we want to test for their vitality and prepotency, and we place five in each of these little squares. A box of that kind would test 72 ears, and you would find a large number of those ears that you would want to discard after that test. This is a simple germination test, and while it is useful it is not sufficient. The value depends on what the seed will do under field conditions, and the strain you desire to improve should be planted in either one of two systems, in a small plot, to determine the quality of the strain which you have selected to start with. One of these systems is a plot test and the other is a row test. Take one of the ears you found best from the germination test and plant a plot ten hills square and you might have twenty or more ears under test in that way.

The other method is to take one ear and plant a single row from this one ear. Now give these plots good cultivation and fertilization, take off all the weak stalks, all the suckers, and at the end of the season go into this plot and select right there as the plant stands, for the height of the ear, for the strength of the stalk, for the position of the ear on the stalk and early maturity. You can take into consideration all the characteristics of the plant that you cannot consider when you are selecting from the corn crib. Of course this plot should be treated in relation to detasseling, etc., in the way I have mentioned before.

After the seed corn is fully matured in the field, the method of storing is important. There is a certain ear of corn here that would otherwise be a most excellent one but it has been poorly stored and was picked when it was too immature. That destroys the vitality and the planting value. The proper method of storing, of course, is to put it in a cool, dry place. When corn is harvested it contains 25 or 30 per cent of water. If that corn freezes before most of the water is out of it, its value as a producer will be badly lessened if not totally destroyed.

I was asked to take up especially at this time a few facts concerning what constitutes a good ear of corn. There has been

developed a score card to use on corn, just as for butter. It is said that the late Orange Judd was the first man to make one of these score cards. A number of changes have been made in them. I have one here for dent corn and one for flint corn. They do not differ very much except in one point. We have thought best to try to increase the circumference of the ear by increasing the depth of the kernel of the flint corn. The flint is much shallower than the dent. The different points of the card are as follows: [Here Prof. Hurd explained the chart.] First we take into account the uniformity,—whether all the ears are alike in length, etc.; then we consider the shape of the ear. Of course different varieties have different variety characteristics, and in the corn back here we have no standard to go by, so one must judge largely from his own idea of what an ear of flint corn should be. A good ear of corn should not be very much smaller at the tip than it is at the butt. In the dent varieties it should slightly bulge through the center. An ear of corn that tapers off indicates lack of strength largely; it also indicates that some of the rows have been lost, and you are losing in the production of corn.

The length of the ears in most types should be 10 or 11 inches. The larger amount of shelled corn that we are able to get now over that obtained formerly is due to the fact that we are getting the tips and butts well filled out. It is pretty hard to get a flint variety that does not have a pretty large butt, but the dent varieties have been bred until there is a small butt surface; also the tip is covered over so that the cob is entirely invisible. Some experts will say that is not very desirable. They like to see just the tip of the cob show, because if it is covered it shows that that corn has reached its maximum production so far as the tip is concerned.

Next, the kernels should be uniform. See that the kernels are uniform and that they are deep. Certain varieties have certain colors. The spaces between the rows should also be considered. A wide space, or as is often the case wide spaces due to the shape of the kernel should receive a certain amount of consideration. The ideal shape of a kernel of corn is wedge shape, so that it fits closely. If the kernel is round there will be a vacant space next to the cob. The maximum amount of

shelled corn is produced with the wedge shape kernel. The vitality of the seed is something that has to be taken into consideration. There are certain ears of corn in the back of the room that are excellent so far as all the other points I have mentioned are concerned, but they are very immature, and their vitality would be affected. The amount of corn to the cob is usually found by shelling every other ear in the exhibit. Weigh the ears before they are shelled, then weigh the cobs after shelling and subtract the weight of the cobs from the whole weight; then divide the weight of the shelled corn by the weight of corn in the cob and you get the proportion of shelled corn to the cob.

I have not said anything about silage corn. In this line we need considerable work done. So far as I know, there is not a first-class variety of silage corn being developed in the State today. We have certain kinds of corn that produce plenty of forage but have no ears and we get a poor quality of silage. Other varieties produce plenty of ear corn but yield a very small tonnage to the acre. There is a good field for some one in the breeding of a variety of silage corn, because more and more the Maine dairyman will depend in the future upon silage as a basis of his dairy feeding.

The sweet corn industry in this State is just in its infancy. Maine produces the best sweet corn of any state. New York and Michigan growers before the inauguration of the pure food laws used to label their corn "Maine Grown Corn." The bulk of the sweet corn seed comes from farther south, and the great trouble with the sweet corn industry today is the fact that about once in three or four years we lose a crop. By three or four years selection along the lines I have indicated it would be perfectly possible to take several days, if not two weeks, off from the period required to reach maturity of a sweet corn that would be acceptable to the canners, and it seems to me there is no better field open for the enterprising farmer of this State today than to enter into an experiment or a breeding test for the purpose of improving the sweet corn, because every bushel that he produces could be readily sold at a high price. At the recent corn show at Springfield, Ill., the ten best ears of corn sold for \$2,700. It shows that there is value and money in corn. I am personally interested in this matter, as I am work-

ing largely along the line of farm crops. I am glad that some one has instituted this work in the Maine State Dairymen's Association and I hope it will continue, and that in the course of ten years there will be many good varieties of corn being grown in this State.

THE ESSENTIALS IN MAKING AND MARKETING DAIRY BUTTER.

By L. W. DYER, Cumberland Center.

To the farmer who has had the opportunity of coming in direct contact with the consumer, little need be said on the first half of this subject—the necessity of making his butter good. On the making of good butter depends the prosperity, the very income, of the farmer who keeps cows for the production of milk. The consumer of butter has the right to dictate to the maker what kind of butter he shall make for him, for he is the man that pays the price. The farmer has been too slow to realize this. He has gone right ahead and made butter good, bad, and indifferent, assuming that the consumer has no choice in the matter, and would have to take what there was to be had. But as population has grown and consumers of butter multiplied, the demand for good butter has become more and more insistent, and today is so earnest that the effort of every farmer, and every butter maker, must be strongly enlisted in producing the only grade of butter wanted, the premium-taken brand, good butter. "Bring us good butter," is the demand from the consumer to the butter producer. The necessity of making a gilt edged article is seen in the satisfaction that good butter gives the guests at the table; it is seen in that relishable wholesomeness of cooked food that only good butter can impart; it is noted again in the request of the housewife shopping at the store and invariably asking for "the best" quality.

There is no greater necessity in the dairy world today than that of making good butter. So great is the necessity for good butter that the national government has established colleges where students may be taught those things that are needful to

its production. So great is the necessity for good butter that no one is now considered competent to make butter in a creamery until he has mastered the teachings at a dairy school and served an apprenticeship of one or two years in a creamery under the daily tutoring of an expert butter maker. So great is the necessity of making only good butter that out of the need of the hour has sprung the organization of dairymen's and butter makers' associations in every state where butter is considerably produced, their object being to improve that knowledge among their members that will enable them to make this good butter so greatly demanded. New ways of creaming have superseded the old; new ways of cream handling have displaced old methods; new ways of churning and working butter are now standard—all, the result of the imperative necessity of making good butter. The farmer's part in the production of good butter is first, keeping a sufficient number of cows to make it well worth while to provide for them a kind of feed and give them the care they should have. Second, the cows must be of a recognized milk-producing type. A cow that does not yield 200 pounds of butter fat during one year's period of lactation, can seldom be kept at a profit. The best dairy herds now produce over three hundred pounds per cow per year, and some have set a much higher mark. Third, the cows must have an ample supply of nourishing and palatable food, summer and winter, and plenty of pure water. For a palatable and nourishing food for winter use, there is nothing better than corn ensilage. Fourth, and fully as important as any of the many requirements in profitable dairy farming, is the care given the milk. Good milk, good cream, good butter, a trinity one and inseparable. It is not an easy task, this matter of dairying. It is not an easy thing to handle a herd of cows to get the best possible return from each, and it is not an easy thing to care for this milk and cream as it should be—as it must be—cared for, if good butter is to be produced.

But with the cream separator, the agitator cream cans, the barrel churn, the butter worker, seven and eight pound butter prints, the work has been wonderfully simplified. Each in his occupation must use brains, employ well his time, direct his business intelligently, and work with energy and persistence,

if he shall gain success. If the farmer shall do this, who is there to say that his will not be the greater share in so much of that material wealth, peace, prosperity, and that homely happiness in life and contentment in occupation as those may expect who are earnestly associated in making and marketing good butter.

In regard to marketing the dairy products there is very little to be said, for in my opinion a gilt-edge dairy product, either cream or butter, is as good as sold when produced. The supply of good butter never has exceeded and never will exceed, the demand. We are obliged to turn away good trade every month, for the simple reason that we are unable to produce the goods. The farmer's part in the sale of good butter is to so use his vote and personal influence in the legislation of this country as to forever make impossible the counterfeiting of pure butter made from pure milk, either on the farm or in the creamery.

My advice to the dairy farmer is, be more self sustaining, raise more corn, more oats, more barley; grind them together. How can a better food be produced? And in closing, will say, do as *I* tell you; not as *I do*.

MILK AND CREAM CONTESTS AND THEIR LESSONS.

By IVAN C. WELD, Dairy Division, U. S. Department of Agriculture, Washington, D. C.

I want to congratulate you most heartily on the large number of samples submitted in your first milk and cream exhibit. Comprising, as it does, more than 70 entries, you have outstripped in number every other state and national contest ever held. Regarding the quality of this exhibit, I cannot speak at any great length, because all the necessary examinations have not been made. I have, however, examined your exhibit for flavor and freedom from sediment, and in these two particulars I can assure you that it is fully up to the average of the contests which have been held throughout the country.

Until three years ago a milk and cream contest was unheard

of and unknown. For many years makers of butter and cheese have had their products scored and have profited greatly by the results. You all know how the quality of creamery butter and dairy butter has been improved by these competitive contests which have been held by State Dairymen's Associations in about every state where dairying is an important factor. About three years ago some of us were thinking along other lines. If these contests were doing so much to improve the quality of butter and cheese, why could not something be done to improve the quality of market milk? With that question in mind we set to work to devise some way by which milk and cream could be scored. There came a time when it seemed best to try out the plan. Two years ago last February the Dairy Division of the United States Department of Agriculture inaugurated the first milk and cream contest ever held in the world. It was held in connection with the National Dairy Show in Chicago. There were exhibits from ten or eleven states. The work was a success and out of that contest have grown exhibits in many states and cities. The first state exhibit to be held was held by the Dairymen's Association in New Hampshire two years ago this month. Other exhibits have been held in Connecticut, New York, Pennsylvania, Ohio, Michigan, Illinois, and Wisconsin.

Working along this same line some of the cities seeking to better their milk supply sought the advice and cooperation of the Dairy Division. During the last year or two we have cooperated with a few cities in conducting such contests. Prominent among these contests have been those held in Cleveland and Pittsburg. The Cleveland Chamber of Commerce, which is a very progressive organization, financed the proposition, and offered gold and silver medals for the highest scoring milk and cream. They looked after the expense of printing and advertising, and furnished a place in which to conduct the contest and hold the meeting. About 60 dairymen responded with their exhibits and the interest shown by those dairymen in the quality of their products proved most conclusively that one of the best ways in which to improve the product is to get the producer of that product interested in his own business. At the meetings which were held in connection with the contest there were some 300 producers of milk and cream present, who

participated in the program and by their questions, and otherwise, showed their active interest. As a result of that first contest another has since been held and in this second contest even a greater interest was manifested than in the first.

Only last month the Chamber of Commerce of Pittsburg, learning of the success in Cleveland, undertook a similar contest there. As a result some sixty odd samples were exhibited, and between six and seven hundred dairymen came out to the meetings to discuss their business, the business of producing milk and cream for the city of Pittsburg. In a letter which the president of the Chamber of Commerce has since written he said, "The Chamber of Commerce has never in its existence undertaken a work which has been so heartily commended by the people of Pittsburg as has been its work in connection with the milk and cream contest which has just been held."

The judging or scoring of milk or cream is a study of those products not only from a chemical and bacteriological standpoint, but from the standpoints of flavor and freedom from foreign matter. Certain definite mathematical values are given Flavor, Composition, Bacteria, Acidity, and Appearance of Package and Contents. Each of the foregoing conditions are examined and rated according to their merits and such ratings when added, constitute the score of the milk sample under consideration, one hundred points constituting a perfect score.

FLAVOR.

(Forty out of one hundred points).

The palatability of any food is said to have much to do with its usefulness in nourishing the body. This may be due in part to the increased flow of saliva which is stimulated by a particularly palatable food. The flavor and odor of milk it may be said are due to that peculiar property which acting on the organs of taste and smell creates in the mind of individuals a degree of satisfaction or disgust. In a way it may be said that the cleaner milk has the better flavor. This brings us to a consideration of the conditions commonly affecting the flavor of milk and cream, namely—(1) Changes in flavor due to the physical condition of one or more cows in the herd. (2) Changes in flavor due to one or more cows in the herd eating strongly flavored

food. (3) Changes in flavor due to the absorption of various odors in the atmosphere where milking is done or milk is stored. (4) Changes in flavor due to bacterial infection and the development of bacteria in the milk.

While there is sometimes a combination of defective flavors, any one of which it is impossible to recognize, an experienced person will yet be able to judge the general quality of flavors and odors. In many cases distinct flavors and odors, if present, can be definitely recognized by specially trained men.

COMPOSITION.

(Twenty-five out of one hundred points).

About 47 quarts of cow's milk will weigh 100 pounds. Of this amount 87 pounds is water, 4.95 pounds sugar, 4 pounds fat, 2.6 pounds casein, .7 pounds albumen, .75 ash. These are average figures and if the composition of a cow's milk was never subject to natural causes for variations in composition one of the somewhat troublesome questions of the past, present and future milk supply would have been entirely eliminated. But the natural composition of milk is variable. The percentage of milk solids and water varies not only among different species of mammalia but also among different breeds of cattle and among different cows of the same breed. Some of the widest variations in composition may also be found in the milk produced by the same cow at different periods.

In view of the constantly changing percentages of milk solids, and also in view of the fact that milk is readily adulterated without materially changing its appearance, and furthermore in view of the fact that consumers cannot judge for themselves regarding its quality, it long ago became necessary for the several states and cities to establish certain arbitrary standards for fats and solids in milk, and below which milk should not be sold. These standards vary in different states as for instance in some states a standard for 11.5 per cent total solids is the minimum, while in others 13 per cent milk solids is required. In still others a double standard is maintained which allows a lower per cent of milk solids in summer than during the winter months.

While in a few isolated cases the standards seem to be rather high and therefore subject to well deserved criticism, in other places they are so low as to admit of skillful adulteration of normal milk, which even then can meet every requirement of the local low standard. From the abundant evidence available I believe the consumer of milk can reasonably demand a milk that will contain not less than 3.25 per cent fat, or 8.5 per cent solids not fat, and a milk in which fats and solids not fat combined shall equal at least 12 per cent total milk solids.

To be sure, individual cows have been bred to produce an enormous flow of milk that will not normally contain so much as 12 per cent solids. These same selected cows can also be so bred that their progeny will in turn give even a greater amount of still thinner milk. It thus becomes possible by following a certain line of breeding to accomplish in that way precisely what has sometimes been accomplished by using the pump. Either practice, however, leads to the same result and an arbitrary standard for fats and solids not fat in market milk, long has been, and doubtless long will continue to be the surest safeguard not only to the consumer of milk but for the honest producer and distributor of milk as well.

The percentage of fats in milk and cream is determined by the well known Babcock method. Knowing the percentage of fat the solids not fat may be most conveniently estimated by (1) determining the specific gravity of the milk, (2) by the use of a short rule, viz: To find the per cent of solids not fat in milk, add two-tenths of the per cent of fat to one-fourth of the lactometer reading.

BACTERIA.

(Twenty out of one hundred points).

While certain forms of bacteria may be useful in the manufacture of butter and cheese, we may safely conclude that so far as market milk and cream are concerned the fewer germs of any kind contained in these products the better for all concerned.

While milk in the udder of a healthy cow *may* contain bacteria, practically all contamination takes place after the milk leaves the cow's udder. The extent of the contamination depends almost entirely upon the conditions under which the

milk is secured and handled. Clean milk can only be secured by clean milkers who use clean utensils and who do their work under clean cows and in a clean atmosphere. There are various ways by which cleanliness may be secured: The expense of cleanliness need not be great, but the absence of it may be and sometimes is most damaging to a dairyman and to a community.

Basing my opinion upon the work of many clean and successful dairymen I believe a *perfect* certified milk should not contain over one thousand bacteria per cubic centimeter. I also believe a *perfect* market milk should not contain over ten thousand bacteria per cubic centimeter. Milks and creams containing bacteria in excess of the above mentioned standards are scored according to the conditions found (see score card for milk) but no certified milk containing over forty thousand bacteria per cubic centimeter should be entitled to a single point on the score card.

The number of bacteria in milk or cream may be determined in the following manner:

The bottle of milk is vigorously shaken so a fair sample can be secured. 1 c. c. pipette (sterilized) is filled and the sample is transferred to a flask containing 99 c. c. of sterilized water. (The milk is then diluted 100 times). A definite amount of milk thus diluted (.1 c. c. or 1 c. c.) is then transferred to a sterilized petri dish. To the diluted milk is added a culture media (2% lactose agar) melted or in a liquid condition. The diluted milk and culture media are well mixed. The culture media solidifies as its temperature lowers and each individual germ is made stationary in the solidified jelly. The dishes and contents (milk and culture media) are then placed in an incubating oven at about 98°-100° F. where for two days the germs are allowed to grow. At the end of that time each original germ will have multiplied a sufficient number of times to form a colony large enough to be seen with the naked eye. By the aid of specially devised apparatus the colonies are counted. The necessary calculations are made (according to the dilution of the milk sample) and the total number of germs originally in the milk is known.

ACIDITY.

(Five out of one hundred points).

It seems to be a well established fact among authorities that acids other than lactic acid are present in newly drawn milk. Any increase in the total amount of acid over that originally present in milk is due to the formation of lactic acid. According to the best authorities the formation of lactic acid in milk is the result of the presence and activity of bacteria. It has been demonstrated that when the total acid amounts to as much as .20% the lactic acid producing bacteria have usually increased sufficiently to have become thoroughly established in the milk, and, in such a case, and under fairly favorable conditions, will soon render the milk sour and unmarketable. We can therefore understand the desirability of knowing definitely the amount or degree of acidity in the samples submitted in competition. The acidity of milk or cream is usually determined by titration. A given quantity of milk or cream, say 50 cubic centimeters, is treated with a few drops of phenolphthalein, a chemical which in an acid solution is colorless like water but which in an alkaline solution is red. To the 50 c. c. of milk containing this chemical is added a sufficient amount of one-tenth normal alkali to neutralize the acid, when the milk or cream will be changed to a light pink color. The amount of alkali required to do this is carefully noted. As one cubic centimeter of one-tenth normal alkali will neutralize .009 gram of acid the per cent of acid is determined by multiplying the number of cubic centimeters of alkali required by .009, dividing the result by 50 or the number of cubic centimeters of milk or cream used and then multiplying the product by 100. Hence we know that one sample of milk may contain .16% acid while another may contain .28%.

PACKAGE.

(Ten out of one hundred points).

Since the practice of dipping milk from open cans on the street is highly objectionable, and the drawing of milk through a faucet from cans in the delivery wagon is an equally bad practice, we find it necessary to make use of some small pack-

age well adapted to delivering milk to the retail trade. During the past few years several new packages have appeared on the market and attracted more or less attention. Some of the packages have been constructed entirely of paper and some of paper and tin. In many cases packages of this class are very useful for grocery and market men who retail molasses, vinegar, kerosene, oysters, etc. In a limited way they are also well adapted for distributing hot coffee or milk to city laborers who are dependent on lunch rooms and restaurants for food supplies. In a small way such packages are useful in retailing milk over the counter of the city milk plant, but experience has taught dairymen who have tried to use such packages in their regular retail wagon business that they are usually unsatisfactory in several important respects. As yet we have found no package that for attractiveness and general desirability can compare with the common glass milk bottle. A retail package for milk should be free from metal or rubber parts. It should be so constructed as to enable rapid and thorough cleaning. The sterilizing of bottles used in the retail trade is particularly desirable and is not difficult to accomplish. For a long time it has been considered a bad practice to place "New wine in old bottles." In this day and generation we should be particularly careful not to place clean, new milk in bottles that are in any way unattractive or unclean. We must at first please the consumer's eye by showing him a clean, attractive package, entirely free from sediment or foreign matter. The milk must be well protected by a tight-fitting bottle cap. If a little boiling-hot paraffine is poured on the top of the cap after it is in place it enters into every little crack and opening and effectually seals the bottle making it practically air tight. The paraffine also protects the cap and the milk as well, from the hands of the dairyman and from dust, rain, or mud. Another thing that helps to protect the cap and also the milk is a parchment paper covering for the top of the bottle. A paper covering is less expensive than metal and answers practically every purpose. Such a covering may be used either with or without the paraffine above mentioned. It affords additional protection to the milk and is especially desirable when bottles of milk are to be packed in crushed ice for shipment or for delivery.

It will be observed that a milk and cream contest systematizes and makes possible a study, in detail, of the various influences affecting the milk and cream supply.

It is a perfectly natural thing for any man who is a producer of milk, to believe that his own particular product is about right, and if there is any trouble anywhere it is most likely to be with that produced by the other fellow. The score card is no respecter of persons, it is no respecter of wealth, politics or position. The score card deals with the *product* and we do not care anything about *who* produces it. Among the things which have been most prominently brought to our attention in some of the contests are those in connection with the appearance of the package and its contents. Before we ever disturb a bottle of milk by shaking it or a bottle of cream by pouring it, we look carefully at the package, and to aid us in a careful examination we make use of a good reading glass. We hold the bottle of milk high enough so that we can see the bottom of it without disturbing the contents, and carefully examine it for sediment. Now it is true that a producer hardly ever looks for sediment in his own milk, and it is one of the things which he should watch very carefully. If you are taking to town along with your milk more or less sediment, don't you want to know it, and don't you want to correct it before the consumers find it out? In these days consumers are beginning to look at the bottom of the bottle as well as for the cream line. Right here is a bottle that contains some very coarse particles. I do not suppose the man who sent it knows that it contains sediment or that he thought it possible that there should be such a thing as sediment in his milk. I am not going to tell you whose milk it is, but *if it is yours* then you want to more effectually guard against sediment in the future. It is a thing that can be prevented. We have other exhibits here that do not contain any sediment whatever. I have one in my hand which is apparently as clean as anything can be. Next year when you send your milk and cream down to the exhibit, try hard to have it absolutely clean and free from any foreign matter whatever. This is one of the first things you ought to correct, because in correcting it you are going to make a lot of other things easier. By keeping the dirt out of your milk you are going to have a more

palatable article. You *must* look after the dirt. One of the things that occurs to me in this connection is the fact that on most farms where milk is produced, as one inspects the barn and the various details which enter into dairy work, some dairymen take particular pains to tell you how many thicknesses of cloth they strain their milk through. It is a good thing to strain milk, I am not saying a thing against it, but do you realize that if there is any dirt in the milk it is almost impossible to strain it out? And don't you know it will be a great deal better if you can tell visitors to your farm how painstaking you are to keep the dirt out of the milk rather than how painstaking you are to strain it through six or eight thicknesses of cheese cloth? Just keep that thought in mind, and when visitors come around be prepared next time to show them how impossible it is for dirt ever to get into your milk. I regret that I cannot tell you how your milk scores. I wish we had the complete score here so that each exhibitor might now have the information in detail. That is not possible because of the fact that several days are required to do a part of the work and those days are yet to come. When you do receive your score cards, however, and sit down, as you probably will, to study the details and to know the exact condition of your product, you will begin to wonder *why* and *how* it is so. As you study the details of the score you will find that in sending here a bottle of milk or cream you sent not only the bottle of milk but a whole lot of conditions. And you will find when you come to study these individual conditions that you are really then and there beginning to study the details of milk production. When you begin to study how you can safeguard the flavor, how you can be sure of proper composition, how you can lower the number of bacteria, how you can have the package clean and free from sediment and attractive in appearance, then you will begin to study and to better understand the vital things which are involved in the production of milk.

There is just one other thing which I want to mention and that is the result of the milk and cream contest in connection with the National Dairy Show which is now being held in Chicago. At that show we received seventy exhibits of market milk and cream, coming from twenty different states and from

Canada. Some of the exhibits were shipped from as far east as New Hampshire, others as far west as Utah. The milk was examined after it was a week old, and of the eight gold and silver medals awarded seven were won by producers who had exhibited milk and cream in previous contests, either in their own state or city. They were producers who had received the benefit of previous experiences, and who had by studying the details of their business been able to safeguard their product at every important point.

I believe the fact is clearly established that a properly conducted milk and cream contest will bring to producers of milk detailed information of an extremely practical value.

REMARKS.

By ORIN BENT, Boston, Judge of Butter and Cheese.

Ladies and Gentlemen: I have been selected to read the award of premiums on butter and cheese, and to remark on same.

Well, I have judged the goods to the best of my ability, and you have the result. I cannot make you all happy by giving you top scores. My friend, Mr. George Aitken of the Billings Farm, Vt., was given one hundred points some years ago, and has never entered any butter since; so, you see, if I thought your butter was perfect it would not do to say so, for we do not want to lose you.

You are doing better with your butter than one could expect when you send away so much cream; but of your cheese I am sorry to say that the art of dairy cheese-making is almost lost. I believe the health of the people would be improved if every housewife would learn to make good cheese and have it on the table at every meal. Use it instead of meat; sell less milk and cream and more hog. Of course, the hog is all right, but please keep him in his place.

In the old countries, the people eat cheese instead of meat; here, cheese is mostly regarded as a luxury. But you try a good cereal—shredded wheat or oat meal—corn cake or whole wheat

bread, and coffee, with a liberal allowance of good cheese, for breakfast, and I will guarantee that you can do as big a forenoon's work as on a whole lot of pork, and you will feel a great deal better in the long run. Of course, a certain amount of fat is good.

You talk about a well-balanced ration for your cattle and poultry, and by what I hear you seem to think it is very essential to have this kind of a ration. Now, are they of so much more account than we? How you would pity any of them if you saw them suffering from over-feeding or drinking, as many of us poor humans do!

Now as to the commercial end of your cheese. My firm carries as good cheese, both plain and sage, as there is made. We have to charge 15 1-2 to 16 1-2 cents per pound for it. My grocers say to me, "I must get 20 cents for it in order to live," and they go slow; but if any of them get hold of any dairy cheese, they sell it readily for 25 cents. Doesn't this speak well for the dairy cheese? We do get a very few dairy cheese from New Hampshire.

A word regarding your milk and cream exhibit. It is a step in the right direction. Starting at the head, if you have not followed the instruction of my friend Prof. Merrill and brushed the dirt off your cows and have not been fussy whether filth got into the pails or not, Prof. Weld will find it and will call it by its proper name, not "barny," as we do sometimes. It is not the barn we taste, but the filth that comes off the dirty cows.

I am in favor of high-priced milk. Let's pay enough for it so that the farmer can get good intelligent help to milk and care for his cows. If we have to cut out our beer and our cigars, we will but gain by having good, clean milk.

WEDNESDAY EVENING.

The seventh annual banquet of the Maine Dairymen's Association was held in Grange Hall, Dexter, Wednesday evening, at 7 o'clock, and was much enjoyed by all present. The Association is deeply indebted to Dexter Grange for the attractive decorations and the excellent banquet. The responses to toasts were especially entertaining and instructive, and the fine music and well rendered selections of Dr. C. H. Haines added much to the pleasure of the occasion. The program was as follows:

Music,	McLuer's Orchestra
Invocation,	Rev. J. A. Corey
Banquet.	
Selection,	Orchestra
Reading,	Dr. C. H. Haines
The Power of Organization; Its Uses and Abuses,	
	F. O. Additon
Selection,	Male Quartette
Farmers' Institutes,	B. Walker McKeen
Selection,	Orchestra
The University of Maine,	Dr. Chas. D. Woods
Selection,	Male Quartette
"By Their Fruits Ye Shall Know Them,"	
	Col. Stanley Plummer
Reading,	Dr. C. H. Haines
The Grange of Maine,	C. S. Stetson
Selection,	Orchestra
United States Dairy Division,	Dr. G. M. Twitchell
Selection,	Male Quartette
New England,	Prof. J. W. Sanborn
Selection,	Male Quartette
Selection,	Orchestra

REVIEW OF BOVINE TUBERCULOSIS IN MAINE
FOR TWENTY YEARS.

By JOHN M. DEERING, Saco.

Mr. President, Ladies and Gentlemen:

It has come to pass that the Maine Dairymen's Association has become one of the most important organizations in the State, in promoting and fostering our agricultural industries, for the reason that our conditions are such that dairying is at present, and probably always will be, the foundation upon which the structure of all other branches of agriculture must stand.

In view of these facts it must be conceded that our cattle industry is of the greatest importance to the future prosperity of our State.

In taking into consideration the present condition of our live stock interests, we should be honest and state facts as we find them, bearing in mind that if we find that this industry is showing the effects of some unfortunate condition that has crept in upon it, Maine is not to blame, nor alone, for all other states and countries in the civilized world are facing the same conditions, and many of them are suffering very much more than Maine. It may be true even at this time, that there are dairymen and breeders in our own State who do not realize the dangers of tuberculosis to our cattle industry, yet by being present at the International Congress on Tuberculosis, held in Washington in September, and attending all of the sessions held in section VII, which was devoted entirely to "Bovine Tuberculosis," hearing the reports and papers read by the most noted scientists representing 33 countries of the world, one must realize and must believe; and it would give one an idea how Maine stands in this most important matter. It is very gratifying to your Cattle Commission to be able to report that Maine is in the front rank in the small per cent of diseased cattle, and that our laws and regulations in controlling tuberculosis among our herds are amongst the most efficient of any state or country in the civilized world. While this does not mean that we are perfect, it should at least be encouraging to the dairyman and breeder of Maine.

It was surprising to note that in all countries the "tuberculin test" was recognized and its value and efficiency was beyond question, in diagnosing tuberculosis. Different laws and regulations change the method of handling reacting animals somewhat, yet upon the whole the principle upon which the policy is founded is practically the same as in this country, with the exception of Denmark. I wish to call your attention to this particular method, as there are some dairymen and breeders in this State that favor this method and have complained to the commissioners from time to time that they were destroying too many cattle by the policy of our State in controlling tuberculosis. While there is no law in Maine compelling breeders to use or apply this "Bang method," there is also no law against it, or against anyone practicing it if he sees fit. If people would rather have the cattle destroyed the commissioners destroy them.

The "Bang method" so called, of controlling tuberculosis, is well advertised all over the world; but I do not understand that it is practically and successfully carried out except in Denmark, unless in a very limited way, experimentally, in Pennsylvania and New York. Denmark is Professor Bang's native country and he remarked at the meeting that he could not understand why his method was not meeting with better success in the United States.

He claimed that from an economic standpoint his method was the best, and I am inclined to think that if one has the patience and the thoroughness, and will go to the expense, and adhere strictly to the principles laid down to work by, it is the most economic method now in practice in countries and states where meager appropriations are made by the government for compensation for cattle found diseased. In Denmark, only cows that are diseased in the udder are paid for, which is claimed by Prof. Bang to be only one per cent of the diseased cattle. The cow population of Denmark is placed by him at about 1,000,000.

Cattle are tested the same as in Maine, and all cattle that show physical signs of the disease are destroyed (including about one-third of the reacting animals), and when not too bad, or in other words, when they will pass the "meat inspector," they are marked "tuberculous meat" and sold for what they will

bring. All bad cases, or those that will not pass inspection the owner loses, unless the disease is found in the udder.

In other words, the "Bang system" calls for the tuberculin test upon all animals; the destruction of all showing clinical symptoms; the complete isolation of all reacting animals, in separate barns; separate attendants; pasteurizing the milk; selling it for just what it is in competition with healthy milk, usually only to creameries, to be made into butter; the sound animals to be tested once in six months, and any reacting ones to be placed with the diseased ones; the calves from diseased animals used for the propagation of stock, to be immediately taken away and raised on healthy cows or on pasteurized milk.

Denmark pays for animals diseased in the udder; pays for the tuberculin testing of all animals; pays nothing for animals that are diseased and destroyed unless the disease is in the udder.

In one experiment 245 cattle were tested and 82% reacted. From this 82% calves were raised, and in four years only one calf reacted.

This was the best experiment he gave. In another experiment it took eight years to bring the herd out with only 2 reacting animals.

This herd consisted of 264 head and were tested semi-annually. So that the Bang system is as he says "a gradual purification of an infected stock during the course of several years."

The originally infected stock die off in their isolated quarters and being isolated no infection comes from them. Prof. Bang stated that they were not doing enough in his country and that he wished they could do more. Even in Denmark, there has been according to his own report, "a sad falling off." According to the report, out of 1,000,000 cattle, there were tested in the year 1907, some 22,982 head and 2,252 reacted, which is 10%. This number includes cattle under treatment. This would not seem to be a very extensive business as compared with Maine, as we have 300,000 cattle and during the same year we tested nearly 25,000 head, yet this is nothing against the Bang method. The government of Denmark appropriates 100,000 Kroner, or \$25,000 of our money, yearly for a term of 5 years, and we spent \$32,000 during the year 1907. If their per cent of udder

disease is correct, they only paid for 25 cows out of this number, while we paid for 804 cows, 66 horses and 56 sheep in the same time.

In other words 2 per cent of their appropriation is spent for cattle and 98% for testing and administrative expense, while with us, 66% is paid on cattle and 33% for testing and administrative expense.

From a money standpoint it would not seem to be as economical as the system in Maine, yet they husband the lives of 66% of their reacting cattle and let them wear themselves out with tuberculosis while we destroy them all and the State pays for them. There was one other statement made by Prof. Bang which I fully endorse and that was that a herd of reacting animals will not give as much milk as a sound herd by 10%. This proves what we have always advertised, that a diseased herd was not profitable and that the dairyman could not afford to have tuberculosis in his herd. Moreover, the tuberculous milk has to be sold for a lower price per quart.

In carefully reading the Denmark report and personally hearing Prof. Bang speak and explain his method, I have come to the conclusion that in states and countries where the government pays the dairyman for only one per cent of the cattle found diseased by the tuberculin test, the Bang method is the most economical for the government, and perhaps the only way for the breeder and farmer; but in states where the cattle are paid for as liberally as in Maine my opinion is that our method is much better than his, especially in grade herds. Perhaps in valuable breeding herds, where slaughter would involve great sacrifice, the Bang system might be the most economical, yet it is not without its attendant expense.

In France cattle are tested and all reacting animals are destroyed and paid for by the government, the compensation being practically as in Maine, and in all countries where governments are the most liberal with the breeder and dairyman, there is where the greatest success is obtained in controlling tuberculosis. Some of the western states of this country are advocating Federal control. This is partly on account of not being able to obtain appropriations sufficient to be of any great benefit and partly on account of Cattle Commissioners and Sani-

tary Boards not being able to reach the dairyman and breeder on account of the large per cent of disease among the herds and public sentiment not being strong enough to justify compulsory methods. Dr. Baker reported that on twelve open ranges in California, including 41,000 cattle, 9 1-2% were tuberculous, and in some sections of the middle west tuberculosis was rampant among hogs to almost an alarming extent caused by the hogs following the cattle and picking up their living from the droppings of the cattle, proving the fact that hogs became diseased from this source. Dr. A. D. Melvin, Chief of the Bureau of Animal Industry at Washington, said, "While the saving of human life affords the highest motive for combatting tuberculosis, the prevention of financial loss *alone*, is sufficient reason for undertaking the eradication of tuberculosis from farm animals." The economic loss on account of tuberculosis in food producing animals is heavy. The loss on animals in which tuberculosis is found in the Federal Meat Inspection Service, is estimated at \$2,382,433 annually, and if the same conditions were applied to animals slaughtered without Federal Inspection, the annual loss would be increased to \$4,354,855. The stock on hand is also depreciated in value because of the disease. Assuming that living tubercular milch cows are annually depreciated to the extent of one-tenth of what the loss would be if slaughtered, other cattle one-third and hogs one-half, the total depreciation amounts to \$8,046,219. The annual loss in the decreased milk production is estimated at \$1,150,000. There is also some loss from impaired breeding qualities. Taking all of these losses into account, the annual loss because of tuberculosis is estimated at not less than \$14,000,000.

Such heavy financial losses make the eradication of tuberculosis from farm animals very desirable as an economic matter. Of entirely eradicating tuberculosis, I have but very little hope, unless the Federal government steps in and takes a hand in the matter, but it would not be good policy for any state or community to wait for the government because in sections where the disease exists, if nothing is done, it will increase. There is no such thing as its decreasing of its own free will. If disease exists, the longer it is let alone the more there will be among farm animals on account of its infectious character, and

I claim without hesitation that the danger from tuberculosis to the cattle industry alone justifies the destruction or isolation of every reacting animal.

Tuberculosis from the public health point of view was the part of the discussion at the late Congress that created the most interest. There has always been a difference of opinion among scientists as to the degree of danger of "bovine tuberculosis" to the human family. Prof. Koch, at the Congress held in London in 1901, declared that there was a difference between bovine and human tuberculosis and that it was rarely inter-communicable.

At that time there were others who thought that Dr. Koch was right, yet there were others who had been investigating along such lines that convinced them that there was a degree of danger but at that time the degree could not be settled upon and I understand it was left unsettled. Prof. Koch, being the discoverer of the bacilli of tuberculosis and the inventor of tuberculin, other scientists were not strong enough in their findings and beliefs to set aside Koch's decision in the matter and his declaration stood although disputed by some scientists. At the last Congress held in September, or seven years later, this same unsettled question was brought to the attention of every member of the Congress. After seven years of experiment and investigation made by the most scientific men in the world, Prof. Koch again made the same declaration. I heard him say that there was a difference between human and bovine tuberculosis and unless investigations were carried out along such lines as he laid down, he would not agree that bovine tuberculosis was dangerous to man to any degree worth troubling ourselves about.

Prof. Koch's ideas and deductions did not pass current at the late Congress.

There were 33 countries represented and 32 of them I understand were against him in the stand that he took. While at one time he stood at the head of his class scientifically and was acknowledged to be one of the greatest pathologists of the world, yet today the consensus of scientific opinion even of his own nationality, seems to be against him. Possibly Prof. Koch is right in his conclusions and the rest of the scientific world is wrong, yet if we accept the latest decision laid down by the Congress in 1908, it will be that there is a danger and especially to children.

I contend that this side of the question is for the scientist to settle and we cannot expect positive agreement upon it by all of them.

It is the farmers' and breeders' share when they discuss and take into account the danger tuberculosis is to the cattle industry. I have never known a dairyman or breeder who would keep a diseased cow upon his farm if he knew the animal was tuberculous and never before has the farmer been so sensitive upon this point as at the present time. Not a quart of milk nor a pound of meat can be sold in Maine if the fact is known that the animal producing the milk or meat is tuberculous, and this is the proposition that we are up against.

It matters not what Prof. Koch or any other professor says regarding communicability, such food products will not pass current in Maine.

The cattle population of Maine is around 300,000, which will be reduced somewhat by the light hay crop this year, but two or three years of good crops will bring them back. The average value of our cattle industry for the last fifteen years is nearly \$10,000,000. The knowledge and experience that I have had with the live stock interests of our State for the last twenty years lead me to believe that the future outlook for our cattle industry is encouraging, and that the breeding of pure blood stock will be more than doubled within the next ten years, provided Maine continues its present liberal and persistent policy in controlling tuberculosis. I could not conscientiously have made this statement four years ago.

The next Cattle Commissioners' Report will show satisfactory results obtained by the pure blood law passed four years ago. The records will show that the first test made showed 20% of the cattle tested to be diseased. The last test made showed less than 5% and the result of this law is calling the attention of breeders in other states to the advisability of coming to Maine to purchase pure blood cattle. When the breeders of Maine can advertise their stock absolutely free from tuberculosis, guaranteed by the State, who can estimate the increase in value this will be to the pure blood part of our cattle industry? The time is coming when healthy pure blood stock will be more eagerly sought for and an honest certificate of health will bring to the breeder a financial success.

Then again, healthy pure bloods mean healthy grades, because diseased pure bloods have been responsible for tuberculosis in the grade herds.

At the present time we are handling tuberculosis by four methods.

First: By tuberculin. Not because we love it, but because it is the best agency known to science to diagnose a case of tuberculosis.

Second: By carrying on a strict system of disinfection of diseased premises, learning by experience that it is just as important to disinfect the stable as to remove the diseased animal.

Third: By educating the dairyman in regard to the danger a diseased animal is to the rest of the herd, and that good sanitary conditions are essential. Not that they will cure a case of tuberculosis, but they will prevent it many times.

Fourth: By the use of bovo-vaccine. This method is not very general as yet. There are about one hundred under treatment at present and thirty are under the control of the commissioners. These young cattle are in three lots and have been under treatment about 18 months, and up to the present time only two have been found tuberculous by the test, which must be considered very good results.

The Bang method, then, is the only method recognized by other countries which we could adopt to round out and make a complete whole.

I will say, I believe in the Bang method under certain conditions and restrictions. The only question is, as to whether our dairymen would have the patience to work it out and stand the expense.

In Denmark the farmer binds himself to keep the diseased animals isolated, separately attended, in different buildings, even the common water pipe cut off from the infected stock and separate pastures and utensils.

It is not my intention to criticize the methods of other states or countries in controlling tuberculosis, not being acquainted with their conditions, yet I do not know of any state that adheres so strictly to the results of the tuberculin test as Maine. Some states do not condemn and destroy cattle by the test

except when the animal shows the disease by a physical examination. Had this been the policy of Maine we would have had today at least 20% of our cattle diseased. Of the 25,000 cattle tested last year, the records show only about 3 1-2% diseased and the business has been extensive enough the last two years to establish this fact. There is at present a strong sentiment among dairymen and consumers for a general test.

Federal control would mean a compulsory test. We do not need a compulsory test in Maine. If the State would pay for the testing of all grade herds, and 75% of the value of all animals found diseased, at least one-half of the cattle in Maine would be tested in the next two years, upon the owner's free will.

It would cost \$75,000 to test 150,000 cattle and if 3% were diseased it would cost \$150,000 to pay for the cattle and other expenses, or a total of \$225,000 for the two years. I give these figures to show what a general test would mean to the State; not that they are absolutely correct but according to past experience they are fairly near the mark.

If the State should see fit to expend \$225,000 upon its cattle industry for the purpose of eliminating tuberculosis and by so doing it should increase the value of butter fat one cent per pound, allowing each cow to produce one-half pound of butter fat each day of the year, the increase from 150,000 cows would be \$273,750. This would give a balance in favor of the State of \$48,750. If these figures are correct, it must be conceded a good investment, without taking into account the increased value of the herds, by having them practically free from tuberculosis. It should be borne in mind that each following year the expense would grow less and less the same as in the testing of the Portland milk supply. The first year it cost \$10,500; this last year (the third test) we are hardly noticing the expense as there is a very small per cent reported as diseased. The degree of infection caused by tuberculous animals when housed together should be brought to the attention of every dairyman. I will mention two cases that have come under my personal observation very recently. One was a herd tested three years ago and proved to be sound. About two months after the test a fresh cow was bought that showed no physical signs of the

disease. Eighteen months after the commissioners were notified to come and see this cow as she had become a wreck. The owner wished to have the herd tested and 24 cows out of 26 reacted, and later, 13 young cattle were tested and 12 reacted.

This bad cow destroyed 36 head of cattle inside of two years. The other herd was tested two years running and was sound. About 8 months ago a fresh cow was added to the herd. It was tested a short time ago and the whole herd, including 8 cows, re-acted and were condemned. This shows the degree of infection caused by putting diseased animals into sound herds and if one knows that his herd is sound he should never add an animal until after it had been tested and proved to be sound.

There has been a demand made upon the dairymen by the boards of health of several cities in the State, that all milk and cream sold in said cities should come from tuberculin tested cows and there is no question but that other cities will follow suit. The city of Portland has had this work done for the last three years and must be conceded to be the pioneer city of the State in this line of work. The first year, within a radius of 10 to 15 miles of Portland, 16 1-2 per cent of the cows were found diseased. Back further in the country towns very much less disease was found and out of six thousand cows tested the average was 6%. The present year the same work has been carried on with the result that about 2% were found diseased. This result should be very gratifying to the consumer of milk in the city of Portland.

On the other hand, three years ago the retail price of milk was 6 and 7 cents per quart; now it is 8 and 9 cents per quart. The producers have made a persistent fight with the dealers to get their share of the rise and I am glad to report that they won out.

At the March meeting of the State Board of Health there was held a conference on the subject of "Bovine Tuberculosis, from the public health point of view," between the State Board and various persons representing the Department of Agriculture, Creamerymen's Association, Dairymen's Association, Cattle Commission, Veterinary Medical Association and others. At the close of the conference it was voted that a committee be appointed to consider the advisability of any new legislation

bearing upon public health interests in connection with animal industry. This committee, representing every interest in the cattle and dairy industry, is composed of the following persons:

Chas. S. Pope, Manchester; Leon S. Merrill, Dairy Instructor; Dr. F. L. Russell, Orono; F. S. Adams, Bowdoinham; E. L. Bradford, Auburn; Rutillus Alden, Winthrop; Dr. A. G. Young, Augusta.

The sentiment of the meeting was that the State should do more than it was doing to eradicate tuberculosis. The Cattle Commission is at times criticized because it does not go farther and do more. Every year we use up the appropriation and create a deficiency of \$10,000, \$20,000 and this year about \$21,000. We feel that we should keep within the appropriation unless driven to exceed it and yet we know that we should do more; but the question is, will public sentiment uphold us in creating a deficiency year after year?

In the year 1884 the late Hon. Hall C. Burleigh, well known for his great interest in the cattle industry and everything pertaining to agriculture in this State, appeared before the Board of Agriculture and advocated a law to protect the cattle industry from contagious diseases. His wide experience as a breeder and his knowledge of contagious diseases in cattle in other countries led him to prepare for just what came about a few years later.

He spoke particularly of the danger of tuberculosis and said that the time was coming when the cattle industry of Maine would need to be protected by the strong arm of the law. He was far-sighted enough to see what was needed yet he got no help from the board. In 1889 he was a member of the legislature and succeeded in getting the law passed under which we are working today. The law should be revised and provide ample powers for the commission to do anything required to control or eradicate contagious diseases, provided money enough is furnished by the legislature. When the law was passed tuberculin was unknown, and if Mr. Burleigh could have foreseen that by its use many apparently healthy cattle could have been located as diseased cattle, he would not have come before the legislature four years later and asked the legislature to reduce the appraisals by one-half. His law provided for appraisals of \$100 on grades and \$200 on registered stock, but

as only wrecks were being paid for by the State he afterwards advocated the reducing of these amounts by one-half. We of today are more fortunate in having the use of tuberculin for an early diagnosis of the disease and feel the need of larger appraisals in order to satisfy the breeder and dairyman for his financial loss. If there is to be any change in the law it should be along the line of increased appraisals and that means increased appropriations as well. We have paid out this year (or will have paid out when the bills are settled) something over \$30,000 for stock destroyed and \$15,000 for other expenses. If appraisals are increased and more work is done to lessen the disease it will mean still larger appropriations yearly.

It is up to the dairymen and breeders to say what shall be done. They can hardly expect the commission to do more than is actually necessary when the appropriation will not justify it. And the consumer is also demanding more work to give him a healthier milk supply, which is only right and proper.

The time has come when a decision should be made as to our future policy as regards appropriations; whether to try to eradicate or whether to go along as we have been going. We are getting ahead; but not fast enough to satisfy the consumer, the dairyman nor the breeder.

In conclusion I wish to say; that I consider the cattle industry of such importance to all other industries of the State that any new legislation that would not continue to foster and protect it would be a calamity.

That dairymen should study and better understand the bovo-vaccine and Bang methods of controlling tuberculosis, in order that they could be put into practice wherever practical.

The Cattle Commission Law, as it stands on the statute book today, is and always has been in spirit and effect absolutely for the protection of the cattle industry of the State; yet conditions have changed and if revised it should be along the same lines of protection, bearing in mind that in order to successfully control tuberculosis you must have the good will and co-operation of the cattle owners and this can only be done by a liberal and consistent policy.

Ques. I would like to ask Mr. Deering if in his judgment the time is quite ripe, or nearly ripe, for the increase of the

transfer test. We now have it on blooded stock, are we anywhere near to having it apply to the transfer of all stock in the State?

Ans. That means a great deal. I should like to see that, it would be a good thing, but whether the time is ripe or not I will leave it to the State to say. It means practically the testing of every animal in the State. The law in relation to pure bred cattle only called for those cattle to be tested which changed hands. The result has been that practically all of them, herd after herd, have been tested and cleaned up. If we had that law we could not make it work very well except by a general test, in my opinion.

Ques. What, in your opinion, are the merits of bovo-vaccine?

Ans. I do not think I can discuss that matter intelligently enough to satisfy you. It is only in an experimental stage. The professor in New York who is experimenting with it said that while it was well to try it along experimental lines, he did not think it was yet time to put it into grade herds. We have some herds under our control with which we are trying bovo-vaccine, and we are watching the results; as yet they are fairly good.

Dr. PURCELL. This world seems to be divided into two classes, one people call the conservative, the other they call the radical. The conservative man probably thinks the radical man is too radical, and the radical man thinks the conservative one is too conservative. I am going to class myself as a radical. I think radicals accomplish a great deal of good in this world. It has always appeared to me as though the Cattle Commission should be the first to recommend, and they should be the most radical to recommend such legislation as would be for the benefit of everybody in their particular department. There is a practical side that most veterinarians will find when they go out to test cattle. Mr. Deering says that if the State will pay the bill for testing and if the State will raise the appraisals one-half, all the cattle will be tested. I am radical enough to say that the State should do this, and Mr. Deering ought to have said that the State should pay for the testing. The farmers ask why they should pay for testing cattle that the people of the

city of Portland may have the benefit of it. I am of the opinion that the farmer should be paid the full value of his animals, on a reasonable valuation. I think the State ought to appropriate money enough so that they can pay for the testing of the animals, and they should pay the estimated value of the cow on a fair valuation. It seems to me the Cattle Commission ought to have done more than they have been doing.

Mr. BEAL. The paper by Mr. Deering has been very interesting and instructive. Dr. Purcell has opened up a question as to whether the Cattle Commissioners have done all they ought to do or not, and I do not want that left just as he left it. The Cattle Commissioners have done all that it was possible to do with the appropriation given them by the legislature. They have stood willing and ready to do much more, to carry it much farther, if the legislature would pay the bills. We have done all they authorized us to do, all they appropriated money for, and have run the State in debt. The fact is, there are two laws, one compels the Cattle Commissioners to do certain work when in their judgment it is essential to do it, and the other is the law that appropriates the money to do it, and if the money is not sufficient the legislature is always supposed to make up the deficiency. The gentleman asked Mr. Deering a question as to whether the time was ripe for the general testing of all transferable cattle. The transferring of cattle within the borders of the State is one thing, the transferring of cattle from this to any other state or territory is another. No one can bring cattle into the State today without a permit from one of the three cattle commissioners, and if brought in, then the law is that they shall remain upon the owner's premises 30 days in quarantine, during which time the commissioners shall cause the animals to be tested and if found tuberculous they shall be destroyed without compensation. If not, the animal is at liberty to pass. Now the advantage of testing grade cattle is not of that particular consequence within the State of Maine as is the testing of full blood cattle. Full blood cattle are kept more for breeding purposes, more to form the head of herds. It was for that purpose that the full blood law was put into effect, so that the disease could not be disseminated from the animal that the man puts at the head of his herd, expecting to improve his herd. Of

course in the buying and selling of milk it is essential that the grade cattle also shall be healthy animals, but in the transfer from one neighbor to another it is not so important to have them tested as it is to keep outside animals, which are largely diseased compared to ours, from coming into the State and spreading the disease broadcast among us. I have been upon the Cattle Commission for twenty odd years, and it was a long time before we could settle where this disease seemed to originate, how it got into certain herds. We finally decided that it came from pure blood animals. One man had a large Jersey herd which was tuberculous and in selling the calves to be the head of other herds he had spread the disease. So I say while the time is ripe to have the tuberculin test applied, it is not so essential in the transfer of grades as it is in the transfer of pure blood herds.

Regarding the appropriation, it does seem as though we should have a little more work done by the Cattle Commission throughout the State. The Cattle Commission are ready to do anything the legislature will allow them to do, and if we could have some law passed and an appropriation to back it up, so that we could test the cattle of any man who asked for it, at the State's expense, I think it would go a long way in eradicating the disease from the State.

Mr. Deering has given statistics in regard to the disease. Let me add right here that the cattle that have been tested are largely the ones that have been more or less suspected; therefore it is a wonder that the number diseased is not ten per cent, that it is down to three per cent. Some cow has calved and dried up in her milk or is not eating well; she is suspected of being diseased, and the cattle commissioners are notified. That is the class of cattle that has been tested, not those that everybody believed were all right. If the whole number of cattle were tested I do not believe you would find more than one per cent diseased. I learn through the congress we had in Washington that the State of Maine is the cleanest state regarding the health of their cattle of any state in the Union, and the laws we are working under were acknowledged to be the best of any. The State of Maine is far ahead of any other state, and the United States is far ahead of any other country except Holland.

RAISING CALVES FOR THE DAIRY.

By Z. A. GILBERT, North Greene.

My theme, though so commonplace, is nevertheless one of importance in dairy circles. Every dairyman can replenish his herd with calves of his own raising.

(1) The first requisite in successful dairying is good cows.

(2) The first requirement for a good cow is a good calf.

Good cows every dairyman is searching for and no one ever finds enough. The foundation of a good cow—the base from which the mature structure is built, is a well-bred, vigorous, healthy calf. The breeding of the calf is not my theme, so that will be left in the mystic realm of uncertainty where it has so long parried the approaches of advancing knowledge. I begin with the calf when first dropped, and insist that it must be well born. No calf should ever be raised that is not vitally—naturally—strong when dropped. No such calf is wanted as that advertised by Artemus Ward for sale with its dam—“One brindle cow with a wobbly bull calf at her side.” No “wobbly” calf, tumbling about the pen for the want of stamina enough to stand erect, is wanted. Instead the calf to raise should be on its feet stretching in thirty minutes after dropped, as much as to say, “Here I am! Now bring on your stuff.” Such a calf has vitality to build upon. No calf is worth the raising whose dam has not been dry two months prior to the dropping of the calf. Vitality is as necessary to the cow as is fuel to the engine to enable her to perform the function designed, and this can never be built into an animal that does not possess it through inheritance.

I have had much experience in raising young calves and growing them up to mature animals, and have realized much satisfaction from the uniform success that has attended my efforts. There is much pleasure in seeing the young things grow in their perfect health and thrift.

Given, then, a calf fit to raise, and the first and foremost matter to receive attention is cleanliness. The next is strict attention to diet, and these two constitute the whole gamut.

By cleanliness I mean, give the calf at all times a clean pen, pure air, a clean pail or other receptacle to drink from, clean milk to drink and clean other feed to go with it. These are simple requirements, but they are the price of uniform success. When strictly attended to there will be no trouble with that dread disease, the scours, which has baffled the success of so many well meant efforts.

Always feed from a pail, and always wash and scald it each day, the same as the other milk pails. See to it that the milk is of the same temperature each feed, and that the same quantity is fed at each feeding. Any increase in quantity, or change in the kind fed, must be approached gradually. These are little things but of vital importance as related to continued success. The objection to the patent calf-feeders offered for sale is that they cannot be easily kept scalded each day, as is necessary, especially in hot weather, in order to be in condition for the calf to take milk from. It is really a sad sight to see the many thin, thriftless, filthy, scouring calves, hopelessly trying to live, and I always want to take the pitiful and helpless subjects, give them the rational treatment that is their right, and send them on the way to thrift and beauty and usefulness.

The idea that a calf can be more easily taught to take its milk from the hand of its keeper if never allowed to suck its dam is all bosh. All a calf knows at first is the natural impulse to draw milk from its dam in the natural way. The older the calf grows the more it knows, and the more it knows the more easily it can be taught to drink its milk if rightly handled. This I have learned in hundreds of cases, the testimony of so many others to the contrary notwithstanding.

In recent years I have raised all my calves on skimmed milk. This has now become the general practice, and is to be recommended on account of the less cost. While the calf so fed will not reach so great weight at a limited age as when fed whole milk, yet this lack of rapid growth is easily made up by feeding a longer time, and animals to be grown up for cows for dairy purposes are more valuable than if reared on the whole milk. For a heifer to be grown up into a dairy cow muscular vitality is wanted rather than adipose tissue, and this it gets from the skim-milk feed in larger measure than from whole milk, and also does it at less cost.

In raising a calf on skim-milk, it should be allowed to suckle from its dam at least a week, and as much longer as the convenience of its keeper may call for. When taken from the cow at that early age it should be fed on the whole milk of its dam till three weeks of age, the quantity varying from seven to ten pounds (three to four quarts), according to size of calf, twice a day. Much care must be exercised at this time that the quantity is the same each feed, since any irregularity at this tender age is quite sure to cause trouble of some kind and interfere with the thrift of the calf.

At three weeks of age a change to skim-milk may be started by withdrawing one-quarter of the ration of whole milk and substituting a like quantity, at the same temperature, of skim-milk. After two or three days' feeding, another quarter of the whole milk may be withheld and substitution made as before. In this way at about five weeks of age the calf may safely be put on a ration of entire skim-milk, and without any danger of damaging disturbance of the digestive apparatus.

At about this age the calf will begin to chew some straws of fine hay; second-crop clover is the best. Place a wisp within its reach, where it will remain sweet and clean. Remove each day all not eaten and renew with a fresh supply. Beside the hay place a handful of whole oats, in a clean box. The natural instincts of the calf begin to crave something to chew, and it will learn to take the whole oats more readily than ground grain of any kind. Besides there is no better grain feed for a growing calf than oats.

The skim-milk ration may be continued at the option of the feeder. In my own practice, I usually feed till five months of age.

I do not find it desirable or necessary in raising calves in this way to feed grain of any kind to any considerable extent, and never more than perhaps a handful of oats a day. If ground grain feed of any kind is fed to milk-fed calves it never should be mixed into the milk, but instead fed dry in a separate box.

Spring calves—March, April or May—should not be turned to pasture the first summer. They will thrive better held at barn and fed on dry hay. The practice often seen of hitching calves out while young to get a bite of green grass is all wrong

and labor lost. Better for the calf and less labor, to be fed on the dry hay at the barn with their ration of skim-milk.

In closing I wish to say that perhaps some of my practices which I have here laid down as necessary for others to follow may seem trifling and unimportant. But I wish to say they are the price to be paid for reliable and continued success. Given a calf well born, and the course I have prescribed, followed to the letter, and a sound, healthy, vigorous and thrifty heifer is insured, one that will grow up into a cow that will be the pride of her owner. And besides, it costs not a whit more to do these things in the right way, and win success, than to follow the wrong course and invite failure.

THE PRODUCTION AND HANDLING OF SWEET CREAM.

By J. D. McEDWARDS, Livermore Falls.

I have been in the creamery business or farming all my life, and I will try to give you a little of my experience, although I have not had time to prepare a paper. The sale and production of sweet cream is a great factor in this State. I remember my first experience in farming. I was born on a farm, and my early days there have always been the memory of my life, one that I shall never forget, especially when my father would call up stairs at four o'clock in the morning (there were three boys of us) "Boys, get up!" We would go out to the barn, and we did not have barns such as some of those here in Maine. Occasionally the wind would blow through the windows, the dressing would be frozen and we would have to cut it with an axe. We would sit down and milk the cows, and sometimes it was 30° below zero. In the summer time they would switch the flies off and switch my face, and in the winter time the dressing would cover the cows, so that my recollection of the farm is not very pleasant, but my sympathy has been with the farmer and I have been connected with him all my life. What we have to fight most in the production of sweet cream is bacteria, in other words, dirt. Most of this dirt comes from the udder and sides

of the cow. Many of the tie-ups are in such a condition that it is almost impossible to keep a cow clean. The filth gets into the pail and into the milk and it is impossible to strain it out, just about as impossible as it is to get a spoonful of sugar out of a cup of coffee after it has dissolved. Milk from a cow that is perfectly healthy is sterile after rejecting the first two or three streams from the udder, so that all the contamination comes from outside things, either from the cow, from the milker's clothes, from strainers that are not properly scalded out every time they are used (especially when they are cloth), or from similar conditions. The State Board of Health in Boston, where we ship cream, will allow us 500,000 germs per cubic centimeter. This is a lot of germs we think, but when we consider that it takes about 300 bacteria to make the thickness of a card, it is a pretty small affair. We have had some samples of cream which we had purchased tested by the State of Maine Laboratory of Hygiene to see how many bacteria it contained. I have a table here that Prof. Evans of Augusta sent us. We made the regular run of cream. We had 200 gallons of heavy cream, equal to 400 gallons of thin cream. We ran it through the pasteurizer at 160 degrees, then we cooled it down to about 40 degrees, and put the cans into ice water. We did not submerge them, but had the water as high as the cream in the can. The next day I took out a sample of cream (it was four days old) and it had an acidity of 1.51, and contained 300 germs per cubic centimeter. The 5th day I took a sample out of the same can and there were 560 germs per cubic centimeter; the 6th day there were 980 and the 7th day 2,100. You see after the sixth day they develop more rapidly. By the time the cream was landed in Boston and delivered to the consumer it must have been seven or eight days old. It is sometimes left in the stores a couple of days, and perhaps some of it is 15 days old before reaching the consumer. That shows you what the creamery men of Maine are doing with regard to killing these bacteria. But that does not make clean cream.

With regard to stable inspection, the cow testing associations I think are doing a wonderful work. It is a step in the right direction. I should be glad to see one in every community where there are 25 or 30 farmers. The expense is not large.

A man can be procured to do the testing from a school where these things are taught, and I would be glad to see them turn out more of these students at Orono. Those that are coming out are doing good work and appear to be smart, intelligent young men, up-to-date, which speaks well for the instructors. The inspection of the stable should go hand in hand with the inspection of the herds. We should see that there is light enough in the stable, and see that the tie-ups are in proper shape to keep the dressing off from the animals, and see if we cannot produce a better quality of cream. I think the Maine Creamerymen's Association will join me in saying that they are willing to stand some of this expense in the effort to get better cream. It will have to be done through associations because an individual creamery cannot engage a man. The farmer will say, If you do not like my cream I will send it to another creamery. If the association sends out a man he goes in the name of the association. If the cream is rejected by one creamery, and sent to another creamery, it will be rejected there also, if it is not in proper condition. The milk should be kept at as low a temperature as possible from the time it is drawn from the cow. Farmers who have Cooley tanks should take the milk out of the stable as soon as milked, strain it through several thicknesses of cloth and submerge it at once in the tank. This is important in checking the growth of bacteria and important to the proper separation of the milk. The warmer you can put it into your tank the better the separation will be. I suppose many of you have cream separators. If you have not I should advise you to get them at once, both with regard to the full separation of your cream and the bacteria content. We have had trouble this year with the ice keeping. It has been a severe year. In many of the ice houses, especially the small ones, the ice melted out fast, and the consequence was that along in September we were receiving a lot of sour cream. It had to be made into butter at a less price. We were paying more for butter than we could buy it for in the open market, by two or three cents. On this line I would say that we are getting butter from the West and reprinting it, and it is costing us two or three cents less than we are paying the farmers at the door. It goes to show that the State of Maine is giving more money per pound of butter fat

to the farmers than any other state in the Union. Thirty-four cents for fat taken at the farmer's door is quite a good price. The highest price I have seen in the western states was 27 1-2 cents, for the month that we paid 31 cents. I have an instance of a farmer who had 13 cows. He asked me to give him the results, and I sent him the figures from the creamery books. The checks from the creamery and the calves he had sold gave him an income of \$76 from each cow. Deducting the grain bill it gave him a net profit of \$58 per cow. They were mostly graded Jerseys, two or three of them thoroughbreds. He claims that the skim-milk that came from these cows, and the dressing, paid for the hay they ate, and he thought he was conservative in saying that he had received a net profit of \$58 per cow. If you can get a cow worth \$50 or \$60 that will give you \$58 a year profit, that is about 100 per cent on the investment. I do not know of any other business that a man could engage in and get this profit. Some men will say that it is hard work and very confining to stay at home and take care of the cows night and morning. You have to say the same about any other business. The banker has to count his money every morning. It is not more confining than other business.

I will not take much more of your time. I am glad to say that the prospects for the State of Maine look very good indeed with regard to dairying. I have belonged to this association ever since it started and have attended all its meetings, and I can see by the interest manifested here and the intelligence of the farmers, and especially when going to their stables after they have attended these conventions, that it has a good effect. And I am looking for something better for the State of Maine. I think the farmers will go into the cow business instead of putting their money into the savings banks as mentioned yesterday. They will put it into better stables, better equipments and better cows.

SEASONABLE SUGGESTIONS.

By ELMER E. HARRIS, Skowhegan.

There was once a small boy who had already eaten quite a dinner but he wanted a piece of pie. The pie went down all right until it came to the crust, then he became tired and said he didn't want any more dinner; but his mother made him eat the crust, which was very much against his will. Perhaps you may sympathize with the boy. The creamerymen's hour may be the pie. I feel very much in place of the crust. I am on the program and so I suppose you have got to hear me.

When Brother Merrill, our worthy secretary, asked me to address this meeting at the creamerymen's hour, I hesitated, not because I wasn't interested, but because there are so many who could have done better, and given you something that would have been of more benefit to us all.

After I consented to serve, he said he wanted the subject of my paper as soon as possible. Now this was a hard thing for me to do,—to select a subject to talk upon at the creamerymen's hour of the Maine State Dairymen's meeting; and yet it ought not to be hard after so much has been said and done for the dairy business of our State.

I finally decided upon this,—“Seasonable Suggestions;” not that I was in any way fitted to present these suggestions or ideas where so much has already been said to advance our interests and to lead us out into larger fields, but I believe that a mere suggestion sometimes is the starting point of many reforms and advances in any walk of life.

In our various occupations when an obstacle stands in the way, if we want to make progress we must set about to remove that obstacle. In our highways the stumps and stones are removed, the way is made as smooth and easy as is possible with the means we have at hand.

For the vessel that sails down the river, if it does not have a good channel to run in, then one is provided, sometimes with great expense, too. So it is with the housewives. They try to economize in time and strength in doing their work and are not to blame either.

The man who has set out to be a dairyman must look to this very important way of doing things; not run as does the water along the course of least resistance, and like the brook when he comes to an obstacle go around; but he must set about to remove all barriers. To make a profit in the business we must see to it that there are no obstacles in the way in the shape of debit cows.

I believe that a man to be a good dairyman or good creameryman must be in love with what he is doing and the things he has to do with. For the dairyman it is first of all the cows (after his wife of course), then his home and their home. Then comes the creamery to which he sells his product, or the customer if he is a private dairyman. For the creameryman, he must be in love with his calling and feel a deep interest in his patrons and their welfare as dairymen. Their interest in the work must be kept alive. This may be done in a measure by judicious reasoning and careful investigation by the creameryman when anything goes wrong with the patron, or he thinks he is wronged in any way. If we would use a little more common sense flavored with just a little bit of love, there would not be so much dissatisfaction in the way of life.

The application of co-operation in the manufacture of dairy products has a wonderful effect on both sides, but unless, as I have said before, the man is in love with his calling and the animals he has to do with, the four topics which Prof. Beach of Vermont spoke on last year, viz., "Selection of the Cow, the Feed, the Care, and the Breeding," will do us but little good.

It has been said that it takes wit to buy dairy cows, but it takes more brains to raise them. It is man's ambition to have something, to do something, to build something, to create something, and when he has a fine herd of young stock, I care not what it is, he is proud of it and has a right to be.

The cow is the personality of motherhood, do not forget this. From her many of us got our first start in life. Some of us might not have been here had it not been for the cow. I am sure of this because I speak from experience. She has a right to claim first place in our heart's affections for animals; and should we not treat her well? Why not anticipate her wants and comfort. I suppose there is one thing that is human about

the cow as well as all other animals and that is, they have to eat and drink as do we. God has given us this privilege to care for the lower animals; can we not in doing this imitate Him in what he has done for us? We must if we would be good dairymen. Let us realize that the cow cannot speak, and yet she knows when she wants something to make her feel comfortable.

But the cow is not my subject; it is "Seasonable Suggestions," and perhaps right here is a good place to put some in.

Don't keep the cow you are not in love with. Sell her and perhaps someone else will fall in love with her. This is why all breeds find acceptance with men. The lack of love for the cow and an appreciation for what she does is noticed in the cream check. Let us rout the scrub cow by the use of the Babcock test and a pair of scales. The beef man wants her.

At the Storrs Station in weeding out the poor cows for five years, the profit per cow over and above the cost of everything, went from \$1.23 loss to \$21.69 net profit. Profits in dairying depend on details and details are legion. And right here the Cow Test Association comes in and is of great advantage to the dairyman, as is also the Breeders' Association. We all know something of the workings of these associations, and the good they accomplish; every creameryman should urge their adoption and organization. Let us creamerymen accompany the advance in the science of breeding and feeding.

The factory system is not on a settled basis fully. Much is to be learned by some about separators, starters, butter-making, cream and marketing, turning the commodity into cash for the patron.

How nice it would be if we could understand why the amount of butter fat in milk varies from day to day; if we could only look into some of the hidden things of nature! This would help the creameryman out when the patron finds fault because his test has gone down from what it was the previous month, or because it is not what it was a year ago, when he knew that he was feeding just the same and running his separator just the same. So much is based on the fat content of cream. Much has already been said upon this subject, and we know of many reasons why milk and cream will vary in test, but I believe the

care and treatment of the cow have more to do with this one thing than we realize.

Consider for a moment a herd of ten cows in a tie-up, on the south side of a barn, that has a space of three feet at the rear of the animals, where we may walk. There is a hanging shed on the south side of this barn also, to preserve the manure pile and keep out the sunlight, and the dressing is piled up to the windows on the outside, making the walls damp. Then come to this barn after the proprietor has awakened, and we find he has provided other means for preserving the manure (and should not the dairyman consider a little more, the value of this by-product?) He has built a shed at one end of the tie-up outside the barn and connected with it only by a walk, then he wheels the dressing into this shed or has it conveyed there some way. He also has made walls to this hanging shed, put a floor in it, and knocked out the side of the barn. He now has a roomy tie-up with plenty of sunlight and air if he has properly ventilated it, which is a very easy thing to do. The former conditions exist today with many of our dairymen. Some of them have awakened. Many however are still asleep; How can we awaken them?

I believe that cow barns, if well built, are never too cold in winter; and yet cold weather uses up fat of some kind, let us not forget this. Is it not easier to keep things warm in winter than to keep them cool in summer? Think of this sometimes. I know that people can and do sleep out of doors, even in as cold weather as we have had thus far this fall, and feel better for it. This I know from experience. Every shiver of the cow shakes money out of the owner's pockets, and we can and must keep them from shivering. Why give them ice water to drink, which some do even in the coldest weather? I don't believe they take the trouble to in the summer time. Why blanket the horse in cold weather and let the cow go without, except perhaps a few days in hot weather when she is on exhibition at the fair and must look slick?

Much has already been said about the lack of interest in dairying. If one is interested in a thing, how easy it is to do it, how it booms. It seems to me the thing for us to do when we go home, those of us who have had the privilege of hearing and learning so much here, is to give away what we have received.

You know the old saying, "You can't keep anything that you don't give away." Surely we want to keep what we have learned, and we want to give it to others.

One way to stimulate an interest in your neighbor is to get up an argument with him; get him to talk on the thing he is interested in. Those of you who are progressive dairymen, and think enough of your calling to be here, try to interest your neighbor, or perchance you may induce some to talk it over in the grange. I know of a grange that had an evening in which the creamery patron and the private dairyman discussed the advantages of both sides. The private dairyman now, however, is selling his cream to the creamery along with the other fellow. The creamery is not so bad a place after all to enlist in. We creamerymen wish there were more of them who would join us and get more benefit than they do now even; for surely the creameries in the State have helped the private dairyman in regard to prices, more, I dare say than he is willing to acknowledge.

Prof. Hitchings said the other day at Waterville in the pomological meeting, "Eternal vigilance is the secret of orcharding." So it is in dairying and creamery work. Sunlight, fresh air, and hot water are cardinal factors in cleanliness. Keep things clean on the outside of the creamery as well as on the inside, then the substance which is taken from the udder by the patron can be taken care of before it goes to market without any material deterioration. The output of butter and cheese, as well as of sweet cream and milk, is enormous, but the demand is still on the increase. Lucky is the man who can lead in quality. To cool quickly the milk that is gotten under favorable conditions is the secret of its good keeping qualities.

Now we have an article which should come to the consumer as soon as possible after it is taken from the udder. Can it be carried all over the State and then made into as good an article of food? Is there any danger of centralization affecting the quality?

Finally, ought not the creamerymen to cooperate just as we have done here in our State, only it could be carried to a greater degree than it is. We who are the servants of the dairymen ought to demand better market facilities, and not let our prod-

ucts go at the quotations that a few men may make, which do not fairly represent the values. Some such law as they have in Minnesota, where the commission man has to make a return to the consignor, stating who bought his consignment also the price received for same, might be advocated. We must cooperate more with the Maine Dairymen's Association in better work, more aggressive work, better laws concerning our dairy interests and an enforcement of those laws.

One thing more; as we go from this meeting let us be determined to handle this most precious article of food in the best possible way, that it may be gotten to the baby, the invalid, and the consumer in general as pure as possible.

LEON S. MERRILL.

I have been interested in the paper by Mr. Harris, and also in the discussion by Mr. McEdwards. I have been in close touch with the work of the creamerymen of this State for quite a number of years, and I want to say that in my experience, with the opportunities I have had to meet the creamerymen of other states, we have today the most progressive creamerymen that I know of anywhere. I have never seen anything advocated that has stood for progress, conservative progress, progress that was demanded by the conditions of our markets, that has not been supported by these men. And I think we can safely leave some things in their hands, Mr. President, because they are in touch with the consumer, and he is the man who has to say in what condition this product shall be placed before him. After all, it is the man who rubs up against the hard things in life who can tell you what the real conditions are, not the man who is passing his opinion upon theory. We have had too much of that in the past. Here we have an organization which has done much in the past few years. They have been cooperating with the Department of Agriculture in everything that it has suggested. I have not asked anything of the Creamerymen's Association during the two years that I have been connected with the Department of Agriculture in which they have not given me willing co-operation. If any one needs to have a demonstration of that he can go down here in the milk room

and see what the creamerymen have done in the exhibit of milk and cream, in interesting their patrons. Go down there and look at those cases which the creamerymen have made and have loaned, with the bottles, to their patrons who would exhibit at this meeting, and you will begin to understand how anxious these men are to receive a product that will meet the demands of the market.

We have been talking along improved methods for the production of milk and cream. Our people understand pretty well how to produce good cream and good milk; how to care for the milk after it has been taken from the cow stable. But I want to say to you that the next great move for the improvement of dairy products must be in the stable itself. The improvement must be made in the methods that are in use right there in the barn. I have not time to discuss the reason for this, but I think it is apparent. The average dairyman today expects his wife to use better methods after the milk has been taken to the house than he uses in the stable. I think it is the proper thing for the good wives to say to their husbands, you must use as good methods out there in the stable as I use in the house in making the butter, caring for the milk and cream and cleansing the utensils. I think that is a fair proposition.

Here is the matter of dairy inspection. The Department of Agriculture have been doing some of this work in the past year. Some of our creameries have taken it up also, and I think I am safe in saying that 2,000 dairies have been inspected. I have never visited a dairy that the owner has not said, "I am glad to have you come to my place; come again." It is our experience that we have been welcomed because we have been going as the friend of the producer, and pointing out the necessary changes to be made; not all of the changes that should be made, but the ones that need to be done first in order that a good product may be produced. I believe this is one of the great works we have before us. It has to do with sanitation, it has to do with the health of the animals, it has to do with the product. There is no one thing that will be asked for in the use of our dairy inspection score cards, by our creamerymen and by the Department of Agriculture, in the changing of the stables, that will not also be an economy in the production of the product. Did you ever think what an economy it is to have

the stable so constructed that the dust and chaff will be kept off from the cow's back? There will be less dust if the stable is sheathed.

I think we have never had a session when so many creamerymen were present. I believe the officers of the association should so plan the program next year that a sufficient amount of time may be guaranteed for the discussion of the papers presented by them. We want to co-operate with the Creamerymen's Association, which handles millions and millions of dollars worth of the milk and cream produced by the farmers of our State.

Mr. JOHNSON. I have been listening with a great deal of interest to what has been said. I fully agree with Mr. Merrill in what he said in regard to allowing the creamerymen a chance to have a little voice in this matter, and I want to say that I think the Creamerymen's Association is in a position to do more in regard to the improvement of the product than any other association connected with the work, for the simple reason that the creameryman is in touch with the consumer. And another thing which is more important, in my opinion, than that,—he is in direct touch with the producer. The most important thing to be taken into consideration is the place where this product is produced. Begin with the barns, with the stables. They are, in my judgment, the source of more trouble in this direction than any other place, and one thing that I have been thinking of is the manner of reaching the people from which the most of this trouble comes. Now the farmers that attend this association, we will say, are not the ones that are to blame for the bad products that are put out from the creameries. The farmers that are attending this meeting are those who are producing the best articles. Those who are producing the poor product are the ones you do not touch. There ought to be something done along a little different line to get in touch with those people. If you cannot get them out to the meeting get in touch with them through printed matter in some form, to a greater extent than you do. Of course we get a great deal of this through the press and to a certain extent through circular matter sent from the department, but I do not think we get enough of that matter distributed among the patrons where it is most needed, and I feel that along that line there is a chance

to do more good than has been done. Of course I realize that the department is making a great effort to get at this matter in the very best possible way, and they have accomplished wonderful results in the past few years. Along that particular line I think more can be accomplished than a good many of us are aware, and, as I said, one of the most important things we have to do is to get at the people that are producing the undesirable product, and they have to be reached in some other way than through these meetings. The question is, What is the best way to reach them? That it seems to me ought to be considered, and of course it is being considered and a solution will be reached in time.

W. K. HAMLIN.

I am an officer of both the Maine Dairymen's Association and the Maine Creamerymen's Association, and I am sure it does occur to you as it has to me, that the connecting link between these two societies is very weak. Now I am perfectly willing that the idea shall prevail that this link is a weak one if it conveys the impression to you that there is no strain on that link, no pulling apart between the two societies. I have been trying to think as I sat here what we could say to interest you. We are creamerymen, a few of us, but we do not want to talk to creamerymen, we want to talk to the dairymen, and it seems to me that the most important thing I can impress on your minds today is that we are in harmony with you. We are not organized to make a monopoly, to squeeze you. It seems to me that I am in a position to say that we are working for your interest, perhaps better than you are working for your own interest. But I will own up to you that neither you nor I are doing as well as we know. Now if we will just go to work and not try to make this long jump across the gulf at once, but take the way laid out on little steps across, one at a time, and do the work nearest to us, we shall reach a higher plane. Just as fast as we do the nearest thing to us, there will be a little light shining out. Here is something that you can do to make things a little better, and no matter how far you go, there is still the incentive to go a little higher, do a little better, be a little more perfect. So let us, as we go home from here, not try to jump too far at

one jump, but do the things we have to do the best we know, and if we are interested and conscientious and honestly want to do better than we are doing, I assure you there will be a way present itself to us whereby we can improve.

I notice a strainer pail on exhibition here, with eight little feeders, so that one can milk eight cows and strain each cow's milk separately. It costs \$3.00 and seems to be a first rate thing, so far as it goes, in the line of cleanliness. It is not all of us who can get a \$3.00 pail, but we can go home and be a little more careful than we have been and do ever so much better than some of us have done.

I have one more thought, in regard to the making and marketing of butter that we discussed yesterday. There is one rule that occurred to me that will cover the matter easily, and that is, when you are getting at the essentials of making and marketing butter just put yourself in the consumer's place, if you are making it, and do just exactly, or as near as you can, what you would want him to do if he were making it. That is a pretty good rule to apply all the way around. I represent the creamery interest in a small way, and as I go out among the patrons I feel that that rule is just the right one to apply.

CHAS. D. WOODS. If I read rightly the handwriting on the wall, there is one thing we are going to be up against very shortly. A few years ago it was quite customary for men to go before certain audiences and hold up pieces of cloth variously colored, and they referred them to fruits and jams, ketchups, soda water, ice cream, etc. We had at the hotel yesterday articles of that kind showing that they were colored. Perhaps you do not realize that today there are only two articles that can be colored in commerce and the fact not stated thereon, and those are butter and cheese. There is a complaint if milk or cream is colored. And if I read rightly the handwriting on the wall, this country is going to demand purity in butter and purity in cheese, just as it is demanding purity in ketchups, in jams, in soda waters. Now, gentlemen, you creamerymen educated the taste for creamery butter when you began your creamery work. At that time the butter you are selling today would not find its market because people did not like that flavor, they wanted the dairy flavor. But you have gone on with this coloring until you are outrageously dyeing butter in many instances. It is

up to you, gentlemen of the creameries, to begin lessening the amount of color. As Brother Gilbert said about changing the feed of the calf, you can go about it in such a way that the public will never step upon it, and in my judgment this use of poisonous dyes is not wise. You say you are using a harmless color. This is true in a sense, but it carries a caustic poison. This coloring matter you are using, in my judgment, must be kept out of food. The law is that the foods shall be labelled and the facts stated, if coloring matter is present. If I rightly understand public sentiment, there is going to be a demand presently that these two articles which are exempt from this general requirement shall come under the regulations of the law, and when public sentiment demands it, it must be done. I wonder if you cannot begin thinning down a little, educating the taste to a little less color?

Another thing, we have breeding associations, and they will come to us and say that with certain breeds high colored butter cannot be produced. There is no reason, if I am a breeder and am producing richly colored butter at this time of the year, that you shall come along with your dye and imitate it. I presume I have said a disagreeable thing, and I know you can see lots of reasons why we should color our butter, but in my judgment the time is sure to come when we will be obliged to omit the coloring matter.

L. S. MERRILL. At the present time the most insistent demand is coming from the oleomargarine people, for this reason,—they are able to place upon the market an immense quantity of oleomargarine that is such a close imitation of butter that it could not be told from genuine butter by the color. We see sometimes an account of colored oleomargarine being placed upon the market. Some of our papers have called attention to the fact that it was decreasing in amount. It means simply this: The amount of oleomargarine which the manufacturers are able to make and place on the market in close imitation of butter through the selection of natural fats has increased to such an extent that they do not have to color that product. They only color oleomargarine to supply the demand in excess of the amount they are able to make by the selection of fats to resemble butter. The colored oleomargarine is subject to a tax of ten

cents, and the uncolored in exactly the same shade of color pays a tax of 1-4 cent per pound. I know there is an effort to break down this barrier. I know also that there is a tendency among our creamerymen to work away from a high color, and men in close touch with the creamery business know that. But there lies the danger line, so far as the dairy interests are concerned, as true as you live. It may be all right to reduce the color, and I do not believe in putting in poisonous color, but I believe there should be some color that can be introduced into butter that will not be injurious to the public health, which will not allow an inferior product to be placed upon the market to be sold in competition with butter, and sold without the knowledge of the consumer, as it is in a great many cases, on account of this very thing. It is the ruling of the Secretary of Agriculture in Washington now that every package of oleomargarine must bear inspection. That is going to help out wonderfully but the sale of oleomargarine in imitation of butter is a serious matter for the dairy interests. It is a question in which the dairymen all over the country are interested. I may not know the whole situation but I know the organized grocers in the West, and the organized wholesalers, will make a determined effort to break down the oleomargarine laws,—reduce the tax or make some change, to secure the most favorable terms for the meat packers in the making of oleomargarine.

P. W. LIBBY, St. Albans.

I see that you have been calling on the different creameries from all over the State, but you have not mentioned any of the producers. I am going to rise as a producer of milk and cream, because I think I can get down with the producers and have more effect than the creamerymen. I have no reason to complain, but perhaps I can say just a little that will help my brother farmers to take more interest in their work. I will say in the first place that lots of the men who ought to be here and listen to the talk we have been hearing never get out on such occasions. The gentleman says you can write papers and send around to them, but half of them will not take the pains to read them. How you can touch such men is the conundrum to all of us. If they could open their eyes and see that it is to their

interest to go around and see the creamerymen and do business on a fair, square deal, they would reap lots of benefit. I am going to say as a producer that the things that have been advocated here today are very easy for us farmers to fall in line with. I began a number of years ago to try to improve in a small way the surroundings for my cattle. As the gentleman who spoke last said, we cannot afford to do it all at once. No farmer in this vicinity can afford to throw away everything he has got and build all new, but there is no one in this hall or in this town who cannot begin in a small way and improve his surroundings, so that in a few years he will have everything satisfactory with the creamerymen.

I went two or three years ago to a farmers' institute at Canaan, and heard Mr. Gilman tell about his cattle. Some one asked him how he kept his cows clean. He said, "It is a very easy thing. I have them carded every day, and with the proper drop behind them it is no trouble to keep the cows clean." I said to myself, if he can keep his cows clean as easy as that, I can. I bought a card and it was not two weeks before I had them so I felt proud of them. Now my neighbors come into my barn and look my stock over and have nothing but praise for them. Doesn't that appeal to any of you farmers? I am poor but I am proud,—perhaps my pride is what has kept me poor. I tell you, Brother Farmers, if you want to get good prices for your cream you must be progressive and keep your stock so that people will not be afraid to eat the product you produce. The brother said he did not know how we could ever reach the farmer who did not fall into line. Perhaps I can tell him. I have often thought that it is a shame for those who are trying to have a good product to mix it in with the product of a man who is filthy in his work. Our milk is then no better than his and we have to take a low price for cream that is not fit for anybody to eat. The man who is trying to do well has but very little show in this world. It is the man who is not doing anything that is profiting by the few who are trying to do something. I would say to the creamerymen, when you find a lot of cream not fit to take, send it back. I would not care if I lost a man's custom who did not produce clean milk. I tell you, Brother Farmers, you must keep up with the crowd

or you will be left behind it. I am sorry there are not any more common farmers here today. As common farmers we have got to get into line and produce something that the consumer wants, and then we must have the price which will pay us for making it. I think there will be no trouble in getting the price when we get things into condition.

Mr. GILMAN. This question of reaching the indifferent man has troubled the department for the last two or three years more than anything else along the line of dairying. I want to say that when we sent a man out to examine the stables and meet the farmer face to face and talk the situation over, I cannot recall a single instance where the farmer has not done what he promised to do. I agree with the gentleman who last spoke, that it will avail but little to send literature to them. It has been our experience that they will not profit much by it. The only way, it seems to me, to accomplish what we desire is for the State Dairy Instructor to have an assistant and send him out and let him meet the farmers on their own ground. We need two men to devote their entire time to this dairy work, and I believe we shall have no difficulty in impressing this fact upon the coming legislature.

F. O. ADDITON.

I was proud a few years ago to have Mr. Merrill come over to my place. He did not criticize, so I took it for granted the conditions were fairly good. Our creameryman sent a man around to the patrons. He wanted us to give him the names of the poor patrons. The reply was, we do not have any poor ones; we handle a good product. I want to say to these men who have spoken, do not place all the blame on the producer. Inspect your creameries. I believe, Mr. Chairman, that there is as much trouble with the products of the dairy after they leave the producer's hands as there is on a majority of the farms. Our wives keep the utensils clean, and the majority of the barns are in fairly good condition. I have been into a creamery where the butter was made under filthy conditions. I have been into another creamery, as large as any in the State of Maine, with one exception, where the utensils used, the cans used, were kept in an old foundry building totally unfit for use.

Such utensils cannot possibly make a good product. There is a lack in some of the creameries and also in transportation, do not lay it all on the producer.

E. L. BRADFORD.

The sending out of inspectors is the most effectual way of reaching the farmers, but it cannot be done all at once, and some sending out of circulars may be profitably carried on in the meantime. I almost think that after 25 years of experience I have solved the problem of reaching the patron in a way so that he will feel it, I do not care if he is several towns off. The first circular I sent out must have been sent three or four years ago, a little slip put into the envelope, I think about putting up ice. I remember one patron came along by the factory, when I lived at Turner Center, and said to me, "What is that little reward of merit in my envelope?" You know we used to get a little reward of merit at school if we studied our lessons pretty well, and he wanted to know what that reward of merit was. I think that illustrates the history of a great many of the circulars I have sent out since, but this is not very effective. The nicest way to approach a man is to say to him, If you will do so and so I will give you a cent more on a pound, and it is almost indispensable I think, to tell a man that if his cream or milk comes in in bad condition we shall pay him less for it. We return a little weigh slip, and if the cream is in bad condition we put down a discount of 32 cents, or something like that, and they somehow see that and read it and we hear from it. Many prayers and exhortations I have sent out to farmers to be more careful to keep the milk clean and cold have had no effect because they did not read the letters, perhaps. They see this little notation made on the bottom of the weigh slip and it takes effect. That is the only way you can make them read their reward of merit.

ANNUAL BUSINESS MEETING.

A business meeting of the Association was held at 1.30 P. M., for the election of officers and other business.

The following report was given by the treasurer:

December 5, 1907, amount on hand.....	\$82 82	
December 26, 1907, received from L. S. Merrill	36 00	
January 10, 1908, received from L. S. Merrill	10 00	\$128 82
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December 6, 1907, paid B. C. Brett.....	\$3 75	
December 6, 1907, paid B. C. Brett, expenses at Auburn	21 75	
100 banquet tickets.....	1 00	
December 10, 1908, bill for badges.....	9 60	
L. S. Merrill, banquet tickets.....	2 00	
Maine Farmer Publishing Company.....	3 00	41 10
<hr/>		
Amount on hand.....		\$87 72

The report of the secretary was read and approved. Officers were elected as follows: President, F. S. Adams, Bowdoinham; vice president, W. G. Hunton, Readfield; secretary, Leon S. Merrill, Solon; treasurer, R. Alden, Winthrop; trustee, W. K. Hamlin, South Waterford; corresponding secretaries, L. H. Blossom, Turner; Ira Porter, Houlton; John Buckley, Stroudwater; H. W. Fuller, Jay; J. A. Peters, Ellsworth; Chas. S. Pope, Manchester; E. E. Light, Union; A. C. Fossett, Bristol; Benjamin Tucker, Norway; C. L. Jones, Corinna; F. W. Leland, East Sangerville; John F. Buker, Bowdoinham; C. H. Doe, Fairfield; E. C. Dow, Belfast; David Campbell, Cherryfield; John Pease, Cornish; member of advisory council of Experiment Station, Rutillus Alden.

Dr. Woods. There is one thing I wish to mention, in connection with this Association as well as with the State Pomological Society, and that is, that we depend almost wholly for the money for running expenses upon our annual membership fees, and the annual membership, as far as my observation goes, is dependent upon those who happen to be present at the partic-

ular convention. It seems to me that if it should happen that I should not be here next year I would like to have the secretary notify me that my membership fee is due and remind me that I shall send \$1.00. And I would move that our secretary be instructed to remind those who were members in 1907 and paid a year ago that they should remit \$1.00, and that this should be the uniform practice hereafter.

Voted, That all members of 1907 in arrears for the year 1908 be notified by the secretary that they pay \$1.00 and continue their membership, and that this be the practice hereafter.

The committee on resolutions made the following report, which was accepted, and the resolutions adopted by the association:

Resolved, That as farmers of Maine we rejoice at the recognition of the great agricultural industry by the President, and the appointment of a special commission to consider the best means for strengthening the financial, educational and moral influence centering in farm homes. We rejoice that two sessions of this commission are to be held in New England, but desire to express our just indignation that both of those are located in one state, when the best interests and service of the commission and the people can be insured only by a fairer distribution of direct influence. Recognizing the importance of these sessions, we unitedly favor the sending of one of the officers of this association to the meeting in Boston, December 18th.

Resolved, That the Maine State Dairymen's Association reaffirms the action taken at the annual convention in 1906 in that it endorses the efforts of the fruit growers to obtain increased facilities for the study of orchard problems, and hereby urges upon the legislature the passage of the bill referred to it from the last legislature for the purchase of a farm for the use of the Maine Agricultural Experiment Station in carrying on experimental work for the benefit of the fruit industry of the State of Maine.

Resolved, That in view of the fact that there is an increased demand for more to be done along dairy lines, this association believes that it will be in the interests of the State that such legislation be enacted and sufficient appropriations granted by

the legislature as will enable the Department of Agriculture to extend its work on cow testing associations, to organize breeders' associations, to gather statistics, to assist in supplying farm labor; to provide for more thorough investigation and enforcement of the dairy laws; organize county dairy associations; hold auxiliary meetings; have prepared and put out articles for publication, and encourage the increase of dairy stock and the growing of home grain products.

Resolved, That the work of this association is today hampered by reason of insufficient funds for the carrying forward of its investigations in milk, butter and cream production, as well as to stimulate the growing of more of the crops, notably corn, necessary for the possible and profitable production of milk.

Resolved, That we would publicly bear testimony to the zeal, the faithfulness and the untiring energies of our president and secretary, and the valued assistance rendered by them in carrying forward the work of these sessions. Especially would we recognize the marked ability and influence of Secretary Merrill in securing the magnificent exhibit of milk and cream, and for the efficient service in establishing cow testing associations, and in the duties of his office as State Dairy Instructor.

Resolved, That the Maine Dairymen's Association recognizes and expresses its appreciation of the good work done by Mr. C. E. Tripp, the Dexter Board of Trade, and Dexter Grange, in bringing about the present meeting and making it the splendid success that it is.

Whereas, At a meeting of the Maine Creamerymen's Association held December 9th, 1908, the following resolution was passed: "*Resolved*, That the best interests of dairying in the State of Maine would be promoted by definite and official barn inspection, tending towards sanitation and oversight of dairy products until final delivery to consumer. And we recommend such legislation as will place authority in the State Department of Agriculture to this end."

Therefore, in accordance with the above,

Resolved, That the best interests of successful and progressive dairying in the State of Maine demand some system of co-operation between this association and the Maine Creamerymen's Association tending towards definite and official barn

inspection, sanitation and oversight of products until final delivery to consumer, and we recommend such legislation as will place authority in the State Department of Agriculture.

Resolved, That the association again expresses its indebtedness to the press for the full and able reports of all its meetings.

Resolved, That we are under renewed obligations to the railroads of the State for courtesies received in connection with this meeting.

R. ALDEN,
JOHN M. DEERING,
E. E. HARRIS,

Committee on Resolutions.

Voted, That the resolutions which pertain to legislative matters be referred to the executive committee of the Maine Dairy-men's Association.

Voted, That the names of Rutillus Alden and W. G. Hunton be added to this committee.

Voted, That the president of the association serve as a delegate to the meeting of the commission appointed by the President on Rural Uplift, which is to be held in Boston on the 18th of this month, and that his expenses be paid from the treasury of the association.

Prof. HURD. There is a matter that I would like to bring before this association, and that is in regard to some future work with corn and grain. We all realize, of course, the importance of live stock as a means of keeping up the fertility of the land but back of the live stock industry must be the getting of crops or the use of land. Now the State of Maine has no general agricultural society. It has a Pomological Society, which is a strictly fruit society, and it has a poultry association. This Dairy-men's Association must be the general agricultural society of the State and I am very glad that Dr. Twitchell took it upon himself to offer these prizes, and get up an interest among the boys in the growing of corn. Dr. Twitchell said yesterday that in case the Association did not see fit to take up this work he would continue it. This is something which the State should do, it seems to me, rather than any individual, and I would like to make a motion that the Maine Dairy-men's Association offer the coming year substantial prizes for an exhibi-

tion of corn. I will not name the amount now but I would like to leave the whole arrangement to a committee. Perhaps in future years we might look forward to expanding this to include the small grains and grass and clover. I am a native of Michigan and it is depressing to me to know that men in this State are buying hay from Michigan, when we can raise it here better than it can be raised there. It seems to me that something ought to be done. Our fair associations are almost ignoring the whole business; they do not offer premiums enough to encourage these industries.

Voted, That this association offer substantial prizes for an exhibit of corn, that a committee be appointed to arrange a grain contest for another year, and that the secretary of the association be the chairman of that committee.

This committee was appointed as follows: L. S. Merrill, W. D. Hurd, Z. A. Gilbert.

THE UDDER OF THE COW AND ITS DISEASES.

By Dr. F. L. RUSSELL, Orono.

The udder of the cow consists of four glands that reach their full functional development at the time of the birth of the first calf, or a few days before. The office of these glands is to secrete milk. Primarily to secrete milk to nourish the calf during the first three or four months of its existence, but, under domestication with intelligent breeding and an abundant supply of food, not only has the capacity of the udder for secreting milk been increased beyond the needs of the calf but it continues active during most of the cow's life.

THE STRUCTURE OF THE UDDER.

A yellow, elastic membrane of varying thickness completely covers the glands, binding them together and attaching them to the walls of the abdominal cavity. This elastic membrane also sends off fibers and bands that more or less completely divide each gland into sections or lobes. The gland tissue where the milk is secreted consists of a vast number of small cavities or

cells about 1-200 of an inch in diameter. These cluster in groups around small milk ducts which unite with each other to form larger ducts or canals that all open into a common reservoir in the lower part of the gland just above the teats. The milk is manufactured in the gland cells from the blood with which the udder is abundantly supplied. The milk passes from the milk reservoir through ducts that extend to the lower end of the teat. These ducts are closed at the lower extremity by bands of muscle and elastic fiber, which act as valves, and there are other similar valves just under the reservoirs, at the base of the teats. These valves serve to retain the milk in the udder until the calf or some substitute of the calf forces it out.

DISEASES OF THE UDDER.

These may be divided into those that are purely local and affect no other part of the cow and those general diseases in which the udder is only one of the organs affected. In the first class of diseases we include warts, sore teats, obstructed teats, teat fistulas, bloody milk, torn or cut udder, congestion of the udder. In the second class we include milk fever, cow pox, tuberculosis, and simple and contagious garget. Both lists might be somewhat extended but we can only briefly consider each of these, and depend upon you to ask questions about any points that we omit or fail to make clear. We need say little about warts on the cow's udder; they do not seriously injure her although they are sometimes very unsightly and if they bleed at the time of milking they are decidedly objectionable. They are easily removed. It is only necessary to use a little grease on them after each milking and they will entirely disappear within a few weeks and leave scarcely a perceptible scar. Sore, cracked teats may, when we have the combination of a nervous cow and a quick tempered milker, cause serious results such as the cow's foot in the pail and the milking stool on the cow's back, in consequence of which the milk may be held up and the cow prematurely dried. Sore teats are frequently caused by exposure to sun and wet, in the early summer when the skin is soft, or to the cold and wet, in late fall, or the teeth of a sucking calf. These sores are liable to bleed when the cow is milked and they heal slowly because at each milking they

crack open. As a preventative a little vaseline applied after each milking when the trouble first begins is often all that is needed.

The more serious cases yield readily to oxide of zinc ointment. This should be applied after each milking for two or three days or until teats are fully healed.

Occasionally we find a cow that is naturally such a hard milker that whatever her good qualities she is a failure in the dairy. Or a heifer calves and although the udder is otherwise perfect little or no milk descends into one of the teats, because the upper valve is too rigid. Again a more or less movable lump obstructs the milk duct so no milk will pass. The first two conditions may be remedied by the means of a teat bistoury and the same instrument can sometimes be used to advantage in removing the obstruction in the duct of the teat, but for this it will sometimes be necessary to use a milking tube until the quarter is dried off and then the teat may be opened and the obstruction cut out.

TEAT FISTULAS.

These usually open through the side of the teat and communicate with the milk duct, and are extremely annoying. When the hand of the milker presses the teat the milk squirts out at the side as well as at the end. Treatment is not difficult. When the cow is dry the side opening can be dissected out with a sharp knife or a pair of scissors to the depth of an 1-8 of an inch, or it can be cauterized with a piece of large wire heated red hot. In either case when the resulting wound heals the opening will be closed.

BLOODY MILK.

In this disorder we may find blood in the milk from one or more quarters of the udder, when it has been injured by blow or by the horns of another cow, and also when the udder is badly swollen from any cause. The trouble sometimes results from an abrupt increase of rich food. The blood may be sufficiently abundant to perceptibly color the milk or it may only be discovered on the strainer in the form of clots. This condition is due to the rupture of small blood vessels and pulling down on the udder in milking is likely to aggravate it. Some cases only recover after the cow has been allowed to go dry for

a time, but usually a somewhat restricted diet and careful milking will lead to recovery in from three to ten days. Cows that are heavy milkers are most often affected.

TORN OR CUT UDDER.

Often the udder is cut by barb wire or a nail. These cuts are ragged and frequently difficult to heal. This is particularly true if they are sufficiently deep as to allow the escape of milk. If the cut is clean and not too extensive an attempt may be made to close it by stitches placed close together. The wound must first be thoroughly disinfected and a disinfectant must be used as a wash as it is healing. Superficial wounds may be treated with creolin or zinc ointment.

CONGESTION OF THE UDDER.

Heavy milkers before and just after calving usually have the udder considerably swollen and hot. The swelling sometimes extends a little forward onto the abdomen. This is perfectly normal and requires no special attention but if the milk secretion begins prematurely and the cow is not properly milked out we often get very troublesome conditions, in which the udder is hard and sore and filled with coagulated milk. This condition requires very careful treatment or a valuable cow will be permanently injured. First the feed should be laxative and not too abundant, the udder should be bathed frequently with hot water and rubbed for a long time with the bare hand. After bathing and rubbing camphorated oil may be applied to advantage. More can be accomplished the first day or two that the trouble exists by persistent treatment than is possible later if the cases are neglected. Some of the most serious cases require daily doses of an ounce of saltpeter and 20 to 30 drops of aconite. Exposure to cold or standing in a draft is particularly liable to aggravate this trouble. As a preventative it is always best to begin milking a cow as soon as milk begins to be secreted, even if it is a week before the birth of the calf.

MILK FEVER.

The disease which we call milk fever is practically confined to cows which are heavy milkers and occurs within five days after calving. The udder may or may not be the primary seat of the trouble. Nobody has been able to satisfactorily decide this point, but certainly one of the first symptoms of milk fever is the more or less complete suspension of the secretion of milk, and this condition continues until the animal recovers. This is one of the diseases that has lost most of its terrors. Formerly it was considered a very fatal disease but now recoveries are the rule. The treatment consists in filling the udder with sterile air, after which the cow may be expected to regain her normal condition in from eight to ten hours, sometimes much sooner. It is desirable to give the cow a comfortable bed and warm clothing, but even this is not essential. The preventative for this disease consists in leaving the udder partially filled with milk until the calf is three or four days old.

COW POX.

Cow pox is fairly common in this part of the country but it is not usually considered a very serious disorder. But we have seen a few deaths resulting from it and it is certainly very uncomfortable to have to milk the affected cows. It has to run its full course and the treatment is altogether along the line of preventing the spread of the disease to other animals, and making some attempt to hasten the healing of the sores. Cow pox is a contagious disease of cattle but is sometimes transmitted to horses, sheep, and human beings. It is characterized by considerable fever and sores on the udder and teat of the cow. These sores begin as small, red, tender spots that later break and discharge a pale, sticky fluid, then gradually scab over and completely heal in about twenty days. Healing may be delayed by the scabs getting torn off in milking, and can be somewhat hastened by the use of milking tube and antiseptic washes. The man who milks the cow is liable to contract the disease if he has cuts or scratches on his hands, but this is not a serious matter for cow pox is the disease that is regularly used as a protection against small pox. Vaccine matter which physicians

use on children is obtained from heifers that have cow pox. To prevent the spread of cow pox in a herd the affected animals should be the last ones milked and the hands of the milker should be disinfected when he is through milking.

TUBERCULOSIS OF THE UDDER.

Tuberculosis of the udder is not very common but when it occurs it manifests itself in the shape of hard, slightly tender lumps in some part of the glands. These grow more or less slowly until finally the whole quarter may be filled. In the meantime the milk is normal in appearance and only gradually decreases in quantity. It is needless to say that such milk is unfit for food and the only treatment for the trouble is to destroy the cow.

GARGET.

Garget is one of the most troublesome diseases that the dairyman has to contend with. It results in the loss from the dairy of many otherwise valuable cows. In its mildest form it manifests itself in a scant supply of milk from one quarter of the udder. This milk will contain some thick, stringy particles that may only be discovered when the milk is strained. In more severe cases all the quarters of the udder may be seriously swollen and hot and the secretion of milk almost entirely suspended. The cow will also be stiff and lame, with little appetite. Garget usually results from mistakes in feeding, such as sudden changes in the quantity or quality of feed. But it is also produced by direct injury to the udder, as lying on an uneven floor or a stone in the pasture. Some rough milkers have more trouble with garget than more careful milkers. Treatment is not always very satisfactory. Old cows that have had frequent attacks of garget are often best treated by sending them to the butcher. From the first attack, even although it is severe, the cow usually recovers within a few days as the result of a moderate dose of physic and daily doses of an ounce of salt-peter, with light laxative food. Sometimes satisfactory results follow the distending of the udder with sterile air as in milk fever. This is nearly always beneficial when there is considerable thick milk in the udder that cannot readily be removed. Contagious garget is due to the growth in the udder of certain

species of bacteria. This trouble manifests itself first as a hard, hot, painful swelling at the end of one teat. If it is not checked at this stage the bacteria are carried up into the udder and as a result you have a hard, sore udder with little milk but in its place foul smelling, bloody matter. It is practically impossible to cure the disease at this stage. A loss of one quarter of the udder always results. Taken at the very beginning by the free use of disinfectants on the outside and in the milk duct of the teat it is possible to cure this trouble within a day or two.

Ques. Are there not sometimes bunches in the udder when the disease is not tuberculosis?

Ans. Sometimes bunches in the udder are simply the relics of previous attacks of garget. We have cows with the udders in bad shape who have no trace of tuberculosis. Where tuberculosis is present we may expect a more or less constant increase in these growths, not that they will remain stationary or decrease, but will constantly increase. I have known cases where in drying a cow off, the milk was not milked out quite freely enough and the udder would bunch up. That is not a symptom of tuberculosis.

Ques. In relation to the second phase of garget, is that contagious?

Ans. I want to say a word in relation to contagious garget. Sometimes we have a very serious condition that is due not to mistakes in feeding or handling but that is due solely and entirely to the presence of certain bacteria in the udder. This trouble always begins at the end of the teat, and we get a sore, swollen condition there. The milk comes hard and we may get a drop or two of blood. The cow was all right at the previous milking but at this milking we find at the end of the teat a sore, hard bunch. If nothing is done about it gradually the infection extends up into the udder and we get the whole quarter permeated with these organisms, and instead of milk we get a foul smelling fluid discharged. When it gets up into the udder there does not seem to be any hope for the cow, but in the early stages when it is simply at the end of the teat, by washing out the milk duct with a disinfectant and soaking the outside of the teat, we sometimes stop it. It is infectious because we may

carry the infection on our hands to adjoining cows and give it to them.

Ques. What would you recommend for a disinfectant?

Ans. There are a number that may be used. We quite generally recommend the use of creolin, a 1 1-2 per cent solution. Bathe the outside of the teat in this and inject it into the teat.

In regard to tuberculosis, if any of your neighbors are alarmed as to whether they have tuberculosis or not, modern methods require that they have the cows tested, and that will settle the question.

Ques. What is the cause of the swelling of the duct that runs down to the teat?

Ans. We get that occasionally, and I do not know of any way that we can guard against it. We sometimes find growths on the side of the duct but just what causes them I do not know.

Ques. In a bad case of garget would you recommend for one treatment kainite in preference to anything else?

Ans. No, I would recommend saltpeter. If she was a large cow you might use two ounces at first, and then one ounce twice a day. If it is a bad case, I should give the kainite in combination with the saltpeter.

Ques. Would you please define the second stage of milk fever?

Ans. If we are watching a cow carefully, after she calves and has done well, and her appetite has been good, within five or six days if she is a little uneasy, she is stepping about a little, you have the first symptoms of milk fever. Then they may follow quite rapidly. She loses her appetite, her eyes look staring, the secretion of milk is suspended. If we try her we find that she cannot swallow. About that time she goes down, she cannot stand up, and she usually lies with her legs well under her and her head thrown over to the side a little way; then her legs will be out stiff and her head thrown out against her side, and in that condition she continues until she dies, under the old treatment. But under the new treatment, even if she is stretched out so nearly dead that you can put your finger in her eye and she will not wink, in two hours after the injection of the udder she gets up on to her stomach and in four hours on to her feet, and in ten hours she is eating and drinking and

giving milk,—seems to be all right; only we might say she is liable to milk fever any time within four or five days, if she has had the disease and got over it. If you repeat the conditions that brought on the first attack she is liable to have the second attack. It is well not to empty the udder. The Department of Agriculture at Washington issues a bulletin on milk fever in cows that you might find valuable.

REPORT OF COW TESTING ASSOCIATIONS.

By LEON S. MERRILL.

The officers of the association have requested me to make a report on the cow testing associations in Maine. We have at the present time three associations, containing about 100 members who own over 1,000 cows. The first commenced active work February 2nd, and is located in the towns of Waterford and Norway; the second began operations February 16, in the towns of Winthrop and Readfield, Winthrop being the place of business, and the 3rd June 16, in Canton and Sumner, with possibly one or two members from Hartford.

The purpose of the cow testing association is to determine the dairy value of the individual cow. It must possess certain essential factors. It must be practical in operation, economical in cost, educational in scope, reasonably accurate, and profitable in results. The form of organization has much to do as to whether or not it may be practicable. After an examination of the different forms in use in this country, it was decided that the co-operative form was the one best adapted to our needs, and so it was presented to our dairymen, and evidently this conclusion was correct, as the plans have been adopted without question. However, all of the different plans have always been presented for the dairymen to consider and take what seemed to be best and wise for them. The plan of the co-operative association is for the members to employ an official tester, to visit the farmers at stated periods, once each month, going in time for the night's milking and spending the night with the farmer. He weighs and samples the milk from each cow, and

also weighs the roughage and the grain, both night and morning. The milk is tested, the butter fat computed, and records are made of the milk yield, the butter fat produced and the feed consumed by each cow. After this is done, a copy of the record of this work is left with the individual farmer, and that member carries him to the home of the next member, and thus a complete circuit of the association is made once each month. We have placed here before you a copy of the blanks which we use, the one on the left being the herd or daily blank, from which the information is copied to the yearly or individual record.

This method places the work in the hands of a disinterested person, a man who is especially qualified to do the work, a man whose duty it is to do it upon certain days. This has to do with the practical work of the association. The economical feature of the work we try to cover by providing in each association enough herds to keep a man employed 26 working days in each month, and that those herds shall contain enough cows to bring the cost to at least within \$1.25 per cow for the year's work. The cost does not exceed that in any of the associations. It is around \$1.00.

The educational part of the work is taken up in this way: First, by leaving a copy of the records with the farmer and by the discussion of every feature of that report and every feature of each cow's work with the dairymen, by the opportunity he has for comparison through the examination of the records of other herds, and by the information gained at the monthly meetings of the association. Our associations all have meetings once each month, and at these meetings the Department of Agriculture has a representative to discuss with them the problems that confront them in their dairy work. So these are the features that contribute to the educational part of the work,—first, the definite information given to the man concerning his own herd; second, the information that comes to him concerning the work of all the other herds of the association (and you know that a large measure of the progress of the average person comes through comparison), and third, the gathering together once each month for these meetings, to advise with one another. The meetings are conducted with the idea of developing the individuality of the member and also of imparting

information by means of a speaker who is sent to them. The members usually discuss topics themselves, in addition to the address of the day.

The results are reasonably accurate. Comparisons have been made from different sources by the Danish government where the cow test associations originated, and in a bulletin published by them it is stated that the widest variation they have ever found between this plan of work, weighing and testing the milk once each month, and weighing and testing it every day, in any one herd in one year, has been four per cent. Comparisons have been made in this country with Prof. Haecker's work in Minnesota, and the average variation for 15 years has been less than 1 1-2 per cent, between testing a sample one day each month and testing every day.

The profitable results of this work depend entirely on the member. It makes little difference how much we know if we do not use our information. It makes little difference how much information is furnished, if the individual does not use the information furnished him. The blanks, in order to be uniform, have been furnished by the Department of Agriculture. Each week the Department receives a copy of all the reports made by the official tester, and they are being placed on file for future use. We do this for several reasons: First, in order that we may direct the work, that we may keep in close touch with it and keep a check on the official tester, that all the work may be uniform and that we may be able to make comparisons of the work of one association with another. We send a representative so that the work of these associations may be directed along the most helpful and most educational lines.

We can undertake only one more association with the present force. I believe that it is for the interests of dairying that an assistant be given to the Department of Agriculture, who will have charge of the cow testing and breeders' association work, so that this line of work may be pressed to the utmost, because it deals with the basis of the whole dairy industry.

Just a word concerning what other states are doing. The Dairymen's Association of Iowa, at their meeting just closed, passed a resolution and appointed a legislative committee to secure from the legislature if possible \$10,000 to place men in

the field organizing and directing cow test associations. The Dairymen's Association of Wisconsin have two men in the field who do nothing else except to organize and direct cow testing associations. The Department of Agriculture in Canada has four men, I am quite sure, doing nothing else. The Department of Agriculture in Michigan has one man who does nothing but organize and direct co-operative breeders' associations. I have not seen anywhere an account of a dairymen's association in session that has not recommended the prosecution of this work.

I have tried to make my talk very brief and still give a report of what has been done.

At a recent meeting in Readfield the official tester made a few comments on the work there, and I have taken just a few notes from it. He reported one cow producing butter fat at 11 cents a pound and another one producing it at \$1.85 per pound. In one herd of cows one animal had produced 82 pounds of butter fat, less than any other, and it had cost three times as much per pound as with the best cow in the herd. One man could sell three cows and still be making money. Another man had marked two cows for sale because they were dry about four months in the year. He found out from the individual record that they had already produced, one 305 and the other 315 pounds of butter fat. Because they had gone dry so long he had made up his mind to sell them. The best cow of one herd in ten months had made a profit of \$31.43, and the next one had made a loss of \$10.55.

A. W. GILMAN.

I have had the pleasure of visiting some of the cow testing associations and I am satisfied that since I have had anything to do with the Department of Agriculture we have taken no step that will do so much towards encouraging dairying as this. The farmer as a rule is a very busy man, and it is impossible for one man to do everything. When we first began to discuss the cow testing association movement, even so distinguished a man as Prof. Hills of Vermont thought at first that we should form a cow testing association and let every man test his own milk, balance his own ration, and feed his own cow, and be responsible for the result. That did not appeal to me at all.

I think I am treating everybody fairly when I am willing to compare him to myself, and I know that if there was a cow testing association in my neighborhood, where I could reach it, I should be the first one to go into it, and if I should trust it to my men, as I am away from home very much, I should feel all the time that I was not sure of the success of the work. But when it is conducted as ours are in the State of Maine today, the results are worth something. We do not have to leave the work to the individual farmer. I once held a dairy institute and every man brought his milk to be tested. Now we are rather apt to be a little proud, and we want our cows to test a little higher than our neighbors' and when we got through testing there some of the cows tested as high as nine per cent, and it was in the minds of some that the farmers took the last milk that the cow gave for a sample. We cannot lose any faith in this cow testing association as it is managed now. The farmer does not test his own cow; some one comes there and weighs the milk and tests it, and that is worth more than his own test. And when this man comes in and sits down with the owner of the cow and helps figure out the cost of his ration, and shows him how much he is getting for it, that information is of much value to him. The idea that struck me with the most force in what the distinguished dairyman from New Hampshire said yesterday was this: He said his grain bill was about \$350 a month, and he had his system of feeding so thoroughly organized that he is feeding each individual cow up to the limit of profit. And he came away from home and left those 150 cows which were being fed between three and four hundred dollars worth of grain a month, and said he felt perfectly comfortable about this great expenditure with his dairy, because the cows would pay the bill. Now I have a small dairy at my home, and I am feeding, I have no doubt, as liberal grain rations as the gentleman from New Hampshire; and I have an intelligent man to care for my herd and we believe that they are paying their bills. But my cows do not have the individual, intelligent care that some are getting. If I were in a locality where I could join a cow testing association my dairy would be worth much more to me than it is now. We hope to extend this work as fast as possible.

I think that what Prof. Sanborn said here to the dairymen and farmers will alone be worth enough to pay for this whole conference. He said that he had been farming for fourteen years and his farm was producing more than four times what it did fourteen years ago. Let us stop to think of it a moment. What does it mean? Have you doubled your farm four times in fourteen years? I fear none of us have half done this. I sometimes feel that we really ought to do better or go out of the business. This meeting is going to be worth something to the State of Maine, if we take home some of the things that have been said and profit by them. Many of the men in the State of Maine have been to Prof. Sanborn's home and examined his work. He went there as a poor man and was much in debt and he has not held any lucrative office, he is not a speculative man, but with his intelligence and his thorough knowledge of crop production he has been able to build up his great establishment and make a profitable business out of it. What Maine needs is a more intelligent agriculture.

All of the papers presented at this meeting have been very valuable. There is much for us to learn. If we will give our farm work more intelligent thought, and give our undivided, earnest attention to our farms, we shall certainly be on the road to better conditions.

R. ALDEN. Our instructor is trying to lead us on to higher ground. It is turning a search light on to our business, and it is just here with me today. I am finding out that I have good cows that are paying more than \$30 a year, and then others standing right by them, consuming the same amount of feed, that pay scarcely anything. Are we willing to apply bookkeeping to our business? Do we want to go on in this haphazard way or do we want the search light turned on so that we can tell at the end of the year just what every cow has paid for the year? Are we going to keep the cow that has made 150 pounds of butter and sell the one that has made 350 pounds? I have one cow that I know will not make more than 150 to 200 pounds, and another I think will make 400. One was tested the other day, that I have just started with, and I found she was making 2 1-4 pounds of butter a day. This cow a man could have bought of me at a reasonable price, but now she is

not for sale. These are stubborn facts and we have got to meet them and the sooner we do it the better. I am in favor of cow testing associations. I want to say that in my section the people as a rule are not applying the Babcock test. They thought they could buy good cows by looking at them, I have some of that in me, but this is a search light turned on to my business.

F. S. ADAMS.—As a member of the committee to recommend legislation I shall report in favor of a measure providing that if any dairyman or farmer in Maine wants his herd tuberculin tested he shall make application to the cattle commissioners on a blank prepared for that purpose, and agree to comply with certain conditions laid down by the cattle commissioners, and in case he has his herd tested and we find tuberculosis on his farm he shall agree to disinfect the stable himself under the direction of the cattle commissioners and to have his remaining herd tested at the end of a certain period so as to be sure to stamp the disease all out. Under those conditions the testing shall be done at the expense of the State. There will be nothing compulsory; just give a man a chance to have his herd tested at the expense of the State, and I am fully convinced from what I know of the sentiment of the State that we should have all the business we could attend to.

R. ALDEN. I want to favor a law that will protect us in purchasing cows. If we go out to purchase cows and pay a big price for them I want the law fixed so that the party who sells those cows shall guarantee us in that purchase; so that if he sells a cow that is tuberculous he shall have only one-half the cost of the cow, instead of demanding full price. I have been caught myself and I know of one or two others who have. I know of a large dealer who puts those cows on to the market, and I believe we need some protection.

REPORT OF STATE DAIRY INSTRUCTOR.

*To the Hon. A. W. Gilman, Commissioner of Agriculture,
Augusta, Maine:*

I have the honor to herewith submit my report as State Dairy Instructor for the year nineteen hundred and eight.

As preliminary to the report I wish to state that the work of the Dairy Division during the past year has been concentrated very largely along the same lines as followed during the preceding year. The main thought underlying the work has been the improvement of the productive qualities of our dairy animals, and the different lines taken up in this report will be considered in their relative importance to the above plan.

DAIRY TESTING ASSOCIATIONS.

When the dairy testing work was first undertaken, it was considered advisable to only attempt the organization of two or at most three associations during the first year, as the plan for carrying it on ought to be well developed in detail before being placed in very extensive operation. It is well that such a course was adopted, for many changes have been made in the record blanks and in some phases of the work.

The real purpose of a cow test association is to determine the dairy value of the individual animal and the full scope of the work can best be understood when we consider that dairying in its broadest sense is not only the production of milk economically but the reproduction and improvement of the dairy herd.

During the year one association has been organized. The two associations formed in December, 1907, commenced active work in February, 1908. As a report of the associations in detail is to be published in bulletin form, later in the year, only a brief outline of the results accomplished thus far will be included in this report.

The first association to be organized was the Waterford and Norway Dairy Testing Association with Mr. L. E. McIntire of East Waterford president; Mr. F. H. Morse of South Waterford, vice-president; Mr. W. K. Hamlin, South Waterford, secretary, and Mr. Addison Millett of South Waterford, treasurer.

Actual field work was begun February 1, 1908, under the immediate supervision of Mr. Harold S. Noble of Waterford as its official tester, and has therefore very nearly completed its first year. The association contains thirty-one members owning about three hundred cows. The membership is located in the towns of Waterford and Norway as the name indicates. During the year regular monthly meetings for the discussion of dairy and farm work have been held, usually at South Waterford, but it is understood that for the coming year arrangements have been made to hold the meetings alternately in Waterford and Norway, so that all the members in the two towns will have an opportunity to attend some of the meetings.

These meetings have proven to be a very important feature of the work. They have been well attended and always full of interest. It has been noticeable that those members who have been constant attendants at the meetings have derived the most good from the association.

The Kennebec Valley Dairy Testing Association organized at Winthrop with Mr. W. G. Hunton of Readfield as president, Hon. Rutillius Alden of Winthrop, vice-president, and Mr. C. F. Kilbreth of Winthrop as secretary and treasurer, was the second association to commence work.

Mr. A. A. Colley a graduate of the Maine Agricultural College, was engaged as the official tester. The testing began February 16, 1908, with over thirty members owning two hundred and ninety-seven cows. Monthly meetings have been held regularly with two exceptions. Many of the members have shown great interest in these meetings and a few have been present at every one held during the year. This association includes in its membership farmers from the towns of Winthrop, Readfield, Manchester and Monmouth.

The Oxford County Dairy Testing Association was organized at Canton and commenced work June 16, 1908, with Mr. C. T.

Bonney of Canton as president; Mr. J. F. Palmer of East Sumner, vice-president, and Mr. A. H. Adams of Canton Point as secretary and treasurer. Mr. A. S. Cook of Presque Isle, a graduate of the Maine Agricultural College, was engaged as official tester. The association includes farmers from the towns of Canton, Hartford and Sumner. There are three hundred and forty cows in the test. Monthly meetings have been held, alternating between Canton and East Sumner. They have always been well attended and the members have invariably shown themselves alive to the importance and possibilities of the work.

During the first six months, thirty-nine cows were sold by the members of this association and in the same time thirteen cows were purchased. It is a fact well worth noting that the thirteen cows purchased have paid during the months they have been in the association a monthly profit of \$61.23, while the thirty-nine cows sold only paid a monthly profit of \$66.69. The advantage of the summer season and the low cost for maintenance was also very much in favor of the thirty-nine cows sold.

All three associations were very fortunate in securing competent assistants as official testers, and the work has been progressing most satisfactorily. Interest in different sections of the State is increasing and several more associations could be easily organized if sufficient money was available to provide proper supervision.

Without question no more important work along dairy lines has ever been undertaken in the State and it appears desirable that an appropriation sufficient for extending and carrying on this work should be made by the legislature at the coming session.

MEETINGS.

The work of the Department is essentially extension work and while visits to individual farmers, as in the inspection of dairies, are of great value, yet the large number of farmers in the State and the small amount of available funds at the disposal of the Department, precludes individual work to any great extent. With this fact in mind it has been felt that public meetings offer splendid opportunities for placing the plans of the Department before a large number of people, and making

it possible to leave behind a concrete force for carrying out the plans outlined.

During the year many requests have come to the Dairy Division for lectures upon matters of dairy interest and so far as possible these invitations have been accepted.

Following the above general plan eighty-seven lectures have been delivered before granges, cow test associations, the Creamerymen's Association, farmers institutes and special dairy meetings, and in addition, lectures were delivered in the Farmers' Week course at the Maine Agricultural College on "Cow Test Associations" and before the State Board of Trade on "The Live Stock Interests of Maine."

A summary of the lecture work of this division for the year, follows:

	Number.	Attendance.
Institutes	9	769
Special dairy meetings.....	11	1,098
Grange meetings, subordinate.....	19	1,734
Grange meetings, Pomona.....	6	999
Grange meetings, field day.....	14	11,900
Cow Test Association meetings.....	23	1,105
Creamerymen's Association meetings.....	5	131
	<hr/>	<hr/>
Total	87	17,736

I attended the meeting of the Maine State Grange held at Waterville December 14-16, 1908, and was again honored by the State Master by being appointed chairman of the Committee on Dairy Interests.

INSPECTION OF DAIRIES.

Dairy inspection has received considerable attention during the past year and quite a large number of dairies have been visited. Early in the year the score card in use by the Department of Agriculture at Washington was given careful trial in actual field work, and believing it to be practical in its application to the average dairy, the Department adopted it as the official Maine score card.

In December, 1907, there appeared in some of the newspapers a report somewhat damaging in its character to the dairies of

certain towns of our State, from which the product was being sent to Massachusetts markets. As the statements contained in this report would indicate that milk was being produced and sold in violation of the laws of the State and as the Commissioner of Agriculture is charged with the enforcement of those laws, it was felt that in justice to the producer as well as to the Department of Agriculture, a careful investigation should at once be made. This was done by the Dairy Instructor assisted by Mr. S. C. Thompson, Assistant Dairy Instructor, and the results published in a special bulletin issued in March, 1908.

That this investigation did not bear out the allegations contained in the report above mentioned is a source of gratification to this division. The government score card was used in making the investigation and the advantages accruing from its use became so apparent as to result in its adoption for use in all inspections and investigations of dairies when conducted by or in co-operation with the Department.

Efforts have been made to interest boards of health and creameries in its use, the Department offering to co-operate by supplying blank score cards to all who would use them and return a copy of each inspection to this office. I am very glad to report that several towns and creameries are making inspections of the dairies supplying them with milk and cream and have placed copies of these inspections on file with this Department.

The experience of the Dairy Instructor has invariably been that farmers have welcomed visits from representatives of the Department of Agriculture and have shown great interest in the use of the score card. I believe there is great value coming from official barn inspection when conducted in an intelligent and conservative manner and that the resolution adopted by the Maine Dairymen's Association at its last annual meeting fairly represents the opinion and desires of the progressive farmers of the State. The resolution as adopted, follows:

Resolved, That the best interests of successful and progressive dairying in the State of Maine demand some system of co-operation between this association and the Maine Creamerymen's Association tending towards definite and official barn inspection, sanitation, and oversight of products until final

delivery to consumer, and we recommend such legislation as will place authority in the State Department of Agriculture.

An interesting and encouraging phase of this work appears in the improved conditions of those dairies where inspection has been made the second time. The average improvement as revealed by the score cards amounts to 2.1%.

The towns of Brunswick and Rumford have through their milk inspector made thorough inspection of all the dairies supplying the people with milk, and copies of those inspections are now on file at the Department. D. Whiting and Sons of Boston, owners of creameries at Pittsfield, Canton, Winterport, Newburg, Bucksport, Belfast, Corinna, Dexter, Dover and Guilford, but which are under the direct management of Mr. C. E. Henry of Pittsfield, have also made inspection of all the patrons supplying those creameries with milk and cream and at about half of the creameries inspection has been made for the second time with the result as stated above. Several other creameries have engaged in the work to a lesser extent and report their belief in the efficacy of official barn inspection.

INSPECTION OF CREAMERIES.

In the early part of the year the government score card for the inspection of creameries was adopted and while the press of other important work has prevented carrying into effect wholly the plans of the Department, there was found time to personally visit thirty-eight different creameries in the State, on seventeen of which the score card was used. It is the opinion of the Dairy Instructor that the thorough use of this score card will prove beneficial.

Wherever used it has attracted considerable attention and much interest on the part, not only of the owners of the different plants but of the local managers and help. In several instances my attention has been called to improvements made in construction, equipment and methods since the inspection and I have been invited when in the vicinity to call and score the plant again.

It is the purpose of the Dairy Division that during the coming year every creamery in the State shall be visited and the report of the inspection made upon the official score card.

CITY MILK PLANTS.

Eighteen milk plants have been visited during the year and on some of them the score card was used. The condition of many of the plants visited should be improved materially. A few of them were in good condition and appeared to be making every effort to handle the milk in a proper manner but others should receive immediate attention from the Milk Inspectors and the Boards of Health.

It is the opinion of the writer of this report that the Department of Agriculture or some officer having authority should at once make a thorough inspection of city milk plants and where necessary bring about such healthful changes as the present law will allow.

STATE DAIRY CONFERENCE.

The State Dairy Conference held jointly by the Commissioner of Agriculture and the Maine Dairymen's Association, being the great annual conclave of dairymen from all over Maine, it was felt by the Dairy Instructor that such time and attention as might be necessary should be given to working up an interest in the meeting. Especially was this true as the association for the first time in its history offered premiums for market milk and cream open to any producer in the State.

The prominence and reputation of Maine as a producer of sweet cream made it appear desirable to secure for the conference an exhibit of both milk and cream that would be creditable to the State.

That the exhibit exceeded in size and quality the hope of the most sanguine is now a well known fact. Prof. Ivan C. Weld of the Dairy Division, Department of Agriculture, Washington, who acted as judge in the scoring of the milk and cream, stated in his address before the convention that it was the largest exhibit ever held in this country and at this time we know that a larger per cent of samples scored over ninety points than at any other contest thus far held.

To the Dairy Instructor the one disappointing thing about the exhibit was the fact that but very few of what is known as milk men entered samples for competition. Nearly all competitors were dairymen who are selling their product to creameries. This fact, however, and the splendid score of the samples,

explains to a considerable degree the reason for the enviable reputation Maine milk and cream has gained for itself and was worth much to the sweet cream industry of the State.

I desire to call your attention further to the general appearance of the exhibit. Every sample of milk and cream, with a single exception, was exhibited in a half-pint milk jar of uniform shape, with no metal parts attached. All samples arrived well iced and in good condition. Many of the creameries became interested in the matter and loaned shipping cases to any of their patrons who would enter the competition.

Very moderate premiums, twenty-five dollars for milk and the same for cream, were offered, to be divided pro-rata among all exhibitors whose samples scored above eighty-five points.

SUMMARY OF EXHIBITS.

There were 38 entries of market milk, 21 entries of market cream, 13 entries of pasteurized cream.

Of these samples, 21 contained 10,000 or less bacteria, 7 contained 10 to 15,000 bacteria, 6 contained 15 to 20,000 bacteria, 1 contained 20 to 25,000 bacteria, 14 contained 25 to 50,000 bacteria, 13 contained 50 to 100,000 bacteria, 10 contained over 100,000 bacteria.

Only two entries of milk and three of cream were too low, the limit being 85, to participate in the premiums offered.

SUMMARY OF SCORES.

Score.	Milk.	Cream.	Pasteurized Cream.
96 and over.....	0	1	0
95 and over.....	4	1	0
94 and over.....	5	1	0
93 and over.....	6	3	4
92 and over.....	6	3	2
91 and over.....	3	3	4
90 and over.....	1	2	1
89 and over.....	4	2	1
88 and over.....	2	0	0
87 and over.....	0	2	1
86 and over.....	4	0	0
85 and over.....	1	0	0
Below 85.....	2	3	0

It was a splendid exhibit in size and quality.

The average score of the samples of milk was 90.25, cream 90, pasteurized cream 91.4.

It is hoped that another year, the Dairymen's Association will find it possible to increase their premiums to at least fifty dollars for milk and the same for cream, also that an extra premium, liberal in size, will be offered for pasteurized cream, thus interesting the creamerymen of the State to make an exhibit worth seeing.

While no one thing in connection with our dairy conference attracted more attention, and while the milk and cream exhibit should be made a permanent feature of the conferences of the future, the splendid markets for dairy butter of good quality impresses the writer of this report with the importance of exerting more effort in securing a larger exhibit of this valuable product at future conventions.

Another splendid feature of the dairy conference was the corn exhibit made by the boys. Through the kindness of Dr. Geo. M. Twitchell of Auburn premiums were offered for the three best exhibits of flint corn, ten ear and single ear lots, to be competed for by the boys of the State eighteen years of age or under, with the result that twenty-five entries were made in the two classes.

At the business meeting of the association it was voted to continue the offering of liberal premiums and a committee was appointed to have the matter in charge for the next dairy conference.

It certainly seems desirable that the action of the Dairymen's Association in this matter should receive strong support from our dairymen and be made a permanent and important part of the annual conference.

PROPOSED WORK.

For some time it has been the purpose of the Dairy Division to attempt the organization of Co-operative Breeders' Associations among the dairymen of the State but during the past year the supervision of the cow test associations has prevented the taking up of new work. It is planned, however, to make it an important part of the work for nineteen hundred and nine and

in order that the scope of the work may be understood I feel that it should be briefly outlined.

The purpose of such an association is to promote the breeding and improvement of pure bred and high grade cattle and to aid its members in buying, using, exchanging and selling first-class animals. It is an organization of farmers specially interested in the improvement of some particular breed of cattle in their community, town or county. Believing that through co-operation they can accomplish more than by working singly, the members of these associations bind themselves together for concerted action.

Having once selected the breed to the promotion of which the association is to devote its efforts, its loyalty to that breed should not waver.

Co-operation should be the keynote of the work. An association should hold frequent meetings and undoubtedly some of them should be held at the homes of members, where special opportunity would be given for comparison of animals, methods and results.

Records of the performance of animals should be kept and such part of them as would appear advisable filed with the secretary. Every effort should be made to establish the territory covered by the association, as a center for distribution of the breed chosen. To do this the members must take pride in the work. Animals more uniform in size, conformation and quality must be reared. These conditions together with the large number of herds from which to select will without question accomplish the purpose.

An economy to the individual members can be effected in the buying, using and selling of animals and in advertising.

A large number of animals uniform in quality always proves an attraction to buyers.

This division of the Department is prepared to assist in the organization of these associations, to furnish such record blanks as may appear desirable in order that the work may be uniform, to furnish a representative who will attend the meetings of the Association, to lecture upon subjects that may have been selected and to give such advice and co-operation as may be necessary.

In view of the general admixture of breeds in this State, of the desirability of improving the quality of our stock, of the

opportunity for profit in the raising of high grade and pure bred animals, should not all persons having the dairy and live stock interests of Maine at heart, unite in teaching and urging our farmers:

1. That only pure bred registered sires be used.
2. That all farmers in one community unite on one breed.
3. That the work begin at once, grading up the herd until in form, quality, productiveness and profit the cows equal thoroughbreds.
4. That owners of small herds combine and jointly purchase a purebred bull and after a few years exchange with others, thus not allowing a sire of merit to pass from the community.

GENERAL.

Mr. S. C. Thompson who had been in the employ of the Department as Assistant Dairy Instructor during the latter part of 1907 still continued to act in that capacity during the first two months of 1908, when he left for Washington to accept a position with the Dairy Division of the Department of Agriculture and as there existed no surplus in the appropriations for dairy interests, it has not been possible to secure any assistant in his place.

While the decrease in the number of cows owned in the State during the year 1908 is a most discouraging fact to face, there are some conditions connected with this situation that are very encouraging. The very severe drouth during the summer and the consequent shortage in the amount of roughage harvested undoubtedly caused the sale of a large number of cows, but if this sale included principally, as I believe it did, the poor cows in the herds, then we cannot regard their sale with much regret.

A large number of our dairymen, far too many in fact, are following the practice of buying their cows instead of rearing them and there can be no question but that this condition is responsible in considerable measure for the decrease in the number of cows in the State.

It is a most unhealthy condition and every effort should be made to awaken a full understanding of the certain and evil results coming from such a practice.

The Cow Test Associations and the Breeders' Associations ought to do much along this line.

In closing this report I desire to extend to you my sincere thanks for the consideration and support you have unceasingly given me during the year.

Again I am under obligations to the agricultural and daily press, the dairymen and creamerymen of the State and to many granges for valuable co-operation in the work and I would be ungrateful indeed did I not express in some manner my appreciation of the assistance rendered.

Respectfully submitted,

LEON S. MERRILL,

State Dairy Instructor.



King David No. 13686, A. G. C. C. Dam, Myrtle of Elmwood No. 12317,
A. G. C. C. Winner of 26 first prizes at State fairs in three different states.
Owned by JOHN F. BUKER, Bowdoin.

REPORT OF STATE ENTOMOLOGIST.

To the Hon. A. W. Gilman, Commissioner of Agriculture:

I herewith submit my fourth annual report for the year 1908.

Our insect pests have made a record during the past year both in numbers and in the extent of their ravages. This is accounted for by the very exceptional season; the climatic conditions being such as to favor the development of many species.

Although there was a very marked increase in many species yet in some the decline, due to parasitic and fungous influence, has been quite noticeable. This is true as regards the red-humped and yellow-necked apple caterpillars; these have been reduced at least 90%. The mourning cloak caterpillar was so infested with parasites during the summer of 1907 that hardly any damage was reported from this pest during the past season. In some sections of the State grasshoppers did very extensive damage especially in the grain, corn, beans and young fruit trees; many pastures were stripped bare of the usual fall feed. The elm-leaf beetle was reported as having been found in the southern part of the State during the summer of 1907 but no specimens were sent to the office. During the past season it has been found in considerable numbers at Kittery and York. The San Jose Scale has not reached us as yet.

The past year has been a notable one as regards the making of history. There are epochs that occur in our National life that in after years prove to be the stepping stones to a much broader plane of living. The past year has given us one of these epochs that will surely stand for the betterment of our whole Nation. I refer to the great National, State and private uplift due to the so-called Conservation problem. The solution of this great problem is so far reaching in its effect that we may well apply it in connection with our subject in hand. The term

conservation may properly be applied to protection from loss—by the elements, *decay*—by fungous diseases, *injury*—by insect pests.

Owing to the general trend of public opinion along the above named lines there has been a growing demand for lectures pertaining to forestry, plant diseases and insect pests. There are hopeful signs for the future success of agriculture. But agriculture will never reach its highest attainment until the most modern methods of handling our insect enemies are universally adopted. It has been said that tons of literature pertaining to our more common insect pests have been published each year and sent broadcast over the country, from every experiment station and agricultural department in the land, but of what use is this unless the knowledge thus gained is put into practice. A new era of agricultural conservation is dawning and great achievements are soon to be realized.

INSECTS FOR 1908.

More insects than usual have been sent in for identification during the season.

Several interesting communications were received, from which we quote a few :

Mr. H. W. Jewell, Farmington, reported the following: "Very few cecropias have appeared here this year. I collected 110 cocoons, 86 of which had a hole punctured in one side and contents eaten. Of the 24 remaining I got six moths, two of which were perfect. Out of 27 cocoons found in one lot, none were good. These were on low scrub trees about five feet in height growing in a pasture. On one tree eight cocoons were taken, none were good."

On October 13 one of the scouts found a Gipsy egg cluster under the bark of an oak tree in the woodland in the town of York. The eggs had hatched and the young caterpillars were crawling around. This is a very unusual occurrence as the eggs do not usually hatch until about the middle of May. Such caterpillars could not possibly survive the winter.

A number of apples were sent with the Brown-tail nests attached. The illustration shows two apples united with a large

nest. It looks rather serious when there is not room enough on the tree for the nests without doing up on the apples.

Many specimens of apple borers, *Plagiotus speciosus*, were sent in for identification from different sections. These are reported as doing lots of damage to the city shade trees.

The so-called "Silver Scale," *Lepisma saccharinia* was reported as feeding on some lace curtains. This pest is frequently seen in the evening around the pantry and other places. It is a long, flat, silvery, quick moving insect, more annoying than injurious.

On March 26 a sample of Vetch, *Vicia caroliniana* was sent in with the statement that a horse that had eaten a quantity of it in some hay had broken out with boils. The specimen was sent to the State Laboratory of Hygiene for analysis. The report was that no poisonous qualities could be found.

"PINE BLIGHT."

The condition of the so-called "pine blight" is much the same as reported last year.

We fail to see in the majority of cases how it could result from a fungous disease, although there were evidently in some sections conditions that led many to form that opinion.

We have been called to investigate the conditions in several widely separate sections. In each case new growth had started just back of the "blighted tips," a sure sign that no disease was present. A number of pine insects were found at work on the young branches. The pine louse was found very abundant in several sections.

The so-called "Spittle Insect," the pine leaf-hopper *Aphrophora saratogensis*, was found and also reported from many places. Several other insects that feed on the pine were received at the office.

THE TARNISHED PLANT-BUG.

(*Lygus pratensis*, Linn.)

This little insect is fast becoming one of the worst insect pests we have.

A short description may not be out of place.

It belongs with the true bugs in the family Capsidæ, the flower-bug family, of which there are a great many different species in

Maine. This species is very common and is widely distributed throughout the country. It may be found on most kinds of vegetation in the fields, gardens and orchards. It is not quite one-fourth of an inch in length and about one-eighth in width, and like most bugs is quite flat. It is generally some shade of brown but varies to quite a degree. There is a yellowish V-shaped mark on the scutellum (the triangular piece on the back) also yellow marks on the thorax. They are generally very active, especially during the heat of the day and dodge around the stem or fly quickly at the least approach of danger. There are probably two generations during the season, as the adult female hibernates through the winter, appearing early in the spring, and is found throughout the rest of the season. They seem to be especially fond of the dahlia, chrysanthemum and aster buds, and this year they caused considerable damage to the apples by "stinging" the buds and young fruit, thus causing it to grow so deformed in many cases as not to be marketable.

The damage done by this insect has been referred to in the writings of our leading entomologists. Dr. Harris in his Massachusetts Report in 1838 speaks of it as "swarming in immense numbers and attached to almost all kinds of vegetation."

Prof. Riley in his second report of Missouri, 1870, mentions it as being "one of those insects that we are almost powerless to control. The puncture seems to have a peculiar poisonous effect. It has been known to blight whole potato fields and destroy young pear orchards."

Dr. Forbes in his report of Illinois for 1883 speaks of this bug as being extremely abundant, sucking the sap from the tassels on the corn. In "Insect Life" it is mentioned as destroying about one-third of the fruit buds of the pear and apple in one town in Kansas in 1889. In 1876 it was reported as doing great damage to the wheat, corn and potatoes in Michigan. It is recorded in southern Illinois as having caused the "buttoning" of strawberries so-called, this being a hardening and drying of a part or whole of the berry.

REMEDIES.

Kerosene emulsion has been used quite effectively, if applied in the early morning or at night when the insects are sluggish.



Portion of woodlot in Sidney defoliated by *Heterocampa guttivitta*

Pyrethrum powder has produced good results when thoroughly applied. Some of our common spiders prey upon it to quite an extent. On the whole, however, it is a most difficult pest to get rid of and many dahlia and aster growers have given up in disgust and left the business for other plants that are not so infested.

FOREST CATERPILLARS.

During the past season there was a very phenomenal outbreak of what was popularly termed the "*forest caterpillar*."

From the 9th of July until the 10th of August letters and specimens flooded the office, from parties who were "driven to their wits end" regarding an unknown "green worm" that was "destroying the hardwood growth."

THE SADDLED PROMINENT, *Heterocampa guttivitta*.

In the majority of cases this proved to be the so called "green worm." Owing to the great demand of the regular duties of the bureau it was practically impossible to investigate the conditions in many of the reported sections, but sufficient trips were made to different sections in the infested district to fully determine the nature and extent of the damage. On thousands of acres of hardwood growth the trees were stripped bare. This belt extended from the New Hampshire line at Fryeburg to beyond Skowhegan.

Reports were received from the following places: Alfred, Auburn, Augusta, Baldwin, Bethel, Bowdoin, Bowdoinham, Bridgton, Brownfield, Buckfield, Chelsea, Chesterville, China, Clinton, Cumberland Center, Denmark, Dryden, East Sumner, Fairfield, Farmington, Fayette, Fryeburg, Frye's Island, Gardiner, Gorham, Hallowell, Harrison, Hartland, Hiram, Milton Mills, N. H., Mt. Vernon, Monmouth, Naples, Northport, North Waterford, North Windham, Oakland, Palermo, Readfield Depot, Sebago, Sidney, South Livermore, South Vassalboro, South Waterboro, Skowhegan, Steep Falls, Wales, Waterboro, Waterford, Waterville, Webb's Mills, Weeks' Mills, West Baldwin, West Durham, Wilton, Winslow, Winthrop and Wiscasset.

Most of the defoliation occurred during the last two weeks of July although stragglers were noticed up to as late as August 10.

A circular of information relating to this species was issued from the Department. Since then there have been many requests for information regarding the outlook for damage to our forest growth for another season. In most cases in the past when a species of insect has increased to such an extent as to become a menace its decline is as rapid, and in a year or two it generally disappears as quickly as it came. This is owing to the rapid increase of its enemies, especially the many parasites that may prey upon it, or to the climatic conditions that may favor the rapid development of fungous diseases. These little agents are the more active for the complete control of insect pests.

While making the several inspections of the infested territory it was a very noticeable fact that quite a per cent of the caterpillars were being destroyed by the Tachinid flies, predaceous bugs, beetles and several species of Ichneumon flies, and that a fungous disease was causing the destruction of countless thousands of them.

During the last week in October an examination was made of a section that had been badly infested with the result that but few living pupæ were found. The surface of the ground was literally covered with the shrunken remains of caterpillars. It seemed that hardly one per cent had pupated, and many pupæ were diseased.

This condition shows very clearly what may be looked for another season.

LECTURE WORK.

More requests for lectures have been made than we could possibly attend to, so that many have had to be passed by. Over thirty lectures and addresses were given during the year, mostly on some line of insect pests or fungous diseases. In the majority of cases they have been illustrated by specimens. There is a great field for this work but there are too many other demands that must be met.

STATE EXHIBITS.

The Department was unable to comply with the many requests for the mounts showing the life histories of some of our noted insect pests. Two sets of these mounts, numbering 24 each, were in demand during the summer and "Fair Season" in the fall. For the purpose of exhibiting the live caterpillars during the feeding season sets of cages were constructed and placed on exhibition. These attracted a great deal of attention and proved very educational. These sets were used at the Summer Schools held in Farmington, Castine and Presque Isle, also at meetings of the Bar Harbor Horticultural Society and the York Harbor Village Improvement Society, the several State fairs and some of the county fairs, also at the annual meeting of the State Board of Trade, the State Pomological Society and the State Grange.

ORCHARD INSPECTION.

There has been such a demand for orchard inspection that it has taken much time from the other work and also necessitated the employment of extra help.

About fifty orchards were inspected and in each case the conditions were very serious indeed. Canker was found in every instance and dead and dying trees were left as a menace to the rest of the orchard. Oyster-shell bark lice were much in evidence. Hardly any spraying was being done and as a result much of the fruit was in poor condition.

In many orchards a demonstration was held showing how to treat canker and the necessary pruning to follow such treatment; also instructions were given on handling the different insect pests.

But little can be accomplished along the line of better fruit for Maine until there is a general movement on the part of our orchardists to secure this result. It will not come of itself; there must be a lot of work and good solid work at that. Let us off with our coats and go at it, and in ten years from now the fruit crop of Maine will have increased ten fold.

NURSERY INSPECTION.

The nurseries of the State are as a rule in first-class condition. Only two are doing extensive business and these carry but little fruit, hardly enough for the local trade. Only one is exclusively in the fruit stock business, and this has been established only a few years, so that it cannot furnish much stock as yet. We much regret that such a condition prevails.

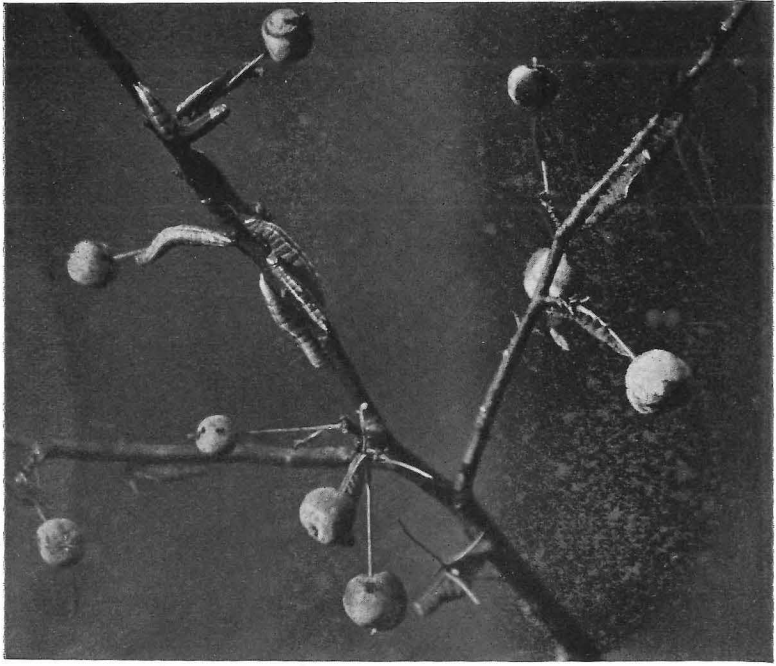
There is a constantly increasing demand for nursery stock in Maine, and we feel that here is a good opening for some live, wide awake horticulturist to get into line and start an extensive nursery for fruit stock alone. First-class, Maine grown stock would sell like "hot cakes" and at a better price than that from other localities.

If all of the stock set in Maine was native grown there would be no danger of having the San Jose scale and some other pests in our orchards.

A meeting of the New England Horticultural Inspectors was called on December 4 to consider the advisability of securing uniform nursery inspection laws for this group of states in order to secure better nursery stock than has been obtained in the past. As a result of this meeting new bills will be drawn and presented in the several legislatures during the coming season. One clause requires that all persons who act as agents for nurserymen outside of the State shall obtain a license for so doing from the State entomologist. A penalty is affixed for not complying with this act; no fee is required.

At the annual meeting of nursery inspectors held in Baltimore December 28-31 the question of what should be included under the term "nursery stock" was brought up and it was agreed to include the small fruit stock such as currant, raspberry and strawberry as well as all trees, shrubs and vines grown for shade, fruit or ornamental purposes. It is a well known fact that San Jose scale can exist on any of these plants and although this pest may not come to us, yet it is well to be on our guard.

In the nurseries we have inspected we have found the following: Oyster-shell bark louse, woolly aphid and galls, flat-headed borer, round headed borer, also brown-tail moth eggs (the inspection is in July) and a large number of leaf eating insects



Branch of tree stripped by *Heterocampa guttivitta*

too numerous to mention; these would not be conveyed on nursery stock except in the egg stage, like the green apple louse, etc.

BETTER NURSERY STOCK FOR MAINE.

In this new era of "Farm Betterment," secured under the problem of "The Conservation of Our Natural Resources," we are confronted with the important problem of our present orchard conditions in Maine. We are all very familiar with these conditions. The great question that presents itself is how best to go at this problem in order to reach a successful solution.

As quite a per cent of our orchards are in a deplorable condition it seems just the opportune moment in which to put forth our best efforts and start at the beginning by demanding better nursery stock and accepting the best.

It is now the universal cry all over the country, "Better Seed Corn!" "Better Dairy Cows!" "Purer Food!" "Purer Air!" "Freedom from Tuberculosis, the Malarial Mosquito, Typhoid Fly" and I may add for New England, the Brown-tail itch!

If we are demanding all these why not include that very essential element of good health, viz:—Good Fruit, and this can be best secured by obtaining first-class nursery stock.

For a number of years there has been an indistinct murmur in the air regarding much of the stock that has been received from some of the nurseries in other states. This murmur has increased in volume until now there is no mistaking the sound. It is ominous of disaster to out-of-State stock, unless some radical measure of improvement is immediately adopted.

The number of complaints received at the office have been increasing each year. Last spring it was deemed advisable to take a more decided stand on this question. With this end in view a thorough investigation was instituted. With the data thus secured guilty parties were reported to the proper authorities with the result that a personal trip was made to some of the leading nurseries in New York state.

A conference was held with the Commissioner of Agriculture and the Chief of the Bureau of Horticulture to see what could be done. As a result of this trip we feel that Maine will receive better stock in the future. If any inferior stock is received or any that is infested with any kind of insect pests, kindly report

the fact at once to the Department at Augusta and the matter will be attended to without delay.

Do not buy cheap stock, it is dear at any price; the best is none too good for Maine.

There has been altogether too much of such stock set in the past and 90% of it died before it reached a bearing age.

If we are going to redeem ourselves as a fruit producing state we must begin at once to use the same business-like methods as regards our orchards as the Aroostook farmer has used regarding the raising of potatoes. Then and not till then will we see our Maine apple stand on a par with the Washington and Oregon fruit that has been so much in evidence during the past winter in our restaurants, fruit stalls and even the corner groceries.

Owing to the lack of efficient international laws regulating the sending of foreign nursery stock to this country we are very seriously handicapped as far as nursery protection is concerned.

It is a well known fact that the brown-tail moth was introduced into Massachusetts on some rose bushes imported from Holland. It is not known that this insect has infested the state of New York but it will not long remain free unless very stringent laws are enforced.

On January 9 of this year a letter was received from the Chief of the Bureau of Inspection of that state saying that a box of nursery stock received from France contained 75 winter nests of the brown-tail moth, all of which contained living caterpillars. On the first of February another communication was received stating that for the month of January 1909, 1,000 boxes had been received from the same locality and what had been examined had been found to contain 1,800 nests of the brown-tail and that the caterpillars in each nest were alive. What a dire calamity would have befallen the state had these been overlooked and allowed to spread.

As far as we know our State is free from the San Jose scale but it may appear at any time in York or Cumberland counties; possibly in other sections.

Woolly aphis has been brought to us each year but we hope to see this cut out henceforth, as we have enough of our own to contend with.

A large lot of nursery trees were examined last spring with the result that many of them were found to be in a very poor condition. These trees had evidently been kept in cold storage during the winter and lacked the necessary vitality for a good, vigorous growth. I venture the assertion that not 25% of them are alive today. They were small, cheap trees and time, money and fertilizer were wasted.

It is poor economy indeed to buy cheap trees, for in the course of nature they will always be cheap in name but dear in quality and yield of fruit. It is a lamentable fact that we have but one nursery in Maine that is growing fruit stock alone, and this on a very small scale. The question of each man raising his own stock is being agitated by some, but this would not be practical for many of our orchardists as they have too many other demands on their time and energy.

The demand for good Maine grown nursery stock is an increasing one and must be met in the near future. We trust that the proposed New England Fruit Show to be held in Boston during the week of October 19-23, 1909, will be an incentive for better nursery stock, not only for Maine but for the whole of New England.

Oregon and Washington are forging to the front with rapid strides and shall we of New England sit idly by and let them monopolize the fruit industry of the country? There will probably be set this spring 1,000 trees in the above named states to every ten in Maine.

The great secret of success is to start our orchard with healthy, vigorous trees and be sure to keep them in that condition. There is much that is human about an apple tree. It has an individuality all its own and must be treated fairly in order to return such favors as are bestowed. A tree that is allowed to run to suckers will turn out nothing but suckers, and so with the human tree. We need to touch elbows in this matter.

As has been said, tons of literature have been distributed and we sit at our firesides and read in our daily and weekly papers of the experiments tried and the results obtained by some leading expert along horticultural lines. We sit up and take notice for the time being but the vision fades away like a dream and the next morning we are back in the old well worn path, trodden bare by the feet of habit.

THE BROWN-TAIL MOTH SITUATION.

There has been but little spread northward of this pest during the past year.

But few nests were taken in the towns north of latitude 44-15; in fact many of the towns south of this did not report a single nest. The nests were well cleaned up during the previous winter so that few remained to spread the pest.

The southern portion of the State is very badly infested owing to the excessive flight of the moths during the night of July 2. This unusual flight will leave its effect so that the nests will undoubtedly be found farther inland, during the coming winter than ever before. This fact should not discourage parties from cleaning up their orchards and shade trees, for if they are thoroughly cleaned up in the fall or spring there will be no damage from the trees being stripped the following summer, as the spreading in the case of the brown-tail is by means of the female moth during her flight in July.

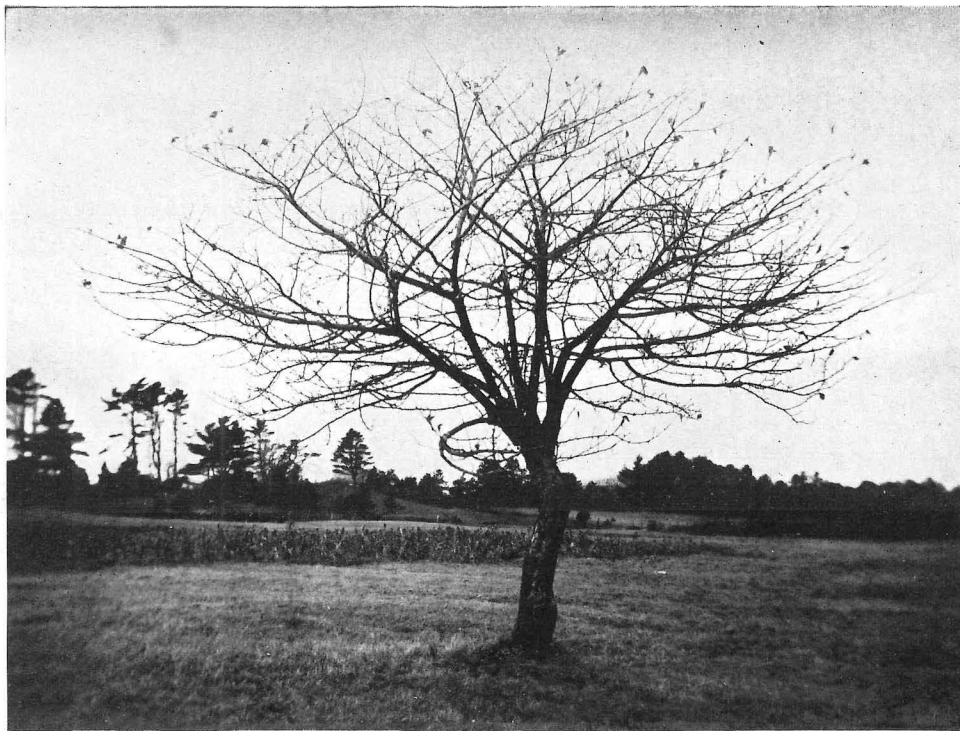
The number of infested towns reported to date is 207. Most of the towns reported that the work had been well done and that the property holders were anxious to get rid of the pest.

BROWN-TAIL FUNGOUS WORK.

It was intimated in our last report that the work of 1907 would be continued during this season. A visit was made during the last week in May to the scene of last year's work and it was found that the germs of the disease had become scattered to such an extent that diseased caterpillars were found through most of the towns of Kittery and a portion of Eliot.

We found that the season was at least two weeks in advance of 1907 and that some of the caterpillars were in their last stage.

Preparations were immediately made to have diseased larvæ collected and planted out. A rain storm hindered the work so that it was not taken up until June 4th. On this date about 5,000 infested caterpillars were collected. On June 5th a place on Rice's avenue was visited and found to be badly infested. Fifteen large apple trees and a black cherry tree were stripped of their leaves but the caterpillars were so badly infested with the disease that the most of them were dead and hanging in clusters from the limbs.



Nests of the Brown-tail Moth on an apple tree in Wells, Me.
(By courtesy of E. Garland, Wells)

On property near Kittery Junction, 21 apple trees were entirely stripped and the dead caterpillars were hanging in festoons from the limbs and trunks of the trees and on the cherry bushes and stone walls near by. Many oaks in the vicinity were infested in a similar manner. The most of these caterpillars were nearly full grown.

On June 6 diseased caterpillars were planted out as follows: Fifty were planted on trees around the place owned by Chas. Judkins on York street, York; fifty on orchard of Clarence Hooper; also on apple trees on Cider Hill lot.

Two hundred were planted along the woods and in apple trees near J. P. Bragdon's place, also some on trees of Jacob Roberts, and one hundred and fifty along side of road on Albert Junken's farm, where the trees were entirely stripped. On abandoned farm on York river bank, 50 oak trees and 31 apple and pear trees were treated. Found a few diseased caterpillars in orchard of Geo. Grovers on Beach Ridge. Planted out some here. Forty were planted on property of C. G. Grover, Beach Ridge. Planted on trees of Geo. B. Maine's place near river in York. Fifty were planted on oak trees growing along the river. These trees were well stripped and the caterpillars were healthy. On the Nathan Parker place in Eliot, planted on apple and oak trees. One hundred were planted on the Nancy Cutler place on Bingham road, also on the Raitt estate on oak trees growing on the side of the hill. Quite a number were planted out on the Eben Spinney place at South Eliot near the river. Many were planted around Rosemary Cottage.

These places are only a few of the number treated. The work was continued through the rest of Eliot.

On June 8 another lot of 5,000 caterpillars were collected and taken to Portland. These were planted in Portland, Woodfords, Riverton Park and South Portland, also in Brunswick, Rockland, Rockport, Camden, Thomaston, St. George, Tenant's Harbor and other places along the line. Although it was late when the work was done, yet some results were apparent when an inspection was made later in the month.

On June 24 an examination was made through the district. At one place in the town of Eliot where a careful watch had been kept by parties interested it was reported that in six days

from the planting there were no caterpillars crawling. On examining the pupæ 12% were found dead. The lateness of the season prevented the working of the disease, to any great extent. It requires about five days for the diseased germs to become effective, so that in the six days intervening between the planting out and the maturing of the caterpillars, the time was too short for any appreciable result.

On June 24 examined 25 pupæ on the Eben Spinney place, previously mentioned, and 44% were found to be dead. Quite a number of caterpillars were found that had died before pupating.

On C. E. Langton's place new leaves were starting on the apple trees and some growth of new wood was apparent. A number of pupæ were examined and quite a per cent were found dead.

All of the other plantings were visited and in most cases some evidence of the work of the disease was apparent.

The great abundance of the nests of the brown-tail this fall over such an extent of territory is due to the unusual flight of the moth on the night of July 2. Thousands of them came across country from New Hampshire and appeared in Portland like a veritable snow squall. The next morning all lamp and telephone poles, trees and sides of buildings were spotted white with them.

If the season of 1909 proves to be a favorable one we intend to follow up the fungous disease work, especially in the wooded sections where they are abundant.

The disease germs will winter over under ordinary conditions so that if the disease can become fully established it may be effective from year to year, providing the weather conditions are favorable.

THE GIPSY MOTH SITUATION.

At the close of another year's work for the control of the gipsy moth in the State the outlook is encouraging, to say the least.

When one makes a thorough investigation of the subject there are brought to light facts that, in more ways than one, demonstrate the thorough manner in which this problem is being handled.



The Thaxter Woods, Cutts Island, Kittery, Maine. The first gypsy moth seen in Maine was found here



The Goodwin Infestation of the Gypsy Moth, Gerrish Island, Kittery



The Moulton Infestation of the Gypsy Moth, York. 480,000 feet of boards infested. The board on edge shows egg clusters



Haley Infestation of the Gypsy Moth, York, Maine. 1034 egg clusters found on the large tree.
This is the record in the State



The work of the bureau, since its formation, has constantly been increasing so that the demands upon its members are greater each year. The gipsy situation at the beginning of 1908 was of such magnitude that the Department placed this work in charge of the special field agent, Capt. E. E. Philbrook. The success achieved is due in a great measure to his untiring energy and good judgment. Second only to his effort is the individual interest, and active cooperation of each man in the field. There has been a desire on the part of each one to see that every effort was put forth to do the best possible work in the interest of the Department.

The summary of this work in detail as given in the appended report of the field agent, demonstrates how fully this has been carried out.

We are also under great indebtedness to Dr. L. O. Howard and Mr. D. M. Rogers for their personal interest and hearty cooperation in aid rendered from the Federal Government.

Respectfully submitted,

E. F. HITCHINGS,

State Entomologist.

REPORT OF SPECIAL FIELD AGENT.

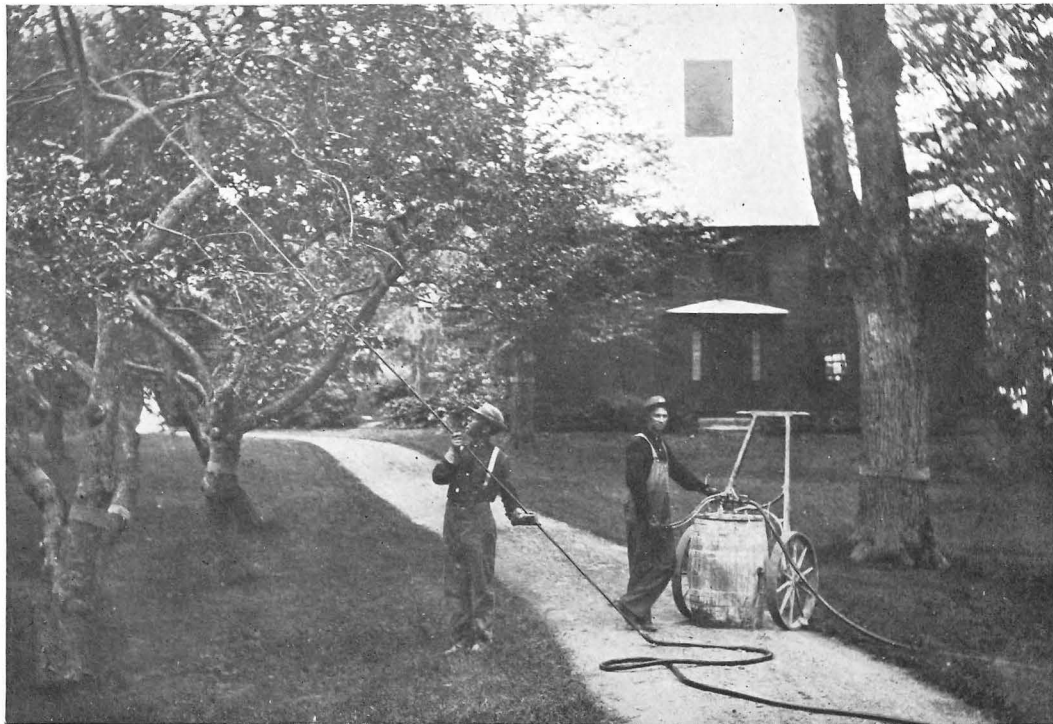
Hon. A. W. Gilman, Commissioner of Agriculture:

SIR:—I have the honor to submit herewith my second annual report as special field agent.

The State work has gone far enough to reveal a most alarming state of affairs. The gipsy moth has been found spread through the towns of western Maine and along the New Hampshire border. It is apparent that the State is called upon to make a most vigorous fight against one of the best known and most important enemies of fruit and shade trees, scattered throughout thirteen towns. With the development of the last year and the experience gained, we are now able to present a much more accurate statement of the existing conditions than was possible at the time of the presentation of the first report.

Following the winter work which consisted of cutting out and burning dead wood, thinning out the tops of trees and burning over the ground, scraping trees, pruning trees, tin-patching holes, etc., we began to put the tanglefoot on the trees; then the trees were burlapped, after which we began the spraying operations which were carried on with great success. After the finish of the spraying season the field forces were put at work attending the burlaps, with good results. From June to the end of August the whole of the force were engaged in crushing the caterpillars under the burlaps, and in destroying the pupæ. 77,048 caterpillars were taken and crushed and in addition to this number hundreds of thousands were killed by fire while burning the ground and stone walls. 160 pounds of tanglefoot were used with good success, six and one-half bales of burlap were used and 60,000 trees were burlapped. Twenty-five barrels of crude oil were used in the burning operations and 1,750 pounds of arsenate of lead were used in spraying.

After the burlap season had finished we began the scouting for egg clusters and continued the same work up to the last of



The Perkins Orchard, York Village. Spraying for the Gypsy Moth

the year 1908. We are also doing some work in cleaning up the woodlands in Kittery, York and Eliot. 16,585 egg clusters were found and destroyed.

The following figures will show the number of men at work in the State (by months) during the year.

January—Govt. 29, State 23, Total 52. February—Govt. 22, State 25, Total 47. March—Govt. 17, State 30, Total 47. April—Govt. 12, State 34, Total 46. May—Govt. 00, State 42, Total 42. June—Govt. 22, State 57, Total 79. July—Govt. 26, State 48, Total 74. August—Govt. 00, State 59, Total 59. September—Govt. 00, State 57, Total 57. October—Govt. 56, State 19, Total 75. November—Govt. 52, State 25, Total 77. December—Govt. 64, State 24, Total 88.

The government has expended about \$17,000 in the work during the year, in employment of men. All of the men employed are natives of the State of Maine. I am very glad at this point to acknowledge the help I have received from the government field agent, Mr. D. M. Rogers. In matters of business policy and sound judgment, and knowledge of practical field work against the gipsy moth he has been of especial help. And finally I am glad to acknowledge my obligations to the inspectors of the field work. These men charged with the responsible duties of their positions, have continued to serve the interests of the State with fidelity and efficiency, and to them in no small degree is due the credit of success which has been attained during the year.

The complete list of towns infested with the gipsy moth is as follows: Kittery, York, Eliot, Wells, Kennebunk, Kennebunkport, Sanford, South Berwick, North Berwick, Berwick, Lebanon, Acton, Newfield and Togus.

KITTERY, 1908.

The work here has been well carried on under the direct charge of E. M. Sadler, Chief Inspector, and the trees on orchards and woodlands have been burlapped, tanglefooted and sprayed, and the burlaps very carefully attended to during the caterpillar season. 56,225 caterpillars were taken from under the burlaps and without any doubt nearly a million were killed by fire and spray.

During the spring months a great deal of excellent work has been done in the infested orchards, in the way of cutting worthless trees and tinning cavities to destroy the hiding places of the gipsy moth. The Thaxter infestation, which was the worse place we had to handle is now completely under control. Many trees were cut out here, the ground burned over, trees sprayed, burlapped, tanglefooted and watched very carefully by a crew of men under charge of A. O. Pike, Inspector. In 1907 there were found 3,356 egg clusters in this infestation. Owing to the very excellent work done in 1908 only 21 egg clusters were found this fall after a very careful scout. This situation is certainly very encouraging and with proper attention the coming year I feel satisfied that the moth will be under control in Kittery.

In 1907 we found and creosoted 5,036 egg clusters. In 1908 only 1,002 were found, showing a gain of 4,034 egg clusters.

One hundred and eighteen orchards were found infested and treated during the year and nearly all of them were found to be free from the moth in the fall scout.

In addition to the orchards infested we have 18 wood lots which have been handled during the year.

This being the most badly infested town, I have had a larger number of men working here, with the results shown.

Most of the orchard work has been handled by C. E. Totman, Inspector. Much credit is due to the men in charge of the work here for the excellent showing made. The coming year much spraying, burning, tanglefooting and burlapping will have to be done in order to make the work already done clean and sure.

YORK, 1908.

As the year 1907 was closing there was discovered a very bad woodland infestation on the property of Malcom Paine, G. W. Raynes and Prof. Ames. This property is directly across from the John Thaxter infestation in Kittery and was no doubt caused by the tide carrying the larvæ across the creek between the two towns.

During the month of January a very careful scout was made and resulted in the finding of 1,394 egg clusters. These were treated with creosote and the woods cleaned and the dead wood

cut out. In the spring the trees were burlapped and the burlaps carefully attended during the crawling season. The work here was under the charge of C. B. Hamilton, Inspector. At the beginning of the year there were 83 infestations in York, 80 being in orchards and 3 in the woodlands. Of the 80 in orchards 53 have been entirely wiped out or exterminated. Very few of the others showed any but scattering larvæ.

Up to the fall scout no woodland had been scouted other than the three places mentioned above.

Believing that there were gipsy moths in the woodlands of York, I detailed A. M. G. Soule to take charge of a crew there and see what he could find. The results were startling in the extreme as he found enough egg clusters in the northern part of the town to wipe out (if left for a year) any township of pine or spruce in the State. On one tree on the Haley estate were found 1,034 egg clusters and on three trees 1,845 egg clusters. This is the record in the State of Maine.

Another bad infestation was that found on the estate of J. R. McIntyre where 1,244 egg clusters were found.

The worst infestation ever found in the State of Maine is that on the Henry Moulton place. Here is a large tract of land of about thirty acres on which is stacked 480,000 feet of lumber. Surrounding this cleared land is woodland of pine, spruce and a few hardwood trees. Here was found 5,001 egg clusters, in the stone walls, board piles, trees, and in fact about everywhere about the place. The lumber belongs to parties in Rochester, N. H., and had it been left and shipped no one can tell the amount of harm that would have been caused. The woods all around this place have been cleared for a hundred feet from the field and by this method we will be able to handle the work to good advantage during the coming year. The work which is being done here will cost in the near vicinity of \$1,200 and will save many times that in the years to come. Great credit is due to the ability and energy of A. M. G. Soule in directing his men so that such infestations as the three mentioned above could be found. They are situated in the remotest part of the town and are six miles from the village and fully one and one-half miles from any habitation.

One of the worst infestations found in 1907 was that on the A. Thompson place at Cape Neddick. At this place on the 13th

day of July, 1907, the caterpillars were discovered crossing the road in large numbers. We burned the walls and about 5 acres of pasture land with oil. We also cut out all of the bushes. Since finding this infestation it has been watched very closely and we have only been able to find one single egg cluster. I simply call attention to this place to show what can be done towards cleaning out the gipsy moth.

A large spraying machine has been bought by the Village Improvement Society of this town at the cost of \$1,000 and turned over to the State for use in the work. This machine is one of the finest in the country and will be of great value in the work against the gipsy and brown-tail moths.

In many of the orchards which have been cleaned, scraped, pruned and tin patched, to clean out the gipsy moth, there was gathered this fall the finest fruit ever grown in the town.

Mr. C. C. Nichols, Chief Inspector, has been in charge of the work in this town for 18 months and deserves much credit for the manner in which the same has been handled.

Next year a great many men will be required here to handle the work as this is the worst town of all as far as the gipsy moth is concerned.

ELIOT.

In the spring of 1908 the scouting showed 18 orchards and 4 wood lots infested. These places were handled in the same manner as those in Kittery with the result that nearly all were found to be free from the moths in the fall.

No general scouting of the woodlands had been undertaken until this fall and they were found to be badly infested. Eighty-eight wood lots with 1,139 egg clusters were all treated with creosote and the lots cleaned in the usual manner.

A great deal of work will have to be done here next year both in scouting and cleaning. Many old apple trees will have to be cut down and many trimmed. Much will have to be done in the woods. This is next to York the worst town we have, but I am satisfied that at the close of the next year we will have it under control.

The work here has been done under the charge of Foremen Pratt and Cleaves.



One Thousand Dollar Spraying Machine bought and paid for by the summer people of York, for use of Department of Agriculture in that town

WELLS, 1908.

This town is in good shape and looks as though the gipsy moth was completely under control. Of the 18 infestations found last year 14 of them are entirely wiped out. As the larger part of the new infestations were found in the spring of 1908 I believe that they are exterminated. Five new infestations were found in the fall and they can be easily handled in the spring of 1909.

The work has been in charge of H. L. Spinney.

KENNEBUNKPORT.

There were six infestations found here numbering 8 egg clusters. Fourteen larvæ were destroyed. These occurred only on two of the infestations; nothing showed up on the other four. These were all new infestations. None of the 1907 infestations have shown any signs of the moth, eggs or larvæ.

KENNEBUNK.

Four new infestations were found here. None of the 1907 infestations showed anything this year.

SANFORD.

Three infestations consisting of 26 egg clusters were located here, most of these being in one infestation.

PARASITES.

At my request Prof. Kirkland of the Massachusetts Department for suppression of the gipsy and brown-tail moths sent on August 25 Mr. F. H. Mosher who is in charge of the laboratory in that state with several hundred larvæ of the *Calosoma sycophanta*. Plantings were made in Kittery, York and Wells and these places will be watched very closely the next year. This insect not only attacks the gipsy larvæ but all other shade
This insect not only attacks the gipsy moth larvæ but all other shade and fruit tree insects.

FIELD DAY.

The first annual field day of the force was held at Kittery on September 24 and was a great success. Many visitors were present from Maine, New Hampshire and Massachusetts. All pronounced it the best affair ever held by gipsy moth workers.

In addition to the towns reported the following towns have been scouted and no signs of the gipsy moth found, viz.: Biddeford, Saco, Scarborough, Cape Elizabeth, South Portland, Portland, Westbrook, Gorham, Buxton, Lyman, Alfred, Fryeburg, Brownfield, Porter, Parsonsfield, Old Orchard. The towns of Dayton, Shapleigh, Limerick and Waterboro will be scouted as soon as the snow will permit.

Providing the legislature makes another appropriation the work of 1909 will include holding the ground we have gained in the different towns and the scouting of the woodlands as far as possible along the New Hampshire border from Fryeburg to Berwick. The season of 1909 will require much more spraying, a method which in favorable weather cannot fail to give the best of results. The next season will see a general use of sticky bands on trees in the woodlands and where it has been impossible to clear the ground, rocks and ledges of the egg clusters. In the field operations it has of course been necessary to organize the forces; and with the experience gained in 1907 and 1908 there will be greater confidence in our ability to handle the work to better advantage in the years to come.

E. E. PHILBROOK,

Special Field Agent.

SHELLS OF MAINE.

A Catalogue of the Land, Fresh-water and Marine Mollusca of
Maine, by NORMAN WALLACE LERMOND.

INTRODUCTORY.

No general list of Maine shells—including land, fresh-water and marine species—has been published since 1843, when Dr. J. W. Mighels' list was printed in the Boston Journal of Natural History.

Dr. Mighels may be called the "Pioneer" conchologist of Maine.

By profession a physician, in his leisure hours he was a most enthusiastic collector and student of all forms of molluscan life.

Enthusiasm such as his was "contagious" and he soon had gathered about him a little band of active students and collectors. Of these Capt. Walden of the U. S. Revenue Cutter "Morris" was dredging in deep water and exploring the eastern shores and among the islands, and "by his zeal procured many rare species;" Dr. Ray, principal of the Insane Hospital at Augusta, collected the land and fresh water forms in the vicinity of that city; Dr. Milliken of Unity in Waldo county and Dr. True, principal of the academy at Monmouth in Kennebec county, collected in those counties.

These collectors were pursuing their favorite "hobby," in the late thirties and early forties.

In 1851 Dr. William Stimpson, the noted conchologist of Massachusetts, published his "Shells of New England," which included many Maine records. His "Synopsis of the Marine Invertebrata of Grand Manan," containing a list of the mollusca dredged by him off that island, was published in 1854; and in 1860 the Smithsonian Institution published his "Check List" of New England Shells, Nos. 1 to 6.

In the early fifties, J. W. Chickering, Jr., and Edward S. Morse became students of conchology under Dr. Mighels.

In 1854 J. W. Chickering, Jr., published his "List of Marine, Fresh water and Land Shells, found in the immediate vicinity of Portland."

As Dr. Mighels had gathered his band of collectors around him in the forties, so Morse and Fuller had several earnest collectors associated with them in the early sixties; of these Rev. E. C. Bolles, a Universalist minister of Portland, now professor in Tufts College, and Major John M. Gould of that city, did much collecting in Cumberland and Oxford counties. While neither Gould nor Bolles published anything on Maine mollusca, they both furnished data and material and aided Professor Morse in the preparation of his "Pulmonifera of Maine," as he acknowledges in the preface to and throughout that work.

In 1861 Charles B. Fuller of Portland, who was attached to the State Scientific Survey, under the directorship of Ezekiel Holmes, and who was associated with A. S. Packard, Jr., in his trip to the eastern Maine coast, dredged and collected the off-shore forms along the coast from Eastport to Casco Bay and the land species on the islands of that bay. The results of this expedition were embodied in his "Report on Marine Zoology," and published in the secretary of agriculture's report for 1862, pp. 129 to 133.

In 1864 Prof. Edw. S. Morse published a finely illustrated catalogue of the land and fresh-water species of the State, with full descriptions and notes on distribution.

To Prof. Addison E. Verrill, a native of Maine, now director of the Connecticut Academy of Arts and Sciences, we are indebted for much of our knowledge of the deep-sea forms. He spent seven summers, from 1865 to 1872, at Eastport and was attached to the government dredging expedition of 1873. The results of his work on the Maine molluscan fauna have appeared in various scientific publications and government reports. His "Explorations of Casco Bay" was published in the U. S. Fish Commissioner's Report for 1874, and in 1882 a complete list of marine species added to the fauna of the New England region during the past ten years, in *Trans. Conn. Academy Arts and Sciences*, vol. 5, pp. 447 to 588.

The first list of Maine shells ever published was that of Dr. Charles T. Jackson, State Geologist, which appeared in an appendix to his first report on the Geology of Maine, Augusta, 1837. In this list Dr. Jackson enumerates 38 marine, 9 fresh-water and 3 land species, or a total of 50 species. Dr. Mighels'

1843 list contains 113 marine, 38 fresh-water and 23 land species, or a total of 174 species. Morse in his 1864 list gives 55 fresh-water and 50 land species, or a total of 105 species. In his published lists from 1874 to 1884, Verrill enumerates 196 marine species and 7 varieties. While the present list includes 256 species and 13 varieties of marine, 82 species and 20 varieties of fresh-water and 65 species and 5 varieties of land shells, thus showing quite a growth in our knowledge of the mollusca of Maine.

In working up local faunas the following field naturalists have done excellent work and added much to our knowledge of the shells of Maine: Olof O. Nylander in Aroostook; Anson Allen at Orono; John A. Allen in the towns of Hebron and Buckfield, Oxford county; Arthur H. Norton, curator of the Portland Society of Natural History, in Cumberland county; Dr. W. C. Kendall at Freeport and Eastport; Rev. Henry W. Winkley at Eastport, Islesboro, Wiscasset, Old Orchard and Casco Bay; Edwin P. Wentworth and wife at Newcastle, Lincoln county and South Portland, Cumberland county; Prof. J. S. Kingsley of Tufts College, in Casco Bay; Dwight Blaney, dredging in Frenchman's Bay, seasons from 1901 to 1906; John B. Hender-son, Jr., and George H. Clapp at Kennebunkport and at Bar Harbor; H. S. Colton at Mt. Desert; Edward W. Roper in Cumberland, Piscataquis and Waldo counties; Henry Jackson, Jr., at North Haven, Penobscot Bay; Charles W. Johnson, curator Boston Society of Natural History, at Deer Isle in Moosehead Lake; and the author in Knox county.

Many of the above collectors have published in local lists the results of their collecting, for the main part in the several volumes of the *Nautilus*. In 1901 Prof. Kingsley's "Preliminary Catalogue of the Marine Invertebrata of Casco Bay" was published in vol. 2 of the proceedings of the Portland Society of Natural History. This list includes 154 species of marine mollusca. In 1904 Blaney's "List of Shell-bearing Mollusca of Frenchman's Bay, Maine," was published in vol. 32, No. 2, of the Proceedings of the Boston Society of Natural History, and a supplemental list in *Nautilus*, vol. 19, p. 110-111.

The State has been only partially explored as yet conchologically; Casco, Eastport and Frenchman's Bays having been the

most thoroughly explored for marine species; and Aroostook, Cumberland, Oxford, Knox, Penobscot, York and Hancock counties for land and fresh-water species. Little or no collecting has been done in Androscoggin, Franklin, Sagadahoc, Washington, Waldo or Somerset counties. 183 species have been reported from Casco Bay, 146 from near Eastport, 137 from Frenchman's Bay and 81 marine species from Penobscot Bay. The following table will show at a glance the distribution of species by counties, including all known records of land and fresh-water species in Maine.

	LAND.		FRESH-WATER.		TOTAL.	
	Spec.	Var.	Spec.	Var.	Spec.	Var.
Androscoggin.....	1	-	1	-	2	-
Aroostook.....	35	4	59	12	94	16
Cumberland.....	43	1	34	3	77	4
Franklin.....	1	-	1	-	2	-
Hancock.....	35	2	3	-	38	2
Kennebec.....	14	-	16	1	30	2
Knox.....	38	3	38	8	76	11
Lincoln.....	11	1	11	1	22	1
Oxford.....	43	2	29	2	72	2
Penobscot.....	32	2	28	2	60	4
Piscataquis.....	11	1	6	1	17	4
Sagadahoc.....	1	-	3	-	4	-
Somerset.....	4	-	9	-	13	-
Waldo.....	5	2	3	-	8	2
Washington.....	-	-	3	-	3	-
York.....	36	2	18	1	54	3

It is with the hope of stimulating further research, especially in those counties where little or no work has been done, and thus extending our knowledge of the distribution of the shells of Maine, that this list is published. Hoping to publish a revised list later on, we shall be glad to receive specimens or records of shells from all sections of the State.

N. W. LERMOND.

Thomaston, R. F. D., December 21, 1908.

A LIST OF THE SHELLS OF MAINE.

MARINE SPECIES.

Pelecypoda (Bi-valves).

- Solemya velum* (Say) 1822.
Casco Bay (Kingsley).
- Solemya borealis*, Totten.
Casco Bay (Fuller, Kingsley); Winter Harbor (Henderson).
- Nucula tenuis* (Montagu).
Casco Bay to Eastport.
- Nucula proxima*, Say.
Casco Bay to Eastport.
- Nucula delphinodonta*, Mighels and Adams, 1842.
Casco Bay to Eastport.
- Yoldia limatula* (Say).
Casco Bay to Eastport.
- Yoldia sapotilla* (Gould).
Casco Bay to Eastport.
- Yoldia myalis* (Couthouy).
Casco Bay to Eastport.
- Yoldia thraciæformis* (Storer), 1837.
Casco Bay to Eastport.
- Yoldia lucida* (Loven).
Nucula navicularis, Mighels, 1841.
Yoldia obesa, Stimpson, 1851.
Casco Bay; North Haven, Penobscot Bay (Henry Jackson, Jr.).
- Yoldia frigida*, Terell, 1859.
Gulf of Maine, 88 to 92 fathoms, and Jeffreys Ledge (Verrill).
- Yoldia cascœnsis* (Mighels), 1841.
Casco Bay (Mighels and Chickering).

Leda tenuisulcata (Couthouy), 1838.

Nucula minuta, Mighels, 1842.

Casco Bay to Eastport.

Leda caudata (Donovan).

Nucula rostrata, Mighels.

Casco Bay, rare (Mighels); Gulf of Maine, 102 fath.
(Verrill).

Arca (*Bathyarca*) *pectunculoides*, Scacchi, 1833.

Casco Bay (Kingsley); just outside Casco Bay, 94
fath. and Cashes Ledge, 27 to 90 fath. (Verrill).

Arca (*Bathyarca*) *anomala*, Verrill and Bush.

Off Cashes Ledge, 27 fath. (Verrill).

Ostrea virginica, Gmelin.

Ostrea canadensis, Lamarck.

Ostrea borealis, Stimpson, 1851.

(The common oyster.)

This shell-fish was common in the tidal rivers and bays of the Maine coast, as the Indian shell heaps, notably the one on the banks of the Damariscotta river, in the town of Damariscotta, and dead shells still to be found in the beds of the rivers eloquently attest. The cause of their dying out on the coast of Maine has not, to our knowledge, been satisfactorily explained. Several attempts, at different times, to restock the rivers have ended in failure, with the possible exception of a bed in Sheepscot river, Lincoln county. There are specimens from this river in the museum of the Portland Society of Natural History that were taken alive by Mr. G. M. Brown, the date of collection not being given. Rev. Henry W. Winkley informs me that he has in his collection a specimen of *ostrea virginica* from the Sheepscot river at a place called Sheepscot bridge, about two miles above Wiscasset. He further says: "There is a small bed of living oysters there and I understand they have survived from ancient times."

Pecten gibbus var. *borealis*, Say.

Pecten irradians of authors.

(The common or eastern scallop.)

Portland harbor (C. B. Fuller collection in Portland museum; in Indian kitchen midden, shores of New Meadows river, Brunswick, (Prof. Leslie Lee).

Pecten islandicus (Muller).

(The Arctic scallop.)

Casco Bay to Eastport.

Pecten magellanicus, Gmelin.

Pecten tenuicostatus, Mighels, 1842.

Chlamys clintonius, Verrill.

(The Maine, Great or Giant scallop.)

Casco Bay to Eastport.

This is the largest *Pecten* on the Atlantic coast, attaining a very large size, a specimen from Portland Harbor, and now in the Portland museum, measuring 6 11-16 in length by 7 3-16 in width. The abductor muscle, called by the fishermen the "eye" or "heart," of the scallops, both the common and Maine species, is largely used for food. "Scalloping," or taking the scallops in dredges, is no inconsiderable industry on the Maine coast, pursued by many fishermen.

Pecten pustulosus, Verrill, 1873.

Gulf of Maine, 115 to 150 fath. (Verrill).

Pecten subimbrifer, Verrill and Bush.

Pecten haskynsi, Verrill (not Forbes).

Gulf of Maine, 121 fath. (Verrill).

Anomia simplex, d'Orbigny.

Anomia ephippium, Gould, 1870.

Anomia electrica, Gould, 1870.

Anomia glabra, Verrill, 1873.

Casco Bay to Eastport.

Anomia aculeata, Linné.

Casco Bay to Eastport.

Mytilus edulis, Linné.

(Common black or blue mussel.)

This edible shell-fish is found in beds, at low water mark, all along the Maine coast. And while it lacks the flavor of the clam, it is quite palatable.

Mytilus edulis var. *pellucidus*, Pennant.

(Rayed or translucent mussel.)

Found in company with the type species, but not nearly as abundant.

Modiolus modiolus, (Linné).

(Red or horse mussel.)

Everywhere along the coast in tide pools, crevices of rocks and in all depths up to 80 fathoms.

Modiolus demissus plicatula, Lamarck.

(Ribbed mussel.)

Casco Bay (Chickering, Fuller, Verrill, Kingsley); banks of New Meadows river, Brunswick (Prof. Lee, Norton and Lermund); Hanaseeket river, Freeport (Dr. W. C. Kendall); Sheepscot river, Lincoln county (Winkley); Damariscotta river at Newcastle, most northern Maine record (Wentworth).

Modiolaria discors (Linné).

Modiolaria lævigata, Gray.

Modiola discrepans, Mighels, 1843.

Casco Bay to Eastport.

Modiolaria nigra (Gray), 1824.

Modiola pectinula, Gould, 1841.

Modiola nexa, Mighels, 1841.

Mytilus pectinulus, Stimpson, 1851.

Casco Bay to Eastport.

Modiolaria corrugata (Stimpson).

Mytilus corrugatus, Stimpson, 1851.

Casco Bay to Eastport.

Dacrydium vitreum (Moller).

Modiola vitrea, Moller, 1842.

Just outside Casco Bay, 50 to 95 fath. (Verrill, Kingsley).

Crenella glandula (Totten).

Modiola glandula, Mighels, 1843.

Casco Bay to Eastport.

Crenella decussata (Montagu).

Mytilus decussatus, Stimpson, 1851.

Casco Bay to Eastport.

Periploma fragilis (Totten).

Periploma papyracea, Conrad.

Anatina papyracia, Gould, 1870.

Casco Bay to Eastport.

Periploma (*Cochlodesma*) *leana* (Conrad).

Cochlodesma leanum, Stimpson, 1851.

Casco Bay to Eastport.

Thracia conradi, Couthouy. •

Casco Bay to Eastport.

- Thracia truncata*, Mighels and Adams, 1842.
Casco Bay to Eastport.
- Thracia myopsis*, Beck.
Thracia couthouyi, Stimpson, 1851.
Casco Bay to Eastport.
- Pandora* (*Clidiophora*) *gouldiana*, Dall.
Pandora trilineata, Stimpson, 1851.
Casco Bay to Eastport.
- Lyonsia hyalina* (Conrad).
Casco Bay to Eastport.
- Lyonsia arenosa* (Moller).
Lyonsia arenata, Kingsley, 1901.
Casco Bay (Kingsley); North Haven, Penobscot Bay,
extremely rare (Henry Jackson, Jr.); rare at Frenchman's
Bay, only one specimen taken in 10 to 12 fath. (Blaney).
- Poromya granulata*, Nyst and Westendorp.
Gulf of Maine, 150 fath. (Verrill).
- Cuspidaria glacialis*, G. O. Sars.
Neæra arctica, Verrill, 1872.
Neæra glacialis, Verrill, 1882.
Just outside Casco Bay, 50 to 95 fath. (Verrill, Kingsley);
Frenchman's Bay, one dead defective specimen, 25 fath.
(Blaney).
- Cuspidaria pellucida* (Stimpson).
Neæra pellucida, Stimpson.
Casco Bay to Eastport.
- Cuspidaria obesa*, Loven.
Neæra obesa, Verrill, 1882.
Gulf of Maine, 52 to 92 fath. (Verrill).
- Cyclas islandica* (Linné).
Cyprina islandica, Mighels, 1843; Gould, 1870.
Casco Bay to Eastport.
- Astarte castanea* (Say), 1822.
Casco and Frenchman's Bays.
- Astarte undata*, Gould.
Astarte sulcata, Stimpson, 1851.
Casco Bay to Eastport.
- Astarte undata* var. *latisulcata* (Hanley).
Frenchman's Bay, 16 to 30 fath. (Blaney).

- Astarte quadrans*, Gould.
Casco Bay to Eastport.
- Astarte portlandica*, Mighels.
Casco Bay to Eastport.
- Astarte elliptica* (Brown).
Casco Bay (Kingsley); six miles east of Seguin, 33 fath. (Verrill).
- Astarte subæquilatera*, Sowerby.
Astarte crebricostata, Gould.
Astarte lens, Stimpson MSS., Verrill, 1873.
Casco Bay to Eastport.
- Astarte borealis*, Schumacher.
Astarte semisulcata, Gould, 1870.
Frenchman's Bay, rare, only valves (Blaney);
Machias Bay (Fuller); off Treats Island, Eastport (Fuller).
- Astarte striata* (Leach).
Astarte banksi, Leach.
Frenchman's Bay, 20 fath., rare, only valves (Blaney).
- Venericardia borealis*, Conrad.
Cardita borealis, Mighels, 1843, Stimpson, 1851.
Cyclocardia borealis, Verrill, 1873.
Casco Bay to Eastport.
- Venericardia novangliæ* (Morse), 1869.
Cardita (*Venericardia*) *borealis* var. *novangliæ*, Dall, 1903.
Casco Bay to Eastport.
- Phacoides filusus* (Stimpson).
Lucina filosa, Stimpson, 1851.
Old Orchard Beach, single valve (Norton); Casco Bay (Kingsley); Portland Harbor (Fuller); near Machias (Capt. Walden).
- Thyasira gouldi* (Philippi).
Lucina flexuosa, Gould, 1841.
Cryptodon gouldi, Gould, 1870.
Casco Bay to Eastport.
- Thyasira plana* (Verrill and Bush).
Casco Bay (Verrill); Frenchman's Bay (Blaney).
- Thyasira trisinuata* (d'Orbigny).
Cryptodon obesus, Verrill, 1873.

"This species is more nearly related to *C. flexuosus* of Europe than to *C. gouldi*. The three should be kept distinct." (Verrill in American Journal of Science.)

Casco Bay (Verrill and Kingsley); outside Casco Bay, 50 to 95 fath. (Verrill).

Thyasira inæqualis (Verrill and Bush).

Casco Bay (Verrill).

Thyasira equalis, Verrill and Bush.

Eastport, Gulf of Maine (Verrill).

Axinopsis orbiculata, Sars.

Broad Sound, Casco Bay, 15 to 30 fath. (Verrill); rare in Frenchman's Bay, 15 fath. (Blaney).

Axinopsis orbiculata var. *inequalis*, Verrill and Bush.

Frenchman's Bay, rare (Blaney).

Rochefortia planulata (Stimpson).

Kellia rubra, Gould, 1841.

Lasæa planulata, Kingsley, 1901.

Just outside Casco Bay (Kingsley); Eastport, 8 to 15 fath. (Verrill).

Turtonia minuta (Fabricius).

Turtonia nitida, Verrill, 1873.

Scarboro (Fuller); Casco Bay (Kingsley); Frenchman's Bay (Blaney).

Cardium pinnulatum, Conrad.

Casco Bay to Eastport.

Cardium ciliatum, Fabricius.

Cardium islandicum, Linné.

Casco Bay to Eastport.

Serripes groenlandicus (Gmelin).

Aphrodite groenlandica, Gould, 1870.

Cardium groenlandicum, Mighels, 1841.

Casco Bay (Kingsley); Frenchman's Bay (Blaney).

Venus mercenaria, Linné.

(Quohaug, or round clam.)

Casco Bay; Frenchman's Bay, one valve dredged in 10 fath. (Blaney); Damariscotta river at Newcastle (Mrs. E. P. Wentworth); Popham Beach, single valves (Norton); Hanaseket river, Freeport (Dr. W. C. Kendall).

Venus mercenaria var. *notata*, Say, 1822.

With clams dug in vicinity of Portland (Mighels, 1843 list).

Callocardia morrhuana (Linsley).

Cythera convexa, Conrad, Mighels, etc.

Callista convexa, Verrill, 1873.

Casco Bay to Eastport.

Liocyma fluctuosa (Gould).

Tapes fluctuosa, Gould, 1841.

Frenchman's Bay, rare, a few valves dredged in 35 fath. (Blaney).

Gemma gemma (Totten).

Venus gemma, Mighels, 1843.

Casco Bay to Frenchman's Bay.

Gemma gemma var. *totteni*, Stimpson.

Found in company with the preceding.

Gemma gemma var. *purpurea*, H. C. Lea.

South Portland (Wentworth); Hanaseeket river, Freeport (Dr. Kendall); Damariscotta river at Newcastle (Wentworth).

Petricola pholadiformis, Lamarck.

Quahog and Casco Bays (Fuller, Verrill, Kingsley); Hanaseeket river (Dr. Kendall).

Tellina tenera, Say.

Angulus tener, Kingsley, 1901.

Just outside Casco Bay (Kingsley); Scarboro Beach (Wentworth).

Macoma balthica (Linné).

Macoma fusca, Mighels, 1843, Gould, 1870.

Tellina fusca, Stimpson, 1851.

Casco Bay to Eastport.

Macoma calcarea (Gmelin).

Sanguinolaria sordida, Gould, 1841.

Tellina sordida, Mighels, 1843.

Tellina proxima, Stimpson, 1851.

Macoma proxima, Gould, 1870.

Whole coast of Maine.

Siliqua costata (Say).

Solen costatus, Say, 1821.

Machæra costata, Gould, 1841, 1870.

While Stimpson, in his 1851 list, gives "whole New England coast," as the range for this species, we have only the following authentic records:

Casco Bay (Chickering, Kingsley); Scarboro Beach
(Fuller in P. S. N. H.); Old Orchard and Scar-
boro (Wentworth).

Ensis directus (Conrad), 1843.

Solen ensis var. *americana*, Gould, 1870.

Ensatella americana, Verrill.

(Razor clam.)

Whole coast of Maine.

Spisula (*Hemimactra*) *solidissima*, Dillwyn.

Mactra gigantea, Mighels, 1843.

Mactra solidissima, Stimpson, 1851, Gould, 1870.

(Sea, surf, or hen clam.)

This species seems to be rather scarce on the Maine coast. We have only the following records and these mostly of dead specimens:

Saco Beach (Mighels); Scarboro Beach (Fuller);
Casco Bay (Chickering and Kingsley); Ash Point,
Knox county (Lermond); Frenchman's Bay
(Blaney); Great Cranberry Island (Norton);
Grand Manan (Stimpson).

Of the edible qualities of this clam, Dr. Mighels, in his 1843 list, remarks as follows: "It is used by a few as an article of food, but it is tough and indigestible and I have known some to be seriously injured by eating it."

Spisula (*Hemimactra*) *polnynma* (Stimpson), 1851.

Mactra ponderosa, Stimpson, 1851.

Mactra similis, Gray.

Mactra ovalis, Gould, 1841, 1870.

Casco Bay to Eastport.

Mulinia lateralis (Say).

Mactra lateralis, Say.

Portland (Fuller in Portland Museum).

Mesodesma arctata (Conrad).

Mactra arctata, Conrad, 1830.

Ceronia arctata, Gould, 1870.

In his 1851 list, Stimpson gives "whole coast," as the range for this species, while we have only the following records:

Saco Beach (Mighels); Old Orchard Beach (Wentworth); just outside Casco Bay (Kingsley); in the vicinity of Portland (Chickering).

Mya arenaria, Linné.

Mya mercenaria, Say, 1822.

(Common clam.)

Abundant all along the coast of Maine, in sand, mud and cleft of rocks, between tides. Largely consumed as an article of food.

Mya truncata, Linné.

Found all along the coast but not very common.

Saxicava arctica (Linné).

Saxicava distorta, Say, 1822.

Saxicava rugosa, Stimpson, 1851, Gould, 1870.

All along the coast, in crevices of rocks at low water-mark to 100 fathoms.

Panomya norvegica (Spengler).

Glycymeris arctica, Lamarck.

Panopæa arctica, Gould, 1870.

Casco Bay (Kingsley); Frenchman's Bay, only valves, 25 to 30 fath. (Blaney); Grand Manan, 40 fath. (Stimpson).

Cyrtodaria siliqua (Daudin).

Glycymeris siliqua, Lamarck.

Solen siliqua, Chickering, 1854.

This species is rare on the coast of Maine. Casco Bay (Chickering, Fuller and Kingsley); only valves dredged in Frenchman's Bay (Blaney); Bar Harbor (Henderson).

Zirfæa crispata (Linné).

Pholas crispata, Linné, 1758.

Casco Bay (Fuller, Verrill, Kingsley, Lee); Popham Beach (Norton); Old Orchard (Winkley); Penobscob Bay, 50 fath. hard clay (Lermond); Frenchman's Bay, one valve in 10 fath. (Blaney); Eastport and Grand Manan (Stimpson).

Pholas truncata, Say, 1822.

Scarboro (E. P. Sampson, per E. W. Roper in Conchologists Exchange, Vol. 1, p. 65, 1887).

Xylophaga dorsalis, Turton.

Just outside Casco Bay (Verrill and Kingsley).

Teredo nana, Turton.

Teredo megotara, Hanley.

"In pieces of drift-wood, cast upon the beach in Jacob's Cove, Ironbound Island, Frenchman's Bay, after a hard southerly storm, September 10, 1902" (Blaney).

Teredo dilatata, Stimpson.

Casco Bay, "comparatively abundant, boring in lobster pots and cars" (Kingsley); Scarboro (Fuller in P. S. N. H.).

Scaphopoda (Horn or Tusk Shells).

Dentalium agile, Sars.

Just outside Casco Bay, 50 to 95 fath. (Verrill and Kingsley).

Dentalium entalis (Linné).

Dentalium striolatum, Stimpson, 1851.

Entalis striolata, Gould, 1870.

Casco Bay to Eastport.

Dentalium occidentale, Stimpson, 1851.

Dentalium dentale, Gould, 1841, 1870.

Deep water off Maine coast, Casco Bay to Eastport.

Siphonodentalium lobatum (Sowerby).

Siphonodentalium vitreum, (M. Sars) Verrill.

Gulf of Maine, 60 to 107 fath. (Verrill).

Amphineura (Chitons or Mermaid-cradles).

Lepidopleurus alveolus, Sars.

Leptochiton alveolus, Dall, 1889.

Gulf of Maine, 150 fath. (Verrill).

Lepidopleurus cancellatus (Sowerby).

Leptochiton cancellatus, Verrill, 1882.

Cashes Ledge, 30 to 40 fath. (Verrill).

Hanleyia mendicaria (Mighels and Adams), 1842.

Chiton mendicarius, Stimpson, 1851; Gould, 1870.

Casco Bay to Grand Manan.

Trachydermon ruber (Linné).

Chiton lævis, Loven.

Chiton ruber, Gould, 1870.

Whole coast of Maine.

Trachydermon ruber var. *index*, Balch.

Blue Hill Bay, off Harriman's Point, 12 fath., one adult, one young and one half-grown (F. N. Balch).

Trachydermon albus (Linné).

Chiton albus, Gould, 1870.

Whole coast of Maine.

Tonicella marmorea (Fabricius).

Chiton fulminatus, Couthouy, 1838.

Chiton lævigatus, Fleming, Mighels, 1843.

Chiton marmoreus, Gould, 1870.

Whole Maine coast.

Tonicella marmorea var. *cærulea*, Winkley.

"In this variety the rose color gives place to a delicate, light blue," Eastport (Winkley).

Tonicella blaneyi, Dall.

Frenchman's Bay, dredged in about 20 fath. (Blaney).

Amicula vestita (Broderip and Sowerby).

Chiton vestitus, B. and S., 1828.

Chiton emersonii, Couthouy, 1838.

Amicula emersonii, Gould, 1870.

Stimpsoniella emersonii, Verrill, 1873.

Casco Bay (Mighels, Chickering, Winkley, Lee, Kingsley); Portland Harbor (Fuller in P. S. N. H.); outside Casco Bay (Verrill); Frenchman's Bay, only one specimen taken from a haddock (Blaney).

Prof. Lee of Bowdoin College informs me that the specimens of this species, taken by him on Whaleboat Island, were unusually large, measuring .2 1-2 inches in length.

Chætoderma nitidulum, Loven.

Just outside Casco Bay, 50 to 95 fath. (Kingsley).

Gasteropoda (Univalves or Sea Snails).

Acmaea testudinalis (Muller).

Patella amœna, Say, Couthouy, Mighels.

Tectura testudinalis, Gould, 1870.

Whole coast of Maine, on rocks at low-water mark and in tide pools.

Acmaea alveus (Conrad).

Very common all along the coast, on eel grass and occasionally on rocks.

Lepeta caeca, Muller.

Patella candida, Gould, 1841.

Pilidium candidum, Stimpson, 1851.

Casco Bay to Eastport.

Puncturella noachina (Linné).

Cemoria princeps, Mighels and Adams, 1842.

Diadora noachina, Stimpson, 1851, Verrill, 1873.

Cemoria noachina, Gould, 1870.

Whole coast of Maine.

Calliostoma occidentale (Mighels and Adams), 1842.

Trochus occidentalis, Stimpson, 1851, Gould, 1870.

Whole coast of Maine.

Solariella obscura (Couthouy).

Margarita obscura, Gould, 1870.

Machæroplax obscura, Verrill, 1882.

Whole coast of Maine.

Solariella obscura var. *bella* (Verkruzen).

A few dredged off Ironbound Island, Frenchman's Bay (Blaney); "The variety is the predominant form at Eastport" (Verrill).

Margarites helicina (Phipps).

Margarita arctica, Leach, 1819.

Margarita campanulata, Morse, 1867.

Whole coast of Maine.

Margarites cinera (Couthouy).

Whole coast of Maine.

Margarites olivacea (Brown).

Margarita argentata, Gould, 1870.

Whole coast of Maine.

Margarites minutissima, Mighels, 1843.

A single specimen taken from the stomach of a haddock in Casco Bay (Mighels). "It is not very nearly allied to any of the other species found on the coast. Under a magnifier it somewhat resembles *M. varicosa*, in the ultimate whorl. It is, however, readily distinguished by its very depressed and obtuse spire."—Mighels.

Margarites grœnlandica (Ginelin).

Margarita undulata, Gould, Mighels, Stimpson.

Whole coast of Maine.

Margarites acuminata (Mighels and Adams), 1842.

Grand Manan, 40 fath., soft mud (Stimpson).

Molleria costulata (Moller).

Margarita costulata, Moller, 1842.

Adeorbis costulata, Stimpson, Gould.

Hussey Sound, Casco Bay (Fuller in P. S. N. H.);

Frenchman's Bay common in 25 to 30 fath.

(Blaney); Grand Manan, 4 to 30 fath. (Stimpson).

Stilifer stimpsoni, Verrill.

Georges Bank, 6 to 60 fath.

"As this lives among the spines of the sea urchin, *Strongylocentrotus drobachiensis*, I see no reason why it should not be found in Maine."—(Charles W. Johnson.)

Turbonilla interrupta (Totten).

Portland Harbor (Fuller in P. S. N. H.); Nova Scotia,

2 to 107 fath. (Dall).

Tubonilla nivea (Stimpson).

Chemnitzia nivea, Stimpson, 1851.

Frenchman's Bay, "only one dead and very worn specimen which suggests *Turbonilla nivea*, Stimpson, 20

fath." (Blaney); in 40 fath. mud and gravel, off

Grand Manan (Stimpson).

Odostomia modesta (Stimpson).

Chemnitzia modesta, Stimpson, 1851.

Frenchman's Bay, 6 to 8 fath., rare (Blaney).

Odostomia bisuturalis (Say) 1821.

Jaminia exigua, Couthouy, 1838.

Odostomia exigua, Gould, 1841.

Sheepscot river, Lincoln county (Winkley); Damariscotta river at Newcastle (Wentworth).

Odostomia trifida (Totten).

Actæon trifidus, Totten.

On algæ, in an inlet of New Meadows river, Brunswick

(Prof. Leslie Lee); Sheepscot river (Winkley);

Damariscotta river at Newcastle (Wentworth).

Odostomia seminuda (Adams).

Mass. Bay, northward (Stimpson).

While we have no Maine record for this species, there is no reason why it should not be found on our shores, especially since *bisuturalis* and *trifida* have been reported from rivers in Lincoln and Cumberland counties. Stimpson gives the range of *trifida*, "Buzzard's Bay to New York" and of *bisuturalis*, "Mass. Bay;" while of *seminuda*, he gives the range as from "Mass. Bay, northward."

Liostomia eburnea (Stimpson).

Rissoa eburnea, Stimpson, 1851.

Odostomia eburnea, Kingsley, 1901.

Casco Bay to Grand Manan.

Menestho striatula (Couthouy).

Pyramis striatula, Couthouy, 1838, Mighels, 1843.

Menestho albula, Stimpson 1851; Gould, 1870.

Whole coast of Maine.

Menestho? sulcosa (Mighels).

Phasianella sulcosa, Mighels, 1843.

Risella sulcosa, Gould, 1870.

Casco Bay, from the stomach of a haddock (Mighels).

Eulimella polita (Verrill).

Aclis polita, Verrill, 1872.

Eastport Harbor, 20 fath., shelly bottom, only one perfect specimen (Verrill and Smith).

Eulimella ventricosa (Forbes).

Eastport (Verrill).

Aclis striata, Verrill, 1880.

Near Eastport (Verrill).

Syrnola producta (C. B. Adams).

Odostomia producta, Adams, 1842.

Chemnitzia producta, Stimpson, 1851.

Portland Harbor (Fuller in Portland museum);

Frenchman's Bay, only one dead and worn specimen, 6 to 8 fath. (Blaney).

Scala groenlandica (Perry).

Scalaria groenlandica, Mighels, 1843; Gould, 1870.

Whole coast of Maine.

Scala (Acirsa) costulata (Mighels and Adams).

Turritella costulata, M. and A., 1842.

Acirsa costulata, Verrill, 1879.

Whole coast of Maine.

- Scala (Acirsa) borealis* (Beck) Morch.
Scalaria borealis, Beck, 1841.
 Eastport, 10 to 40 fath., shelly bottom (Verrill & Smith).
- Polinices (Lunatia) heros* (Say).
Natica heros, Say, 1822.
 Very common all along the coast, from low water-mark to 50 fath., muddy and sandy bottoms. Used by the fishermen for bait.
- Polinices (Lunatia) triseriata* (Say).
 Whole coast of Maine.
- Polinices (Lunatia) groenlandica* (Moller).
 Whole coast of Maine.
- Polinices immaculata* (Totten).
Mamma? immaculata, Gould, 1870.
 Whole coast of Maine.
- Polinices (Lunatia) levicula*, Verrill, 1880.
 Casco Bay (Verrill, Kingsley); Eastport (Verrill); Gulf of Maine, 26 to 100 fath. (Dall).
- Natica pusilla*, Say, 1822.
 Casco Bay (Fuller, Mighels, Chickering); near Eastport, 17 fath. (Fuller).
- Natica clausa*, Broderip and Sowerby, 1829.
Natica consolidata, Couthouy.
Natica borealis, Beck.
 Whole coast of Maine.
- Acrybia flava* (Gould).
Natica flava, Gould, 1841; Stimpson, 1851.
Bulbus flavus, Gould, 1870.
 Portland Harbor (Fuller, in Portland museum); Eastport (Cooper in Gould's Invert. 2nd ed.); Grand Manan, 50 fath. mud (Stimpson).
- Amauropsis helicoides* (Johnston), 1835.
Natica canaliculata, Gould, 1840.
 Off Otter Creek, Mt. Desert, 12 fath, sand (Henderson).
- Velutina zonata*, Gould.
 Whole coast of Maine.

- Velutina lævigata* (Linné).
Sigaretus haliotoideus, Mighels, 1843.
Velutina haliotoides, Stimpson, 1851.
Velutina haliotoidea, Gould, 1870.
 Whole coast of Maine.
- Marsenina glabra* (Couthouy).
Catinus perspectivus, Say.
Lamellaria perspicua, Gould, Stimpson, Verrill.
 Whole coast of Maine.
- Marsenina ampla*, Verrill, 1880.
 Eastport (Dall, Verrill).
- Marsenina prodita* (Loven) 1846.
 Eastport (Verrill and Smith).
- Crucibulum striatum* (Say).
Calypræa striata, Say, 1826; Mighels, 1843.
 Everywhere on the coast of Maine.
- Crepidula fornicata* (Linné).
Crepidula glauca, Say, 1822; Gould, 1870.
 Southern coast of Maine, as far north as Frenchman's Bay.
- Crepidula convexa*, Say, 1822.
 Casco Bay (Verrill, Kingsley); Damariscotta river at Newcastle (Wentworth); Nova Scotia, 0 to 22 fath. (Dall); Mass. Bay, southward (Stimpson).
- Crepidula plana*, Say, 1822.
Crepidula unguiformis, Stimpson, 1851.
 Old Orchard (Wentworth); Casco Bay (Mighels, et al); Penobscot Bay, 49 to 50 fath. and all along Knox county shore, in dead shells of *Buccinum undatum* (Lermond); whole coast of New England (Stimpson).
- Cingula minuta* (Totten).
Rissoa minuta, Gould, 1870.
Littorinella minuta, Verrill, 1873.
 Casco Bay to Frenchman's Bay; whole New England coast (Stimpson).
- Cingula aculeus*, Gould, 1841.
 Whole coast of Maine.

- Cingula castanea* (Moller) 1842.
Mt. Desert (Verrill, 1861; Prof. Cleveland); Frenchman's Bay, 6 to 12 fath. (Blaney); dredged at Eastport (Verrill).
- Cingula carinata*, Mighels and Adams.
Cingula semicostata, Mighels and Adams, 1842.
Rissoa pelagica, Stimpson, 1851.
Whole coast of Maine.
- Cingula arenaria*, Mighels and Adams, 1842.
Rissoa exerata, Stimpson, 1851.
Rissoa mighelsi, Stimpson, 1853; Gould, 1870.
Casco Bay to Grand Manan.
- Cingula areolata* (Stimpson).
Turritella areolata, Stimpson, 1851.
Dredged near Mt. Desert Island by Prof. W. C. Cleveland (Verrill's list); Mt. Desert (Verrill); Frenchman's Bay, not common (Blaney).
- Cingula multilineata* (Stimpson).
Frenchman's Bay, only one dead specimen, dredged in 5 fath. (Blaney).
- Cingula latior*, Mighels and Adams, 1842.
Casco Bay (Mighels, Chickering, Fuller).
- Skenea planorbis* (Fabricius).
Skenea surpuloides, Mighels, 1843.
Whole coast of Maine.
- Litorina littorea* (Linné).
(Pennywinkle.)
First found at Eastport by Charles B. Fuller in 1862, now very common all along the Maine coast.
- Litorina rudis* (Donovan) 1800.
Turbo vestitus, Say.
Littorina tenebrosa, Gould, 1870.
Very abundant on all rocky shores, between tides.
- Litorina palliata* (Say).
Littorina littoralis, Stimpson, 1851.
Very common all along the shores, on rocks and rockweed.
- Lacuna vineta* (Montagu).
Whole coast of Maine.

- Lacuna neritoidea*, Gould, 1841.
Lacuna littoralis, Kingsley, 1901.
 Casco Bay (Mighels et al); 45 miles southwest of
 Seguin, 45 fath. (Verrill); whole New England
 coast (Stimpson).
- Turritellopsis acicula* (Stimpson).
Mesalia acicula, Stimpson, 1851.
Turritella acicula, Gould, 1870.
 Whole coast of Maine.
- Mesalia erosa* (Couthouy).
Turritella erosa, Mighels, Gould, Verrill.
 Whole coast of Maine.
- Trichotropis borealis*, Brodèrip and Sowerby.
Trichotropis costellatus, Couthouy.
 Whole coast of Maine.
- Trichotropis conica*, Moller.
 One dead specimen taken in Gulf of Maine, off Cape
 Sable, N. S., in 75 fath. (Verrill).
- Torellia fimbriata*, Verrill and Smith, 1882.
 One specimen taken near Cashes Ledge, 52 to 90 fath.
 by "Bache" party (Verrill).
- Torellia vestita*, Jeffreys, 1867.
 First taken on our coast in 1872, Gulf of Maine, 150-
 fath. by "Bache" party (Verrill).
- Aporrhais occidentalis* (Beck).
- Rostellaria occidentalis*, Mighels, 1843.
 Whole coast of Maine.
- Urosalpinx cinereus* (Say).
Fusus cinereus, Say, 1821.
Buccinum plicosum, Mighels, Stimpson.
 Casco Bay (Mighels et al); Damariscotta river at
 Newcastle (Wentworth).
- Trophon truncatus* (Strom).
Fusus bamffius, Gould, 1841.
Tritonium clathratus, Stimpson, 1851.
Trophon clathratus, Gould, 1870.
 Whole coast of Maine.

Trophon clathratus (Linné).

Fusus scalariformis, Gould, 1841.

Tritonium scalariforme, Stimpson, 1851.

Trophon scalariformis, Gould, 1870.

Casco Bay (Mighels, Fuller, Kingsley); East and West Cod Ledges off Cape Elizabeth (Verrill).

Trophon clathratus var. *gunneri*, Loven.

Off Grand Manan and off Cape Sable, 59 fath. (Verrill).

Purpura lapillus (Linné).

Very abundant everywhere, on ledges and rocks, between tides.

Purpura lapillus var. *imbricata*, Lamarck.

Found in company with the type, but less numerous.

Columbella (*Anachis*) *avara* (Say), 1822.

Casco Bay, stomach of a haddock (Mighels).

Columbella (*Anachis*) *haliæti* (Jeffreys).

Anachis costulata, Verrill.

Gulf of Maine, Cashes Ledge, Jeffreys Bank, etc., 30 to 114 fath. (Verrill).

Columbella (*Astyris*) *rosacea*, Stimpson.

Buccinum rosaceum, Mighels, 1843.

Whole coast of Maine.

Columbella (*Astyris*) *dissimilis*, Stimpson, 1851.

Astyris zonalis, Verrill, 1873.

Whole coast of Maine.

Nassa trivittata, Say, 1821.

Buccinum trivittatum, Adams, 1838.

Whole coast of Maine.

Nassa obsoleta, Say, 1821.

Buccinum obsoletum, Gould, 1841.

Ilyanassa obsoleta, Stimpson, 1865.

Very common all along the coast in coves and inlets, on muddy flats between tides and at low-water mark.

Buccinum undatum, Linné.

(Whelk or sea snail.)

Very abundant all along the coast, on rocky bottoms, from low-water mark to 50 or more fathoms.

- Buccinum cyaneum* (Bruguiere).
Buccium gronlandicum, G. O. Sars.
 Frenchman's Bay, one immature specimen, with protoconch, 10 fath. (Blaney).
- Buccinum tenue*, Gray.
 Off Cape Sable, 88 to 91 fath. (Verrill).
- Chrysodomus decemcostatus* (Say).
Fusus decemcostatus, Mighels, Gould.
Neptunea decemcostata, Say, Verrill, 1873.
 Common everywhere on the coast of Maine, from low-water mark to 100 fath., prefers rocky bottoms.
- Tritonofusus stimpsoni* (Morch).
Fusus corneus, Say.
Sipho stimpsoni, Morch, 1867.
Fusus islandicus, Gould, 1870.
Neptunea curta, Verrill, 1873.
 Found with the preceding.
- Tritonofusus stimpsoni* var. *liratulus*, Verrill.
 Sheepscot river (Winkley); a few young specimens dredged at same stations as *stimpsoni* (Blaney).
- Tritonofusus pygmæus* (Gould), 1841.
Tritonium pygmæum, Stimpson, 1851.
Neptunella pygmæa, Verrill, 1870.
Chrysodomus (*Sipho*) *pygmæus*, Dall, 1903.
 Whole coast of Maine.
- Tritonofusus sabinii* (Gray).
Buccinum sabinii, Gray, 1824.
 Young specimens taken on Cashes Ledge by A. S. Packard, Jr., and party of "Bache," 1873 (Verrill).
- Ptychotractus ligatus* (Mighels and Adams).
Fasciolaria ligata, Mighels and Adams, Stimpson.
 Casco Bay to Eastport.
- Admete couthouyi* (Jay).
Cancellaria couthouyi, Jay, 1839.
Admete viridula, Stimpson, Gould, Verrill.
 Whole coast of Maine.

- Pleurotomella packardii*, Verrill, 1872.
Mangilia (*Pleurotomella*) *packardii*, Dall, 1903.
 Gulf of Maine, 110 fath. Station 89 "Bache," 1872.
 Gulf of Maine, 105 to 110 fath. Station 54, 1874.
 Gulf of Maine, 85 fath. Station 189, 1878.
- Bela incisula*, Verrill, 1882.
Bela impressa, Verrill, not Morch, 1881.
 Whole coast of Maine.
- Bela virgulata gouldi*, Verrill.
Bela virgulata, Verrill, not Reeve, 1881.
 Casco Bay (Verrill); Gulf of Maine, 25 to 118 fath.,
 most frequent in 25 to 60 fath., on muddy, gravelly
 and shelly bottoms (Verrill); Frenchman's Bay,
 only one dead specimen in 25 fath. (Blaney).
- Bela exarata* (Moller).
Tritonium mitrula, Loven, 1846.
Bela concinnula, Verrill, 1882.
 Casco Bay to Grand Manan.
- Bela cancellata* (Mighels and Adams).
Fusus cancellatus, M. and A., 1842.
Mangelia cancellata, Stimpson, 1851.
 Whole coast of Maine.
- Bela pleurotomaria* (Couthouy), 1838.
Fusus rufus, Gould, Mighels.
Mangelia pyramidalis, Stimpson, 1851.
 Whole coast of Maine.
- Bela nobilis* (Moller), 1842.
Fusus turricula, Gould, Mighels.
Mangelia turricula, Stimpson, 1851.
Bela scalaris, Verrill, 1882.
 Whole coast of Maine.
- Bela harpularia* (Couthouy).
Fusus harpularius, Couthouy, Gould, Mighels.
 Whole coast of Maine.
- Bela decussata* (Couthouy), 1839.
 Whole coast of Maine.
- Bela bicarinata* (Couthouy).
 Whole coast of Maine.

- Bela bicarinata* var. *violacea* (Mighels and Adams).
Bela violacea, Gould, 1870.
 Casco Bay to Frenchman's Bay.
- Bela pingeli* (Moller) 1842.
 Eastport, 20 to 90 fath. (Verrill); Eastport, 15 fath.
 (Winkley).
- Ringicula nitida*, Verrill, 1872.
 Gulf of Maine, 110 fath. "Bache" party, 1872
 (Verrill).
- Haminea solitaria* (Say).
Bulla solitaria, Gould, Stimpson.
Bulla insculpta, Totten.
 On the shores of Damariscotta Bay (E. P. Wentworth).
- Scaphander punctostriata* (Mighels and Adams).
Bulla puncto-striata, M. and A., 1842.
 Casco Bay (Mighels, Kingsley); Portland Harbor
 (Fuller); outside Casco Bay, 50 to 95 fath.
 (Verrill).
- Cylichna alba* (Brown), 1827.
Bulla triticea, Couthouy, 1838.
 Whole coast of Maine.
- Diaphana debilis* (Gould).
Bulla debilis, Gould, 1841; Stimpson, 1851.
 Casco Bay to Grand Manan.
- Diaphana hiemalis* (Couthouy).
Bulla hiemalis, Couthouy, 1839.
 Casco Bay to Grand Manan.
- Retusa gouldi* (Couthouy), 1839.
Utriculus gouldi, Gould, 1870.
Cylichna gouldi, Verrill.
 Casco Bay to Penobscot Bay, rare.
- Retusa pertenuis* (Mighels), 1843.
 Whole coast of Maine.
- Retusa mayoi* (Dall), 1889.
 Portland (Chas. W. Johnson).
- Tornatina canaliculata* (Say), 1822.
Bulla obstricta, Gould, 1841.
 Portland Harbor (Fuller in P. S. N. H.).

Philine quadrata, S. Wood, 1839.

Philine formosa, Stimpson, 1851.

Casco Bay (Verrill, Kingsley); outside Casco Bay (Verrill); in deep water off coast of Maine (Stimpson).

Philine lima (Brown).

Bulla lineolata, Couthouy, 1839.

Philine lineolata, Stimpson.

Whole coast of Maine.

Philine angulata, Jeffreys.

Casco Bay (Kingsley).

Philine sinuata, Stimpson, 1850.

Casco Bay (Fuller in P. S. N. H.).

Philine fragilis, Sars.

Off Cape Sable, 90 fath. fine compact sand (Verrill).

Philine cingulata, G. O. Sars.

Off Cape Sable, 90 fath. (Verrill).

Philinae finmarchica, M. Sars.

Off Cape Sable, 90 fath. (Verrill).

Pteropoda (Free-swimming mollusks).

Limacina retroversa (Fleming), 1823.

Limacina balea, Moller, 1842.

Spirialis gouldii, Stimpson, 1851.

Heterofusus retroversus, Gould, 1870.

Casco Bay (Fuller in P. S. N. H., Kingsley); whole coast of New England north of Cape Cod (Stimpson).

Clione limacina (Phipps), 1773.

Clio borealis, Brug, 1792.

Clione papilionacea, Verrill, 1873.

Casco Bay (Kingsley); Portland Harbor (Fuller and D. W. Wood in P. S. N. H.).

Pædoclio doliiformis, Danforth, 1907.

Harpowell, Casco Bay, 1903 (J. S. Kingsley).

Nudibranchiata (Naked-gilled mollusks, without shells).

Alderia harvardiensis (Agassiz).

Canthopsis harvardiensis, Agassiz, 1850.

Grand Manan, "very common in sheltered, muddy bays, feeding on filamentous chlorosperms" (Stimpson).

- Æolidia papillosa* (Linné).
Doris papillosa, O. Fabricius, 1780.
Æolis farinacea, Stimpson, 1853.
Molgula papillosa, Verrill, 1871.
 Casco Bay (Kingsley); Eastport (Verrill).
- Coryphella mananensis* (Stimpson).
Æolis rufibranchialis, Gould, 1870.
 Whole coast of Maine.
- Coryphella diversa* (Couthouy).
Æolis diversa, Couthouy, 1839.
 Grand Manan (Stimpson).
- Coryphella rutila*, Verrill, 1879.
 Eastport (Verrill).
- Coryphella stimpsoni*, Verrill, 1882.
Couthona atimpsoni, Verrill, 1879.
 Eastport, low-water mark (Verrill); Jeffreys Ledge,
 51 fath.
- Æolis stellata* (Stimpson), 1853.
 Grand Manan (Stimpson).
- Æolis purpurea* (Stimpson), 1853.
 Grand Manan, at Duck Island under stones, at low-
 water mark (Stimpson).
- Tergipes despectus* (Johnston).
Eolis despecta, Johnston.
 Casco Bay (Verrill, Kingsley); five miles southwest
 of Seguin (Verrill).
- Doto coronata* (Gmelin).
 Casco Bay (Verrill, Kingsley); five miles southwest
 of Seguin (Verrill); off Duck Island, Grand Manan,
 15 fath. (Stimpson).
- Doto formosa*, Verrill, 1875.
 Eastport, low-water mark to 50 fath. (Verrill).
- Dendronotus arborescens* (Muller).
Tritonia reynoldsii, Couthouy, 1838.
 Kennebunk to Eastport.
- Dendronotus robustus* (Verrill), 1882.
Heterodoris robustus, Verrill, 1879.
 Casco Bay (Kingsley); Eastport and Grand Manan
 (Verrill).

- Cadlina repanda* (Alder and Hancock).
Doris panulata, Stimpson, 1853.
 Casco Bay to Passamaquoddy Bay.
- Acanthodoris pilosa* var. *bifida* (Verrill).
Doris bifida, Verrill.
 Eastport, under stones at low-water mark (Verrill).
- Acanthodoris ornata*, Verrill, 1879.
 Eastport, at low-water mark (Verrill).
- Acanthodoris stellata* var. *bifida* (Verrill).
Doris stellata, Gmelin.
Doris bifida, Verrill, 1870, 1882.
 New Haven to Eastport (Verrill).
- Acanthodoris citrina*, Verrill, 1879.
 Eastport, low-water mark (Verrill).
- Adalaria proxima* (Alder and Hancock).
Doris proxima, A. and H.
 Eastport (Verrill and Smith).
- Lamellidoris bilamellata* (Linné).
Doris liturata, Stimpson, 1860.
 Casco Bay, "common and of large size near the old mill at the entrance of Basin Cove" (Kingsley).
- Lamellidoris diaphana* (Alder and Hancock).
Onchidoris diaphana, Verrill, 1882.
 Eastport, not uncommon at low-water mark, under stones (Verrill).
- Lamellidoris muricatus* (Muller).
 Eastport, low-water mark (Verrill).
- Lamellidoris tenella* (Agassiz) Gould.
Doris tenella, Agassiz, 1850.
 Near Eastport, under stones in a large pool, at low-water mark (Verrill).
- Lamellidoris grisea* (Stimpson) Gould.
 Near Eastport with *tenella*, but more common (Verrill).
- Idaliella pallida* (Agassiz), Gould.
Proctaporia fusca, Stimpson, 1860.
Amæroecium pallidum, Verrill, 1873.
 Casco Bay (Verrill, Kingsley); five miles southwest of Seguin (Verrill); Eastport, 20 fath. (Verrill).

Issa lacera (Muller).

Cashes Ledge, 25 fath. (Verrill).

Palio lessoni (d'Orbigny).

Polycera lessoni, d'Orbigny.

Casco Bay (Verrill, Kingsley); outside Casco Bay
(Verrill); five miles southwest of Seguin (Verrill).

Ancula sulphurea, Stimpson, 1853.

Grand Manan (Stimpson).

Cephalopoda (Squids, Cuttlefish).

Polypus arcticus (Prosch), 1849.

Octopus bairdii, Verrill, 1873.

Outside Casco Bay, 50 to 95 fath., muddy bottom
(Verrill).

Loligo pealii, Lesueur, 1821.

Casco Bay (Kingsley); Deer Isle, Hancock county,
taken in a weir (Norton).

Ommastrephes illecebrosus, Lesueur.

Loligo illecebrosa, Stimpson, 1851.

Whole coast of Maine.

Stolotenthis leucoptera (Verrill).

Gulf of Maine, 110 fath. (Verrill).

FRESH-WATER SPECIES.

Pelecypoda.

Unionidæ (Fresh water mussels).

Lampsilis cariosus (Say), 1816.

Unio cariosus, Gould, 1841, 1870.

Reported from Knox, Lincoln and Penobscot counties.

Lampsilis ochraceus (Say), 1816.

Kennebec and Penobscot rivers; Knox and Lincoln
counties.

Lampsilis radiatus (Gmelin), 1792.

Cumberland, Oxford and Penobscot counties.

Strophitus undulatus (Say).

Anodonta undulata, Say, 1816.

Anodon undulata, Gould, 1870.

Androscoggin river at Bethel, Oxford county (E. W.
Roper in B. S. N. H.).

Anodonta cataracta, Say, 1816.

Anodonta fluviatilis, Stimpson, Morse.

Anodon fluviatilis, Gould.

Cumberland county, North Haven, Knox county
(Henry Jackson, Jr.).

Anodonta marginata, Say, 1816.

Anodonta fragilis, Lamarck, 1819.

All over the State.

Anodonta implicata, Say, 1829.

Cumberland, Oxford, Knox, Piscataquis counties.

Mighels reported this species from a pond near Eastport in
1843.

Alasmidonta undulata (Say), 1816, Say, 1818.

Strophitus sculptilis, Stimpson, Morse.

Margaritana undulata, Gould, 1870.

All over the State, in ponds and rivers.

Alasmidonta marginata (Say) 1819.

Alasmodon marginata, Gould, 1841.

Margaritana marginata, Gould, 1870.

"Often found but not plentiful" (Mighels, 1843);
(Morse, 1864 list); Westbrook, Cumberland county
(Rev. E. C. Bolles in P. S. N. H.).

Margaritana margaritifera (Linné), 1758.

Alasmodonta arcuata, Gould, 1841.

Margaritana arcuata, Stimpson, Morse, Gould, 1870.

All over the State in rocky and muddy brooks.

Unio complanatus (Solander), (Dillwyn, 1817).

Everywhere throughout the State.

Sphæriidæ.

Sphærium sulcatum (Lamarck).

Cyclas sulcata, Lamarck, 1818.

Cyclas similis, Mighels, Stimpson.

All over the State.

Sphærium striatum (Lamarck).

Fish and Saint John rivers, Aroostook county, abundant on rocky bottoms (Nylander).

Sphærium striatum var. *acuminatum* (Prime).

Eagle Lake, Aroostook county (Morse, 1864 list).

- Sphærium rhomboideum* (Say), 1822.
Cyclas rhomboidea, Prime, 1853.
Cyclas elegans, Gould, 1841.
 Kennebunk, York county (Fuller in P. S. N. H.);
 Aroostook county (Nylander).
- Musculium transversum* (Say).
 Stroudwater river, Cumberland county (Norton).
- Musculium partumeium* (Say).
Cyclas partumeia, Mighels, 1843.
Sphærium partumeium, Morse, 1864.
 Great Pond, Cape Elizabeth, Cumberland county
 (Fuller in P. S. N. H.); a brook South Newcastle,
 Lincoln county (Mrs. Wentworth); North Haven,
 Knox county (Henry Jackson, Jr.).
- Musculium partumeium* var. ————
 ("A form, variety or even species, known also from R. I.
 and Ohio," Dr. Sterki.)
 Muddy pond in field, Warren, Knox county (Ler-
 mond).
- Musculium truncatum* (Linsley).
Cyclas calyculata, Mighels, 1843.
 Running brooks, under stones (Mighels); "Maine"
 (Prime in Morse's 1864 list); Aroostook river,
 Aroostook county (Wentworth).
- Musculium securis* (Prime), 1852.
 All over the State.
- Musculium securis* var. *cardissum* (Prime).
 Pout pond, Westbrook, Cumberland county (Norton
 and P. S. N. H.); Square lake and Fish river,
 Aroostook county, sandy bottom (Nylander).
- Musculium tenuis* (Prime), 1851.
Sphærium tenue, Morse, 1864.
 Androscoggin (Prime in Morse's 1864 list); Andros-
 coggin (Prime in his Monograph, 1865).
- Pisidium virginicum* (Gmelin).
Cyclas dubia, Say, 1817.
Pisidium dubium, Gould, 1850; Prime, 1852.
Corneocyclas virginicum, Baker, 1906.
 Morse's list, 1864; two specimens in Dr. V. Sterkis
 collection, from Saco, York county, sent him by
 • Roper.

- Pisidium compressum*, Prime.
All over the State.
- Pisidium compressum* var. *altile* (Anthony).
Cyclas altilis, Anthony, 1847.
Westbrook, Cumberland county (Norton).
- Pisidium fallax*, Sterki.
Aroostook river, rare (Nylander).
- Pisidium fallax* var. *errans*, Sterki.
Pisidium fallax var. *septentrionale*, Sterki.
Aroostook and Little Madawaska rivers (Nylander).
- Pisidium punctatum*, Sterki.
Portage lake and Little Madawaska river, rare
(Nylander).
- Pisidium variabile*, Prime, 1851.
Cyclas nitida, Mighels and Adams, 1842.
All over the State.
- Pisidium æquilaterale*, Prime.
All over the State.
- Pisidium adamsi*, Prime.
Cyclas nitida, Mighels, 1841.
All over the State.
- Pisidium henslowanum*, Sheppard.
Aroostook county, two young specimens, apparently
rare, collected by O. Nylander (Sterki).
- Pisidium noveboracense*, Prime.
Buckfield, Oxford county (John A. Allen); Fogelins
lake, Aroostook county (in Bryant Walker's collec-
tion, received from Nylander).
- Pisidium succineum*, Sterki.
Mud pool in old lime quarry, Thomaston, Knox county
(Lermond).
- Pisidium walkeri*, Sterki.
Aroostook county (Nylander).
- Pisidium mainense*, Sterki.
Aroostook county (Nylander).
- Pisidium roperi*, Sterki.
Dennysville, Washington county (Bryant Walker);
Aroostook county (Nylander).

- Pisidium streator*, Sterki.
Hebron, Oxford county (John A. Allen).
- Pisidium abditum*, Haldeman, 1841.
Cyclas minor, Mighels and Adams, 1842.
All over the State.
- Pisidium politum*, Sterki.
Portage and Cross lakes, Aroostook county, rare
(Nylander).
- Pisidium subrotundum*, Sterki.
Aroostook county (Nylander).
- Pisidium splendidulum*, Sterki.
Knox county (Lermond); Aroostook county (Nylander).
- Pisidium splendidulum* var. ————
Muddy duck pond in field, Warren, Knox county
(Lermond).
- Pisidium milium*, Held.
Aroostook county, seems to be rare (Nylander).
- Pisidium imbecille*, Sterki.
Aroostook county (Nylander).
- Pisidium rotundatum*, Prime.
Lincoln county (Mrs. Wentworth); Aroostook county
(Nylander).
- Pisidium ventricosum*, Prime.
Aroostook county (Nylander).
- Pisidium vesiculare*, Sterki.
Aroostook county, rare (Nylander).
- Pisidium ferrugineum*, Prime.
Reported from York, Oxford, Knox, and Aroostook
counties.
- Pisidium medianum*, Sterki.
Barren Brook bog, Aroostook county (in Bryant
Walker's collection, received from Nylander).
- Pisidium medianum* var. *minutum*, Sterki.
Aroostook county (Nylander).
- Pisidium pauperculum*, Sterki.
Aroostook county (Nylander).
- Pisidium pauperculum* var. *nylanderi*, Sterki.
Dredged off Oak Point, Portage lake, Aroostook
county (Nylander).

Pisidium pauperculum var. ———

Meadow brook, Rockland, Knox county, only two specimens (Lermond).

Gastropoda.

Campeloma decisa (Say), 1817.

Paludina decisa, Mighels, Stimpson.

Melantho decisa, Morse, Gould.

Everywhere throughout the State.

Campeloma rufum (Haldeman), 1841.

South pond, in 20 to 40 feet of water, Buckfield, Oxford county (John A. Allen).

Valvata sincera, Say, 1824.

Aroostook county (Nylander).

Valvata sincera var. *nylanderi*, Dall, 1905.

Portage lake, Aroostook county, dredged in 18 to 25 feet of water (Nylander).

Valvata tricarinata (Say), 1817.

Sagadahoc, Knox, Penobscot and Aroostook counties.

Amnicola limosa (Say), 1817.

All over the State.

Amnicola limosa var. *porata*, Say, 1821.

Amnicola orbiculata, Lea, 1844.

All over the State.

Amnicola limosa var. *pallida*, Haldeman, 1842.

Amnicola lustrica, Adams, 1842; Mighels, 1843.

Amnicola pallida, Gould, 1870.

Found sparingly in small streams and springs at several localities (Mighels); Saco, York county (Wentworth); Dyers river, South Jefferson, Lincoln county (Mrs. Wentworth).

Lyogyrus pupoidea (Gould).

Valvata pupoidea, Gould, 1840; Mighels, 1843.

Monmouth, Kennebec county (Dr. True in Mighels' 1843 list); "occurs rarely in the southern portion of the State" (Morse 1864 list) Orono, Penobscot county (Anson Allen).

Ancylus borealis, Morse, 1864.

Patten, Penobscot county (John M. Gould in Morse's 1864 list); St. John river at Fort Kent, Aroostook county (Nylander).

- Ancylus rivularis*, Say, 1819.
York, Cumberland, Lincoln, Knox, and Penobscot counties.
- Ancylus parallelus*, Haldeman, 1844.
All over the State.
- Ancylus tardus*, Say, 1840.
Aroostook river at Caribou, plentiful (Nylander).
- Ancylus ovalis*, Morse, 1864.
Androscoggin river at Bethel, Oxford county (John M. Gould and Morse).
- Ancylus pumilus*, Sterki, 1904.
Orono, Penobscot county, a few specimens in Bryant Walker's collection received from Anson Allen.
- Lymnæa columella*, Say, 1817.
Radix columella, Morse, 1864.
Reported from York, Cumberland, Oxford, Knox, and Penobscot counties.
- Lymnæa columella* var. *chalybea*, Gould, 1870.
Mud pool in old lime quarry, Thomaston, Knox county (Lermond).
- Lymnæa columella* var. *macrostoma*, Gould, 1841.
Brook flowing from Crawford's into Seven-tree pond at South Union, Knox county, season of 1908 (Lermond).
- Lymnæa umbilicata*, Adams.
Limnæa caperata, W. G. Binney, 1865.
Buckfield, Oxford county, 3 or 4 specimens in an isolated spring, none found there this season, 1907 (John A. Allen); North Haven, Knox county (Henry Jackson, Jr.).
- Lymnæa desidiosa*, Say, 1821.
Lymnæa obrussa, Say, 1825.
Limnophysa desidiosa, Morse, 1864.
All over the State.
- Lymnæa desidiosa* var. *decampii*, Streng, 1896.
Barren Brook bog, Caribou, Aroostook county (in Bryant Walker's collection, received from Nylander).

Lymnæa desidiosa var. *modicella*, Say, 1825.

Woodland, Aroostook county (in Bryant Walker's collection, received from Nylander).

Lymnæa humilis, Say, 1822.

Everywhere throughout the State.

Lymnæa parva, Lea, 1841.

Limnæa curta, Lea, 1841.

Not yet recorded from Maine, but Baker in *Nautilus*, Vol. 18, page 126, gives its range as from Maine to California.

Lymnæa catascopium, Say, 1817.

Reported from Kennebec, Sagadahoc, Penobscot and Aroostook counties.

Lymnæa caperata, Say, 1829.

Kennebunkport, York county (Geo. H. Clapp); Ironbound Island, Frenchman's Bay, Hancock county (Blaney).

Lymnæa palustris, Muller, 1822.

Limnæus elodes, Say, 1821.

Limnæa umbrosa, Say, 1832.

Reported from Cumberland, Kennebec, Knox, Somerset and Aroostook counties.

Lymnæa decollata, Mighels, 1841.

"Maine" (Mighels, Roper in B. S. N. H.); Unity, Waldo county (Dr. Milliken in Mighels' 1842 and 1843 lists); Penobscot river (Willis collection in P. S. N. H.); Lincoln, Penobscot county (B. S. N. H. and Cambridge Museum).

Lymnæa decollata var. *oronoensis*, Baaer.

Orono, Penobscot county (in Bryant Walker's collection, received from Anson Allen).

Lymnæa emarginata, Say, 1821.

Sebago lake, Cumberland county (Norton and Haskell); Sebec lake, Piscataquis county (Roper in B. S. N. H.); Aroostook county (Nylander).

Lymnæa mighelsi, Binney, 1865.

Limnæa ampla, Mighels, 1843.

Radix ampla, Morse, 1864.

Aroostook county.

- Planorbis bicarinatus*, Say, 1817.
Helisoma bicarinatus, Morse, 1864.
 Common all over the State.
- Planorbis bicarinatus* var. *aroostookensis*, Pilsbry, 1894.
 Aroostook county (Nylander).
- Planorbis bicarinatus* var. *striatus*, Baker, 1902.
 Fish River lakes, Aroostook county (Nylander).
- Planorbis trivolvis*, Say, 1817.
Planorbis trivolvis var. *fallax*, Halderman, 1844.
Planorbis megastoma, DeKay, 1843.
Planorbis lentus, Morse, 1864.
 Reported from Cumberland, Oxford, Waldo and
 Aroostook counties.
- Planorbis campanulatus*, Say, 1821.
Planorbella campanulatus, Say, 1821.
 All over the State.
- Planorbis exacutus*, Say, 1821.
Menetus exacutus, Morse, 1864.
 Reported from Oxford, Knox and Aroostook counties.
- Planorbis parvus*, Say, 1817.
Planorbis elevatus, Adams, Gould, Mighels.
Gyraulus parvus, Morse, 1864.
 All over the State.
- Planorbis dilatatus*, Gould, 1841.
 "A few specimens only have been found in Harrison,
 Cumberland county" (Morse, 1864 list).
- Planorbis crista* var. *cristata*, Draparnaud, 1805.
 Barren brook, Caribou, Aroostook county, "a very
 small shell and hard to locate" (Nylander).
- Segmentina armigera* (Say).
Planorbis armigerus, Say, 1818.
 Common all over the State.
- Physa ancillaria*, Say, 1825.
Physa vinosa of authors, not of Gould.
Physa fragilis, Mighels, 1842; Morse, 1864.
 All over the State.
- Physa sayii*, Tappan, 1839.
 Aroostook county (Nylander).

Physa sayii var. *warreniana*, Lea, 1866.

Reported only from York, Knox and Aroostook counties.

Physa heterostropha (Say), 1817.

Common in all parts of the State.

Physa gyrina (Say), 1821.

Reported only from Kennebec and Knox counties.

Physa elliptica, Lea, 1834.

Aroostook county (in Bryant Walker's collection, received from Nylander).

Aplexa hypnorum (Linné), 1758.

Physa elongata, Say, Gould, Stimpson.

Physa hypnorum, Haldeman, Mighels.

Nauta elongata, Morse, 1864.

Bulinus hypnorum, W. G. Binney, 1865.

Bulinus elongatus, Gould, 1870.

All over the State.

LAND SPECIES.

Alexia myosotis, Draparnaud.

Auricula denticulata, Gould, 1841.

Tralia (*Alexia*) *myosotis*, Dall, 1903.

Portland (Dr. Parsons and Fuller in P. S. N. H.);
"found in the interstices of a sea-wall in Portland Harbor, at low tide" (Morse).

Melampus lineatus, Say.

Melampus bidentatus, Say, 1822.

Auricula bidentata, Gould, 1841.

In the vicinity of Portland (Morse, Fuller, Lee and Wentworth); banks of the New Meadows river, Brunswick (Prof. Lee, Norton and Lermond).

Carychium exiguum (Say).

Pupa *exigua*, Say, 1822.

Bulinus exiguus, Binney, 1851.

Found throughout the State.

Carychium exile, H. C. Lea, 1841.

Hebron and Buckfield, Oxford county (John A. Allen); Aroostook county, common (Nylander).

- Carychium exile* var. *canadense*, Clapp, 1906.
Reported from York, Waldo, Penobscot and Aroostook counties.
- Cochlicopa lubrica* (Muller).
Helix lubrica, Muller, 1774.
Zua lubricoidea, Morse, 1864.
Cionella sub-cylindrica, Gould, 1870.
Ferussacia subcylindrica, W. G. Binney, 1885.
Bulimus lubricoides, Stimpson, 1851.
All over the State.
- Vallonia excentrica*, Sterki, 1893.
Reported from Cumberland, Knox, Hancock, Penobscot and Aroostook counties.
- Vallonia pulchella* (Muller) 1774.
Helix minuta, Say, 1817.
Vallonia minuta, Morse, 1864.
All over the State.
- Vallonia costata* (Muller), 1774.
Reported from Kennebec, Knox, Lincoln, and Hancock counties.
- Acanthinula harpa* (Say).
Helix harpa, Say, 1824.
Pupa costulata, Mighels, 1844.
Bulimus harpa, W. G. Binney, 1865.
Zoogenites harpa, Morse, 1864.
Reported from Cumberland, Oxford, Kennebec, Knox, Waldo, Hancock and Aroostook counties.
- Strobilops labyrinthica* (Say), 1817.
Reported from Cumberland, Oxford, Knox, Penobscot and Aroostook counties.
- Strobilops affinis*, Pilsbry, 1893.
Bethel, Oxford county (Wentworth).
- Strobilops virgo*, Pilsbry, 1892.
Reported from York, Oxford, Knox, Penobscot, and Piscataquis counties.
- Pupoides marginatus* (Say).
Cyclostoma marginata, Say, 1821.
Pupa falla, Say, 1825; Gould, 1870.
Leucocheila fallax, Pilsbry, 1898.
Westbrook, Cumberland county (Norton).

- Bifidaria corticaria* (Say).
Odostomia corticaria, Say, 1817.
Leucochila corticaria, Morse, 1864.
Pupa corticaria, W. G. Binney, 1885.
 Cumberland and Oxford counties.
- Bifidaria contracta* (Say), 1822.
 Cumberland, Oxford and Penobscot counties.
- Bifidaria tappaniana* (C. B. Adams), 1842.
 Oxford, Knox, Penobscot and Aroostook counties.
- Bifidaria pentodon* (Say), 1821.
Pupa curvidens, Gould, 1841; Mighels, 1843.
 All over the State.
- Pupilla muscorum* (Linné), 1758.
Pupa badia, Adams, Gould, Binney,
 Found in all the coast counties.
- Pupilla muscorum* var. *unidentata*, Pfeiffer, 1821.
 Thomaston, Knox county (Lermond).
- Vertigo milium* (Gould), W. G. Binney, 1885.
 Reported from York, Cumberland, Oxford, Kennebec
 and Penobscot counties.
- Vertigo ovata* (Say), 1822.
Pupa modesta, Say, Gould, Mighels.
 Cumberland, Oxford, Kennebec, Lincoln and Penob-
 scot counties.
- Vertigo ventricosa* (Morse), 1865.
 Cumberland, Oxford, Hancock, Penobscot and Aroos-
 took counties.
- Vertigo ventricosa* var. *elator*, Sterki, 1894.
 Oxford, Knox, Hancock and Aroostook counties.
- Vertigo gouldi* (Binney), 1843.
 York, Cumberland, Knox, Hancock and Aroostook
 counties.
- Vertigo gouldi* var. *paradoxa*, Sterki, 1900.
 Woodland, Aroostook county, rare (Nylander).
- Vertigo bollesiana* (Morse), 1865.
 York, Oxford, Hancock, Penobscot and Aroostook
 counties.
- Vertigo tridentata*, Wolf, 1870.
 Quebec and Maine (Pilsbry, 1898 list).

- Vertigo pygmæa* (Draparnaud), 1801.
Vertigo callosa, Sterki, 1890.
 Gardiner, Kennebec county (Mrs. E. P. Wentworth);
 Newcastle, Lincoln county (Wentworth).
- Succinea ovalis*, Say, 1817.
Succinea obliqua, Say, 1824; Stimpson, 1851; Gould, 1870.
Succinea campestris, Gould, 1841; Mighels, 1843.
 All over the State.
- Succinea ovalis* var. *tottenhamiana*, Lea, 1841.
 All over the State.
- Succinea retusa*, Lea, 1837.
Succinea ovalis, Gould, Mighels, Morse.
 All over the State.
- Succinea avara*, Say, 1822.
Succinea wardiana, Lea, 1841.
Succinea vermeta, Tryon, 1866.
 All over the State.
- Philomycus carolinensis* (Bosc).
Limax marmoratus, DeKay, 1839.
Limax togata, Gould, 1841.
Tebennophorus carolinensis, Morse, Gould.
 York, Oxford and Aroostook counties.
- Philomycus dorsalis*, Binney, 1842.
Pallifera dorsalis, Morse, 1864.
 Kennebunkport (Clapp); Aroostook county (Nylander).
- Arion circumscriptus*, Johnston.
Limax fasciatus, Nilsson, 1822.
Arion fuscus, Morse, 1864.
 Kennebunkport, York county (Clapp); on a stone wall, Elm St., Portland (Norton and Lermond); Thomaston, Knox county, common under stones, planks, logs, etc. (Lermond).
- Pyramidula alternata* (Say).
Helix alternata, Say, 1817.
Patula alternata, W. G. Binney, 1885.
 All over the State.
- Pyramidula cronkhitei anthonyi*, Pilsbry, 1907.
Pyramidula striatella, Anthony, 1840.
Patula cronkheitei, Tryon, 1866.
 Common everywhere throughout the State.

- Pyramidula asteriscus* (Morse), 1857.
Planogyra asteriscus, Morse, 1864.
 Cumberland, Oxford, Kennebec, Penobscot and Aroostook counties.
- Helicodiscus parallelus* (Say).
Helix lineata, Say, 1817.
Planorbis parallelus, Say, 1821.
Hyalina lineata, Gould, 1870.
 All over the State.
- Punctum pygmæum* (Draparnaud), 1801.
Punctum minutissimum, Morse, 1864.
Microphysa pygmæa, W. G. Binney, 1885.
 Reported from York, Cumberland, Oxford, Hancock, Penobscot and Aroostook counties.
- Sphyradium edentulum* (Draparnaud).
Pupa edentula, Draparnaud, 1805.
Isthmia simplex, Morse, 1864.
Pupa simplex, Gould, 1840.
Vertigo simplex, Stimpson, Morse, Gould.
 Reported from York, Oxford, Hancock, Penobscot and Piscataquis counties.
- Limax maximus*, Linné, 1758.
 Bar Harbor, Hancock county (J. B. Henderson, Jr.).
- Limax flavus*, Linné, 1758.
Limax variegatus, Binney, 1851.
 "Occurs rarely in Portland" (Morse, 1864 list).
- Agriolimax agrestis* (Linné), 1758.
Limax agrestis, Morse, Gould.
 Reported from York, Oxford, Knox and Hancock counties.
- Agriolimax campestris* (Binney), 1841.
 Reported from Oxford, Knox and Hancock counties.
- Vitrina limpida*, Gould, 1850.
Vitrina pellucida, C. B. Adams, 1842; Binney, 1851.
 All over the State.
- Vitrea cellaria* (Muller), 1774.
Hyalina cellaria, Morse, 1864; Sterki, 1907.
 Portland (Morse, 1864 list); Saco, York county (Winkley); Castine, Hancock county (Wentworth).

- Vitrea hammonis* (Strom), 1765.
Hyalina radiatula, Alder, 1830.
Helix electrina, Binney, Gould, Mighels.
Zonites viridulus, W. G. Binney, 1885.
 All over the State.
- Vitrea binneyana* (Morse), 1864.
 All over the State.
- Vitrea ferrea* (Morse), 1864.
 All over the State.
- Vitrea indentata* (Say), 1822.
 From all the counties except Aroostook.
- Vitrea rhoadsi*, Pilsbry, 1899.
 Kennebunkport (Henderson and Clapp); Buckfield
 (John A. Allen); South Portland (Wentworth).
- Vitrea multidentata* (Binney), 1840.
 "A few specimens have been found in Cumberland and
 Oxford counties" (Morse, 1864 list); Buxton, York
 county (Fuller in P. S. N. H.).
- Vitrea lamellidens* (Pilsbry).
 Buckfield, Oxford county (John A. Allen).
- Euconulus fulvus* (Muller), 1774.
 All over the State.
- Euconulus chersinus polygyratus* (Pilsbry), 1899.
Helix chersina, Say, 1821; Morse, 1867.
 All over the State.
- Zonitoides nitidus* (Muller).
Helix nitida, Muller, 1774.
 Bar Harbor, Hancock county (Geo. H. Clapp).
- Zonitoides arboreus* (Say).
Helix arborea, Say, 1817.
 Common everywhere throughout the State.
- Zonitoides minusculus* (Binney).
Helix minuscula, Binney, 1840.
 Kennebunk, York county (Fuller in P. S. N. H.); near
 Portland (Morse; Fuller in P. S. N. H.); Rock-
 land, Knox county, one specimen in an old lime
 quarry (Lermond); North Haven, Penobscot Bay,
 extremely rare (Henry Jackson, Jr.).
- Zonitoides exiguus* (Stimpson).
Helix exigua, Stimpson, 1850.
 All over the State.

Zonitoides milium (Morse), 1859.

Generally distributed over the State, but rare.

Circinaria concava (Say), 1821.

Over the State but rare.

Helix hortensis, Muller, 1774.

Helix sub-globosa, Binney, 1837.

Helix nemoralis, Fuller, 1862.

On islands along the coast.

Hygromia hispida (Linné), 1758.

Rockland and Thomaston, Knox county (Lermond).

Polygyra sayana, Pilsbry, 1907.

Helix sayi, Binney, 1840.

Mesodon sayii, Morse, 1864.

All over the State.

Polygyra albolabris (Say), 1817.

All over the State.

Polygyra dentifera (Binney), 1840.

Reported only from Oxford, Piscataquis and Aroostook counties.

Polygyra thyroides (Say), 1817.

"Maine" (Fuller in P. S. N. H.); Dr. Jackson's 1837 list.

Polygyra fraterna (Say), 1824.

Stenotrema monodon, Morse, 1864; W. G. Binney, 1885.

Helix monodon, Gould, 1870.

Polygyra monodon, Pilsbry, 1898.

Common all over the State.

EXTRACTS FROM CATTLE COMMISSIONERS' REPORT.

During the years 1907-08, there have been condemned and destroyed by your Commissioners as follows:

	Cattle.	Horses.	Total.	Sheep.
1907	802	68	870	56
1908	925	111	1,036	51
	<hr/>	<hr/>	<hr/>	<hr/>
Total	1,727	179	1,906	107
Business done and paid for, 1907.....			\$25,346	95
Business done and paid for, 1908.....			25,000	00
Business not paid for, 1908.....			21,827	63
			<hr/>	<hr/>
Total business, 1907-08.....			\$72,174	58

AVERAGE COSTS FOR ANIMALS.

	1903-04	1905-06	1907-08
Cattle and horses.....	\$33 98	\$35 48	\$37 87
Owner received	22 07	23 34	25 03
Cost to condemn.....	11 91	12 14	12 84

“Cost to condemn” covers all expense, of every nature, except the actual payment to the owner, which has increased in six years \$2.96 per animal.

This cost has gradually risen, on account of the increasing of the tuberculin test to pure blood herds, more thorough disinfecting of premises where disease is found, and more investigation, and has increased in six years 91 cents per animal.

During the two years, 130 head of cattle were destroyed at Brighton, the owners calling on the Commission to pay for the same, under the law of 1907, costing the State, \$3,220.00.

There has been a large increase in the work of the department within the last few years, so much so, that from a financial standpoint, it has become one of the most important departments of the State. This increase has been brought about by an increased demand made upon the Commissioners, by boards of health of the large cities and towns, demanding a certificate of health from owners of herds sending milk and cream to these communities.

Also dairymen in all sections of the State are testing their herds in order to ascertain whether or not tuberculosis exists among the animals, realizing the danger of this trouble in the herd to the rest of the animals.

Another feature was added to the work, by the passage of the law of 1905, requiring the testing of pure blood animals.

This law has done very much to reduce tuberculosis in the State, going as it does, to the fountain head. Four years ago, there was shown to be 20% among these herds, diseased, while this year it has dropped to less than 5%. The law has been shown to be a success and should be kept in force.

As to the investigation of grade herds, public sentiment is so strong among both dairymen and consumers in favor of healthy cattle and dairy products, that there seems to be no possible way to retrench in the department at the present time.

I am aware that there will be an effort made at the coming legislature, to increase the work of the Commission, which will add more expense to the department. The last two years, the Commissioners have spent the appropriation of \$50,000 and have created a deficiency of \$21,827.63. This deficiency could easily have been enlarged to two or three times its size, had the Commissioners lent willing and encouraging ear to the many applications for work along the line of investigation. There is a strong sentiment in the State for a general test, a general law requiring all cattle to be tested. This would mean the eradication of the disease from our herds, and while it would be a result greatly to be desired, it is one of such large proportions, both financially and physically that it is very doubtful if any legislature would lend its sanction and aid to the proposition.

That the State should do more than it is doing is self evident, or what has been done is a total loss. There are large sections of the State where there is practically no disease. The work of

the Board has been confined to the worst infected part, as there is where boards of health have demanded that the most work be done.

This last year many new sections of the State have been gone over as well as the old districts covered by the Portland milk supply, where testing has been going on for some three years and where the percentage has fallen from 6 to 2%.

There have been nearly 25,000 head tested the last year, being about 5,000 more than the previous year. Each year sees an increase in this direction.

The United States government furnish your Commission with tuberculin, free, to help carry on the work, and have expressed their gratification in many ways, at the amount of work being done.

There is at the present time a demand being made by many states that the government take the matter in charge and make a sweeping test of all the live stock in the country, on account of the disinclination of many states to make appropriations. It is not for us in Maine to wait for any such movement to mature, as we are much freer from the disease than any other state in the Union, and should keep so.

Every government in the civilized world is taking hold of this matter more energetically every year and the late International Congress on Tuberculosis, held in Washington in September, has intensified public interest in this country, to a high degree of endeavor, to eradicate it.

Your Commissioners believe that the sentiment in this State is in favor of the State paying for the testing of animals, such expense in the past having been borne by the owner, and having constituted one of the most serious matters of controversy between the owner and the board of health, in the enforcement of its "regulation."

They would be in favor of the State bearing this expense, whenever it was necessary, or in other words when application was made to the Board by the owner. We believe that such a proposition would be liberally taken advantage of and would be better than an enforced test. When any community through its board of health, demanded an examination of its milk supply, then the Cattle Commission could act, and escape the odium of the enforcement, making friends instead of enemies. There is

hardly a week but that some association, society or body, in this State and all over the country, deliberates, debates and resolves on this subject. Medical literature and expression abound with material on this line, and the Red Cross stamp is only the latest messenger to carry on the crusade which will never stop until the disease has been practically driven from both stable and home.

Late in the fall of 1906, tuberculosis was reported to exist in the insane hospital herd at Augusta. The Commissioners were called into council about January 1, 1907. Prior to this time the herd, consisting of 169 cattle, had been tested by reliable veterinarians, with the result that the entire herd re-acted under the tuberculin test, and by the advice of the Governor, the Commissioners met with the trustees of the institution, and after freely discussing the matter, the trustees voted to turn the herd over to the Cattle Commission, for them to do with as they thought best. This action of the trustees brought the matter before the Commission, giving them power to act, under the law, along the same line as though the herd had been owned by a private party.

There seemed to be a sentiment among some people that the Commissioners could discriminate somewhat upon the herd as it belonged to the State; but the Commissioners could not see it in that light, and the whole herd was condemned and destroyed, the institution paying for the slaughtering of the cattle and the labor for disinfecting the stables and receiving the proceeds from the cattle in the way of hides and carcasses, sold to the Portland Rendering Co., which amount was turned over to the institution.

The disinfecting of the barns was done in a very thorough manner and was looked after by the Commissioners from time to time and when the new stock was bought, Mr. Campbell consulted with the Commissioners and all new stock was tested before going into the stables. The first of December, 1908, all were re-tested and showed to be in sound condition.

MAINE DAIRYMEN'S ASSOCIATION MEETING.

The Maine Dairymen's Association held a meeting at Dexter December 10, 1908, and one day of the meeting was given over to the subject of bovine tuberculosis among our dairy herds. Great interest was taken in this part of the meeting and the consensus of opinion was that the most essential thing for successful dairying, was a healthy herd. There was no criticism offered against the present policy of Maine, in controlling tuberculosis. There was a feeling that expressed itself strongly, for an extension of the work, and in conversation with one member, he expressed himself by saying "We have got tuberculosis on the run, let's keep it going and drive it out. I see *now* that it can be done." At this meeting a vote was passed that it was the sense of the Association that the State should pay for the testing of all cattle whether pure blood or not.

THE INTERNATIONAL CONGRESS ON TUBERCULOSIS.

This congress was held in the city of Washington, September 28, 1908. Commissioners Deering and Beal were present and attended all the sessions of Section VII, which was the section devoted to bovine tuberculosis. It was the most interesting and important meeting ever held in this country on the subject of tuberculosis, both human and bovine. There were thirty-three countries represented by the most eminent scientists, men of world wide reputation, and the flower of scientific research and attainment. It was a liberal education in itself to meet with these men, listen to their papers and discussion of the same and talk with them freely upon disputed points.

Section VII, had its full quota of foreign delegates, and papers were also read by gentlemen from almost every state in this country. For the control of tuberculosis, tuberculin is used in every country and state, and its usefulness and reliability was recognized beyond question.

The principle is the same all over the world in handling and controlling the disease; but there is a difference in handling reacting animals. Some states destroy all reacting animals, others separate them from the healthy ones, keeping them isolated and pasteurizing the product, and selling it for what it

is and for what it will bring in competition with healthy cows' product, keeping this up until the disease wears the animal out and death thins out the diseased herd. This policy is more particularly confined to Denmark, and is called the Bang system after the originator, Prof. Bang. It is only because Denmark is a poor country and cannot afford to pay for all animals which are diseased, that such a system can be practiced. The government only pays for animals that show disease in the udder, which is claimed to be only one per cent of diseased animals, and such payments are only about \$15 on the average. Even in that country, their report shows a "sad falling off" in the number of cattle tested each year.

Dr. Baker of California, reported that upon twelve open ranges in the centre of that state, 41,000 cattle were tested and 9 1-2% were found diseased, and in the middle West they are as badly affected, both among their cattle and their hogs. Dr. Knowles of Helena, Montana, reported, "My observation justifies the assertion that tuberculosis of cattle cannot exist under open range conditions strictly speaking, especially in a high, dry altitude such as we have in Montana, where sunshine, the greatest of bacteria destroyers, is more abundant than it is in Egypt." And yet he says, "Under the semi-range conditions, the number of affected animals in a herd, (ordinarily consisting of from 300 to 1,000 cattle) will be relatively small,—five or six per cent; but where the shelter provided is enclosed on all sides, although the cattle are fed in an open lot, only using the sheds during the night, and in stormy weather, the percentage of infection is usually large—in fact nearly as great as though under close domestication." Dr. W. H. Dalrymple of Louisiana, reported, "The prevalence of and extent of tuberculosis in the southern states seemed to depend largely upon the condition and environment under which cattle exist and also upon the predominance or otherwise of the improved breeds. The genial climate of the southern states permitting an almost continuous out-of-door existence throughout the entire year, should afford ideal conditions for the maximum healthfulness in our cattle.

Reports from twelve southern states show—"That bovine tuberculosis is prevalent, and apparently on the increase. That the prevalence and increase are almost wholly amongst stabled or dairy cattle.

"That native or unstabled cattle, scrub cattle, are nearly free from infection."

Dr. A. D. Melvin, Chief of the Bureau of Animal Industry at Washington, reported that "The annual loss from tuberculosis among farm animals in this country, reaches the enormous total of \$14,000,000."

In France, the method of controlling tuberculosis is practically the same as in Maine.

GENERAL OBSERVATIONS.

In New Hampshire, only cattle that show physical evidence of the disease are destroyed, and yet they will not allow a Maine cow to enter that state unless she is found sound by the tuberculin test.

Massachusetts is a buyer of cattle and Maine is a seller. From 9,000 to 11,000 cattle are yearly shipped to the Brighton market and are tested by order of the chief of the cattle bureau, but during the last two years only 130 cattle from Maine were found diseased.

In California, Dr. Ward reports as follows: "The idea that the close housing of cattle during the winter in illy ventilated stables with restricted hours of exercise constitutes an important factor in the spread of tuberculosis, is quite prevalent in the colder portion of the United States.

"There it is quite generally believed that the climatic conditions prevailing in California discourage the spread of tuberculosis. This is based upon the assumption that the mild climate permitting greater freedom for the cattle, constitutes a powerful factor in the repression of the disease. Eastern cattle spend a large portion of the day in the winter in stanchions in the stable. This raises the question of ventilation, to secure for the cattle fresh air without the discomfort from drafts of air and cold. California cattle are stabled during the time of milking—say four hours a day—and then in structures built so cheaply that the problems of ventilation do not need consideration. Except during milking time, dairy cattle live a free life in the open air."

"We have tested 22 herds, containing 1,022 cows in all, of which 326 or 32% reacted."

So it seems that open range, or open air on dairy farms in California, does not insure against the trouble.

In New York state the same condition seems to exist and the various reports from there would indicate about the same percentage of disease as in California, or over 30%.

Pennsylvania and New Jersey also have their quota and the Cattle Commission of New Jersey claims that that state is the dumping ground for diseased cattle for the larger cities and states surrounding it, and that the Commission is powerless to prevent it as they have no laws bearing on the matter.

New York and Pennsylvania are controlling by destroying reacting animals and in a limited way by the Bang method and immunization of calves with bovo-vaccine. It has been generally supposed by the outsider, that the milk supply of New York City came from tuberculin tested animals; but according to Dr. Alfred Hess, of 107 samples taken at random from dealers, 16 per cent showed the bacilli of tuberculosis.

The same authority states that of "commercially pasteurized milk" eight samples were taken and one of them contained virulent tubercle bacilli. Pasteurized milk has for some time been held to be the ideal way to provide against infection from diseased milk and much money and effort have been spent to establish depots where such milk could be provided for the great mass of consumers. In New York City, through the efforts of Nathan Strauss, a philanthropist of large means, laboratories were founded in 1892 which are continued to the present day for the sale of such milk, and for the dissemination of information as to how to pasteurize milk at home, and for the sale of household apparatus for the home pasteurization of milk. That a great saving of infant life is made by the use of such milk, is distinctly shown by the figures relating to the infants' hospital at Randall's Island, N. Y., where the mortality in 1897, with raw milk, was 44% while in 1898, with pasteurization of the milk, it was only 19%. Yet medical opinion is at the present time distinctly against depending on the "pasteurization" method, for while it is all right when properly done, the value of the method depends upon the thoroughness of the individual, which in these days has been found to be almost a lost art. Milk that has been properly pasteurized is not so pala-

table, so nourishing or so digestible as raw milk and does not so well fill the bill for infants' food.

To an outsider it would seem that instead of spending so much time, effort and money skimming over the surface, establishing hugh depots here and there, hospitals and sanitoriums by the wholesale, the most commonsense proposition would be to commence at the root of the evil and get after the tuberculous cow. Yellow fever in the last 50 years has destroyed only 70,000 persons; but tuberculosis claims 150,000 every year as its own. Like the Minotaur of old, consuming his annual tribute of youths and maidens, so tuberculosis is annually calling for its victims and will continue until the elementary principle of destroying the source is put into effect. Athens paid her yearly tribute to the bull-headed monster with the flower of her young blood, until a Theseus arose to destroy. The world has gone mad over sanitation and sanitary science; but the bacillus of tuberculosis is just as deadly dressed up in a clean suit, as if it were dressed like a tramp. Clean tie-ups and clean cows should be insisted upon and a clean product will be the result; but no amount of cleanliness will ever make up for the diseased cow, and a Theseus is needed as badly today as ever in the olden times. The disease does not need washing, it needs destruction. If ever tuberculosis is brought under control among our herds, it will be after a crusade against the tuberculous cow.

SANITARY CONDITIONS.

Much has been said and done along sanitary lines by the Cattle Commissioners, in the way of remodeling tie-ups, adding more light and more space per animal and educating dairymen to a higher degree of cleanliness so far as we have the power by the law. We can only disinfect and clean up premises where disease is found, to which much more attention has been paid within the last few years, as experience has shown that if disease gets into a tie-up, it is there to stay unless driven out. New cattle put in there will become diseased and it is just as essential to disinfect as it is to destroy diseased animals. The cost of disinfection for the last two years has been about three per cent of the appropriations, and will continue fully as large if good work is to be done in the future. The following "Card" system has been established and whenever disease is found, the

amount of work to be done is agreed upon, the way it shall be done and the price to be paid. The "Card" is signed and returned to the Commissioner ordering the work, when it is completed and ready for inspection.

MAINE CATTLE COMMISSION.

F. O. Beal, Bangor.

John M. Deering, Secretary, Saco.

F. S. Adams, Bowdoinham.

This card must be returned to the Commissioner authorizing the work, when the disinfection is completed.

This is to certify that the disinfection ordered by you has been completed and is now ready for your inspection.

.....

Amount agreed upon.....

Directions for Disinfecting Cow Stables.

A thorough disinfection is necessary, and this should be practiced immediately after the diseased animals are removed from the stable.

In order to carry out such disinfection there should first be a thorough cleaning with brooms to remove all litter and dust, not only from the floor but from the walls, the ceiling, and all projections where dust may lodge.

All loose boards and decayed woodwork should be removed. In most tie-ups of the ordinary stable, a complete removal of all partitions, both in front and between the cows, and the putting in of new work is the surest way, and where extensive disease has been found, the only way of treating the matter safely. If this be not advisable, all the partitions and floors should be washed and scoured with a solution of hot lye. In fact, the whole interior of the stable should be sprayed with a disinfecting solution.

The woodwork should then be whitewashed with a lime wash made from freshly burned lime, containing four ounces of "formaldehyde" solution to the gallon. Corrosive sublimate and carbolic acid are often recommended for this purpose; but as both are dangerous poisons it is better to use lime wash and

formaldehyde solution, which probably are just as effective in destroying the tubercle bacillus. No work can be too thoroughly done, and nothing short of thorough work will do.

RUMFORD FALLS.

Early last March, the people of Rumford Falls Village Corporation became suspicious that their milk supply was not as good as it ought to be, and the Cattle Commission was requested to investigate the herds producing the milk. The commissioners met several gentlemen interested in the matter and explained that they had no right by the law to order testing done unless they were suspicious that disease existed. That in order to get the milk supply tested up the board of health would be obliged to pass a by-law, similar to the ordinance now in force in Portland, which is to the effect that unless milk is produced by tuberculin tested cows, it will not be allowed to be sold in the city.

The village corporation raised \$1,500 for the work, had the proper by-law passed, appointed a milk inspector at \$400 a year salary, furnished themselves with paraphernalia for testing milk and to do all other necessary work to demonstrate the quality of the milk and cream. The State Dairy Instructor was called and scored all tie-ups and gave instruction as to what should be done to improve conditions. The farmers were willing to do what was necessary and the work went on in a very satisfactory manner. The testing commenced in October, and at the present time nearly all the herds have been tested out with very small amounts of disease found.

GLANDERS IN HORSES.

There seems to be an increase in the disease among horses called "Glanders." Glanders or Farcy, is a specific contagious disease of horses attacking the nasal mucous membranes, the bones of the head and the lymphatic system throughout the body. It is quite rapidly fatal and is communicable to the human family, and from it there is no escape once it is contracted, as there is no known cure. During the last two years there have been condemned and destroyed 179 horses as compared with 128 the two previous years. The disease is mostly

found among team horses and especially among the horses in lumber camps, from which it is spread by the annual spring sale of such animals after the lumber season closes. Glanders and Farcy are one and the same disease only manifested in a different manner. When the specific poison enters the system, it may show itself first by attacking the lymphatics of the legs especially of the hind legs, and is then spoken of as farcy. If it attacks the mucous membrane of the head first, it is spoken of as glanders; but in either case it extends and runs from one into the other in time. It is liable to be confounded with chronic catarrh of the nasal passages, which it simulates. Owners of horses should be on the watch for this trouble as it is highly contagious both to horse and man. Veterinarians should promptly report suspicious cases, that they may be dealt with at an early stage.

FOOT AND MOUTH DISEASE.

This disease is also known as epizootic aptha, apthous fever, infectious aptha, etc., and may be defined as an acute, highly contagious fever of a specific nature, characterized by the eruption of vesicles, or blisters, in the mouth, around the coronets of the feet, and between the toes.

Symptoms:—In from three to six days after the exposure of the animal to the infection, the disease makes its appearance. It is first indicated by the animal suffering from a chill, quickly followed by an invasion of fever, which may cause the temperature to rise as high as 106 F. Following this in one or two days it will be noticed that small vesicles about the size of hemp seeds or a pea, are making their appearance upon the mucous membrane of the mouth at the border and upper surface of the tongue near the tip, the insides of the checks, on the gums and the inner surface of the lips, or on the margin of the dental pad. These little blebs contain a yellowish watery fluid and gradually become more extensive as the disease advances. Soon after the eruptions have appeared in the mouth of the animal it will be noticed that there is considerable swelling, redness and tenderness manifest about the feet, at the coronet, and between the digits of each foot. Eruptions similar to those within the mouth make their appearance upon these swollen regions of the foot a day or two later and at this stage it is

usual to find that like lesions have made their appearance upon the perineum of the victim. In cows, the udder and more particularly the teats show the same vesicular eruption. The attack upon the feet of an animal is frequently manifested in all four feet at once; but one or more of the feet may entirely escape and remain unaffected. As the feet become sore, the animal lies down persistently and bed sores develop which wholly baffle all attempts at treatment until after the patient has regained its feet.

While the disease is not very fatal (from 1 to 3 per cent) it destroys the usefulness of the animal for from two weeks to one year, and is quite fatal to young stock fed on the infected milk (from 60 to 80 per cent). It is highly infectious, easily disseminated, and the virus liable to live a saprophytic life for long periods. When an outbreak occurs, the owner should make every effort to keep other animals from coming in contact with his diseased cattle. The contagion is likely to spread rapidly by means of infected manure, hay and other feeds, by the feet of attendants, by dogs, cats and rats carrying it on their feet, by infected cars and other means hard to trace.

As the disease has appeared in Pennsylvania and some other states, your Commissioners decided to refuse permission to bring cattle from other states into Maine until such time as the federal authorities had got the disease under control. They therefore met at Bangor and issued the following notice.

BANGOR, MAINE, November 30, 1908.

Board of Cattle Commissioners in session:

Ordered: That in view of the fact that foot and mouth disease is reported in several middle and western states, the Maine Cattle Commission herewith discontinue granting permits, for the purpose of bringing into Maine any grade or pure blood cattle, until further notice.

The following two provisions should be made into law in this State:

Whenever any person buys an animal of another, either for breeding purposes or for slaughter, and it is found, within 30 days of such sale, that such animal is affected with tuberculosis, the seller shall be held liable for any loss that may occur to the buyer, and all expenses of examination shall be borne by the buyer.

Agricultural societies, offering prizes for pure blood cattle, shall demand a certificate of tuberculin test, duly authorized by the Maine State Cattle Commission, for any and all such cattle exhibited for breeding purposes. Such certificate of test shall bear date of within six months of the opening of such agricultural society's exhibition. Calves under four months old excepted.

We should try and bring our appropriations nearer to our expenditures so that farmers will not have to wait for their money, as in cases now. Sometimes nine months pass before payment is made for the condemned cattle, notably in the present year, and the Commissioners are deluged with letters asking that payment be made.

This is seemingly unnecessary and is a great hardship in very many cases. It constitutes the worst feature of the law.

All of which is respectfully submitted.

F. O. BEAL,

JOHN M. DEERING,

FRANK S. ADAMS,

State of Maine Cattle Commissioners.

STATISTICS OF AGRICULTURAL SOCIETIES.

OFFICERS OF AGRICULTURAL SOCIETIES.

NAME OF SOCIETY.	President.	P. O. Address.	Secretary.	P. O. Address.	Treasurer.	P. O. Address.
Maine State Agricultural.	B. J. Libby.	Oakland.	J. L. Lowell.	Auburn.	T. F. Callahan.	Lewiston.
Eastern Maine Fair Association.	F. O. Beal.	Bangor.	Albert S. Field.	Bangor.	Albert S. Field.	Bangor.
Central Maine Fair Association.	Martin F. Bartlett.	Waterville.	Geo. R. Fuller.	Waterville.	Geo. R. Fuller.	Waterville.
Maine State Pomological.	William Craig.	Auburn.	W. J. Ricker.	Turner.	E. L. Lincoln.	Wayne.
Maine State Poultry and Pet Stock Association.	Silas Bartlett.	Lewiston.	A. L. Merrill.	Auburn.	T. H. Sclater.	Auburn.
Androscoggin County.	A. M. Bumpus.	Livermore Falls.	W. N. Gilbert.	Livermore Falls.	H. A. Morison.	Livermore Falls.
Aroostook, Northern Maine Fair Assn.	A. E. Irving.	Presque Isle.	Ernest T. McGlauffin.	Presque Isle.	A. E. Irving.	Presque Isle.
Cumberland County.	J. L. Robinson.	South Windham.	C. H. Leighton.	Cumberland Mills.	F. D. Scammon.	Corham.
Cumberland Farmers' Club.	M. M. Burnham.	Cumberland Ctr.	Ernest W. Winslow.	Woodfords, R. 2.	N. M. Shaw.	Cumberland Ctr.
Cumberland, Bridgton.	Fred F. Emery.	Bridgton.	C. Lester Ames.	Bridgton.	John S. Ames.	Bridgton.
Farmers' and Mechanics' Club.	Manley F. Burnham.	Auburn, R. F. D. 7.	Charles H. Nelson.	New Gloucester.	George W. Haskell.	New Gloucester.
Cumberland, New Gloucester and Danville.	Arthur Dyer.	Sebago.	A. L. Brackett.	East Sebago.	P. P. Larrabee.	So. Naples.
Cumberland, Lake View Park.	W. C. Anderson.	Freeport.	B. Frank Dennison.	Freeport.	S. H. Fitts.	Freeport.
Cumberland, Freeport Agricultural Society.	V. C. Morton.	Freeport.	Geo. P. Coffin.	Freeport.	L. E. Curtis.	Freeport.
Cumberland, Freeport Poultry Association.	D. O. Coolidge.	Farmington.	Chas. F. Smith.	Farmington.	Geo. M. Carrier.	Farmington.
Franklin County.	D. D. Graffam.	Phillips.	H. E. Harnden.	Phillips.	C. N. French.	Phillips.
Franklin, North.	F. P. Merrill.	Bluehill.	C. S. Snowman.	Bluehill.	M. P. Hinckley.	Bluehill.
Hancock County.	A. D. Archer.	Clifton.	A. N. Jewett.	Amherst.	J. H. Patten.	Amherst.
Hancock, North.	Aaron S. Bunker.	Bar Harbor.	Ephraim Alley.	Salisbury Cove.	William L. Alley.	Eden.
Hancock, Eden.	Francis McGown.	Ellsworth, R. 3.	H. F. Maddocks.	Ellsworth, R. 3.	A. E. Maddocks.	Nicolin.
Hancock, North Ellsworth Farmers' Club.	Fred I. Brown.	Readfield.	E. E. Peacock.	Readfield.	Charles H. Stevens.	Readfield.
Kennebec County.	L. A. Howe.	Augusta, R. F. D. 2.	Arthur N. Douglass.	Gardiner, R. F. D. 9.	Jasper S. Gray.	Windsorville.
Kennebec, South.	H. B. Bowes.	Union.	H. L. Grinnell.	Union.	Geo. C. Hawes.	South Union.
Knox, North.	C. E. Peaslee.	Alna.	A. L. Shaw.	Damariscotta.	E. F. Metcalf.	Damariscotta.
Lincoln County.	C. V. Robbins.	Bristol.	J. Wilbur Hunter.	Damariscotta.	C. B. Woodward.	Damariscotta.
Lincoln, Bristol.	Wm. J. Wheeler.	South Paris.	W. O. Frothingham.	South Paris.	W. O. Frothingham.	South Paris.
Oxford County.	R. Baker Thurston.	Bethel.	W. B. Twaddle.	Bethel.	W. B. Twaddle.	Bethel.
Oxford, Riverside Park Association.	A. L. Stanwood.	Rumford.	O. M. Richardson.	Canton.	T. B. W. Stetson.	E. Sumner.
Oxford, Androscoggin Valley.						

Oxford, West.....	Wm. Gordon.....	Fryeburg.....	B. Walker McKoen.....	Fryeburg.....	Alvin D. Merrill.....	Fryeburg.....
Oxford, North.....	Y. A. Thurston.....	Andover.....	John F. Talbot.....	Andover.....	R. A. Grover.....	Andover.....
Penobscot, West.....	C. L. Jones.....	Corinna.....	E. E. Colbath.....	Exeter.....	F. C. Barker.....	Exeter.....
Penobscot, North.....	S. T. Mallett.....	Springfield.....	B. D. Averill.....	Prentiss.....	C. M. Lombard.....	Springfield.....
Penobscot, Orrington.....	Rawson Lufkin.....	So. Brewer.....	A. M. Harriman.....	S. Orrington, R. 1.....	A. M. Harriman.....	So. Orrington, R. 1.....
Piscataquis County.....	E. T. Monroe.....	Foxcroft.....	E. C. McKechnie.....	Foxcroft.....	A. J. McNaughton.....	Foxcroft.....
Sagadahoc County.....	L. M. Fulton.....	Bowdoinham.....	Geo. R. Tedford.....	Topsham.....	Lyman E. Smith.....	Brunswick.....
Sagadahoc, Richmond Farmers' and Mechanics' Club.....	Geo. M. Curtis.....	Richmond.....	H. E. Alexander.....	Richmond.....	H. E. Alexander.....	Richmond.....
Somerset County.....	Ernest Hilton.....	Anson.....	J. F. Withee.....	Madison.....	E. H. Athearn.....	Anson.....
Somerset, East.....	Lewis Fish.....	Hartland.....	E. A. Webber.....	St. Albans.....	R. C. Hamilton.....	St. Albans.....
Somerset, Central.....	C. Davis Miller.....	Skowhegan.....	E. F. Fairbrother.....	Skowhegan.....	Roland T. Patten.....	Skowhegan.....
Somerset, Embden.....	J. W. Morin.....	No. Anson, R. 1.....	Grant Witham.....	No. Anson, R. 1.....	Geo. O. Moulton.....	No. Anson, R. 1.....
Waldo County.....	John B. Darling.....	Belfast.....	Orrin J. Dickey.....	Belfast.....	William A. Mason.....	Belfast.....
Waldo and Penobscot.....	W. B. F. Twombly.....	Monroe.....	Edwin Jenkins.....	Monroe.....	John B. Nealley.....	Monroe.....
Waldo, Unity Park Association.....	Wm. H. Kimball.....	Burnham.....	E. T. Reynolds.....	Unity.....	E. T. Reynolds.....	Unity.....
Washington County.....	Dr. T. W. Pomeroy.....	Pembroke.....	J. M. Morgan.....	West Pembroke.....	A. E. Lincoln.....	Dennysville.....
Washington, West.....	A. H. Chandler.....	Columbia Falls.....	S. H. Allen.....	Columbia Falls.....	W. H. Allen.....	Columbia Falls.....
Washington, Central.....	E. T. White.....	Machias.....	W. N. Phinney.....	Machias Falls.....	M. Gardner.....	Machias.....
York, Shapleigh and Acton.....	Andrew J. Lord.....	Acton.....	Fred K. Bodwell.....	Acton.....	Geo. T. Crediford.....	Shapleigh.....
York, Cornish Agricultural Associa- tion.....	Wm. H. Pendexter.....	Cornish.....	Wm. R. Copp.....	Cornish.....	Chas. Bradeen.....	Cornish.....

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 cows, heifers and heifer calves.	Number of oxen and steers.	Number of animals for beef.	Number of cattle shown in herds.	Total number of neat stock.	Number of sheep.	Number of swine.	Number of poultry. (coops.)
Maine State Poultry and Pet Stock Association.....	-	-	-	-	-	-	-	-	-	-	-
Androscoggin County.....	75	10	35	50	40	14	24	163	30	1	50
Aroostook, Northern Maine Fair Association.....	151	35	124	30	12	-	40	201	79	15	159
Cumberland County.....	87	47	72	28	190	10	87	434	16	24	105
Cumberland Farmers' Club.....	17	5	26	18	26	14	16	105	-	18	200
Cumberland, Bridgton Farmers' and Mechanics' Club.....	15	8	34	25	56	6	16	145	12	2	24
Cumberland, New Gloucester and Danville.....	38	4	12	26	14	-	5	57	10	9	46
Cumberland, Lake View Park.....	-	2	9	-	-	-	-	13	-	-	2
Cumberland, Freeport Agricultural.....	22	1	4	5	-	-	4	14	6	31	20
Cumberland, Freeport Poultry Association.....	-	-	-	-	-	-	-	-	-	-	738
Franklin County.....	118	36	97	129	354	20	127	763	148	11	99
Franklin, North.....	76	2	14	26	98	4	6	150	71	3	5
Hancock County.....	40	20	15	30	40	25	-	130	10	14	50
Hancock, North.....	19	-	-	24	6	-	-	30	5	12	8
Hancock, Eden.....	-	4	5	8	2	-	-	19	12	8	15
Hancock, North Ellsworth Farmers' Club.....	3	4	6	8	2	-	-	20	8	-	4
Kennebec County.....	85	27	126	40	62	24	42	321	54	33	231
Kennebec, South.....	29	12	12	18	134	15	25	208	5	9	9
Knox, North.....	38	7	12	17	76	14	14	140	10	7	19
Lincoln County.....	31	6	6	12	58	5	14	101	15	-	17
Lincoln, Bristol.....	15	-	-	7	14	3	-	24	4	-	5

Oxford County	54	33	69	98	198	4	24	426	96	12	106
Oxford, Riverside Park Association	71	21	39	46	68	-	48	222	41	19	14
Oxford, Androscoggin Valley	44	26	32	46	52	6	102	264	25	16	38
Oxford, West	83	15	65	40	110	20	33	266	40	12	72
Oxford, North	15	6	2	9	34	4	6	61	38	8	48
Penobscot, West	49	21	42	68	24	-	54	209	12	2	46
Penobscot, North	30	4	12	14	10	-	-	40	14	4	12
Penobscot, Orrington	7	1	-	6	6	-	-	13	-	10	4
Piscataquis County	60	11	20	74	4	-	60	169	24	10	27
Sagadahoc County	80	46	114	72	72	10	75	304	36	60	280
Sagadahoc, Richmond Farmers' and Mechanics' Club	10	1	7	9	14	2	14	47	8	-	9
Somerset County	53	7	19	33	34	24	15	132	93	-	44
Somerset, East	47	3	4	44	12	6	15	84	37	15	30
Somerset, Central	35	10	24	28	74	2	-	138	40	9	250
Somerset, Emden	12	2	12	22	4	-	28	40	2	1	-
Waldo County	-	-	-	-	-	-	-	-	-	-	-
Waldo and Penobscot	80	17	31	18	96	23	72	257	46	4	34
Waldo, Unity Park Association	54	4	17	16	28	18	8	91	32	27	5
Washington County	22	1	10	8	2	-	-	21	6	12	4
Washington, West	39	16	26	41	36	-	5	124	27	7	31
Washington Central	26	6	15	11	12	-	-	44	40	14	33
York, Shapleigh and Acton	5	1	-	17	92	8	-	118	1	2	25
York, Cornish Agricultural Association	42	8	24	22	96	6	3	159	7	1	49
	1,777	490	1,193	1,243	2,264	287	982	6,267	1,160	442	2,967

Oxford County	30 00	27 00	10 00	-	24 00	31 00	-	55 00	57 00
Oxford, Riverside Park Association	6 00	53 75	6 00	3 75	-	3 00	3 00	16 50	50 00
Oxford, Androscoggin Valley	19 00	10 00	5 00	-	5 00	-	3 00	14 00	104 00
Oxford, West	32 00	19 00	-	-	-	-	14 00	19 50	50 00
Oxford, North	-	3 00	-	3 75	-	-	-	6 75	41 00
Penobscot, West	12 00	4 00	16 50	6 00	4 00	6 00	5 00	17 50	9 00
Penobscot, North	2 50	2 50	2 50	2 50	1 50	3 50	-	17 20	3 25
Penobscot, Orrington	-	-	-	2 50	-	4 50	-	6 50	5 00
Piscataquis County	10 00	14 00	8 00	-	3 00	5 00	-	15 50	50 00
Sagadahoc County	25 00	10 00	14 00	10 00	9 00	15 00	-	47 00	87 00
Sagadahoc, Richmond Farmers' and Mechanics' Club	2 00	-	2 50	-	-	-	-	50	75
Somerset County	11 00	6 00	4 00	2 00	6 00	6 00	3 00	21 50	15 00
Somerset, East	16 50	6 50	3 00	4 50	-	7 50	-	26 50	5 25
Somerset Central	9 00	5 00	12 00	3 00	-	5 00	4 00	15 00	50 00
Somerset, Embden	-	-	-	-	-	-	-	-	20 00
Waldo County	-	-	-	-	-	-	-	-	-
Waldo and Penobscot	40 00	21 00	21 00	12 00	10 00	12 00	32 00	40 00	68 00
Waldo, Unity Park Association	13 00	6 00	4 00	6 00	12 00	6 00	6 00	23 50	16 00
Washington County	3 00	7 00	3 00	-	-	-	-	-	14 00
Washington, West	45 00	-	45 00	-	-	100 00	-	167 00	34 00
Washington, Central	16 00	4 00	12 00	4 00	-	2 00	-	21 00	10 00
York, Shapleigh and Acton	-	-	-	-	3 00	3 00	-	-	-
York, Cornish Agricultural Association	19 00	7 00	-	-	4 00	4 00	7 00	46 00	2 00
	\$516 00	\$310 50	\$329 75	\$168 60	\$179 65	\$348 63	\$161 63	\$986 75	\$1,086 77

ANALYSIS OF AWARDS.

ANALYSIS OF AWARDS—Continued.

NAME OF SOCIETY.	Amount of premiums awarded thoroughbred bulls and bull calves.	Amount of premiums awarded thoroughbred cows, heifers and heifer calves.	Amount of premiums awarded grade cows, heifers and heifer calves.	Amount of premiums awarded herds.	Amount of premiums awarded working oxen and steers.	Amount of premiums awarded matched oxen and steers.	Amount of premiums awarded trained steers.	Amount of premiums awarded beef cattle.	Amount of premiums awarded town teams.	Amount of premiums awarded oxen and steers for draft.
Androscoggin County	\$25 00	\$38 00	\$50 00	\$10 00	\$30 00	\$35 00	\$10 00	\$20 00	\$65 00	\$75 00
Aroostook, Northern Maine Fair Association	312 00	661 00	73 00	85 00	26 00	—	8 00	—	—	—
Cumberland County	115 00	75 00	43 00	35 00	53 00	27 00	8 00	22 00	16 00	106 00
Cumberland Farmers' Club	11 00	30 00	27 00	20 00	9 00	10 00	14 00	15 00	27 00	27 00
Cumberland, Bridgton Farmers' and Mechanics Club	35 00	80 00	27 00	20 00	9 00	56 00	—	10 00	36 00	52 00
Cumberland, New Gloucester and Danville	10 00	20 50	32 75	3 00	5 50	2 00	—	—	13 00	3 00
Cumberland, Lake View Park	3 00	11 00	—	—	3 00	—	—	—	—	—
Cumberland, Freeport Agricultural	3 00	6 50	5 50	3 00	—	—	—	—	—	—
Cumberland, Freeport Poultry Association	—	—	—	—	—	—	—	—	—	—
Franklin County	91 00	167 50	95 00	96 00	71 00	45 00	14 00	24 50	146 00	70 00
Franklin North	2 50	11 45	15 50	4 00	5 00	9 00	—	3 50	17 15	23 00
Hancock County	20 50	40 00	50 00	—	31 00	24 50	—	12 00	—	28 00
Hancock, North	—	—	16 50	—	2 00	2 25	—	—	—	—
Hancock, Eden	17 00	18 00	3 50	—	3 00	—	—	—	—	—
Hancock, North Ellsworth Farmers' Club	5 50	12 00	10 00	—	1 00	—	—	—	—	1 00
Kennebec County	30 00	70 00	39 50	24 00	21 00	27 00	10 00	23 00	56 00	91 00
Kennebec, South	31 00	22 25	22 75	16 75	25 50	26 25	10 00	20 50	42 00	36 75
Knox, North	19 42	22 05	14 96	9 45	11 55	10 50	2 10	6 30	18 20	30 71
Lincoln County	13 00	10 25	6 50	5 00	4 50	14 00	1 50	6 50	20 00	54 00
Lincoln, Bristol	—	—	5 00	—	4 00	1 00	—	2 00	—	—

Oxford County.....	126 00	166 00	190 00	27 00	92 00	70 00	-	11 00	86 00	175 00
Oxford, Riverside Park Association.....	109 50	72 00	34 50	48 00	34 00	9 35	3 00	-	24 00	34 00
Oxford, Androscoggin Valley.....	47 00	49 00	78 00	73 00	35 00	36 00	5 00	9 00	34 00	39 00
Oxford, West.....	60 00	80 00	134 00	44 00	26 50	30 00	10 00	25 00	68 00	115 00
Oxford, North.....	11 50	2 50	13 00	5 00	9 25	10 50	5 25	2 75	9 00	20 00
Penobscot, West.....	45 50	71 50	88 50	56 00	9 00	13 00	8 00	-	-	-
Penobscot, North.....	5 00	7 00	5 00	-	-	-	-	-	-	-
Penobscot, Orrington.....	2 00	-	4 50	-	1 50	-	-	-	-	7 00
Piscataquis County.....	18 50	24 00	31 00	35 00	3 00	2 00	-	-	-	13 00
Sagadahoc County.....	194 50	298 25	130 75	137 00	35 00	42 00	7 00	17 00	41 00	224 00
Sagadahoc, Richmond Farmers' and Mechanics' Club.....	1 00	5 00	2 75	2 00	1 45	1 95	1 00	60	-	-
Somerset County.....	6 00	15 75	24 00	8 00	12 50	10 50	1 00	13 00	28 00	22 00
Somerset, East.....	11 50	14 00	42 00	9 00	8 00	-	3 50	5 25	-	-
Somerset, Central.....	13 00	41 50	43 00	-	22 25	22 50	-	4 00	24 00	58 00
Somerset, Embden.....	4 00	-	-	9 00	-	3 00	-	-	-	-
Waldo County.....	-	-	-	-	-	-	-	-	-	-
Waldo and Penobscot.....	49 00	77 00	39 00	130 00	20 00	19 00	5 00	43 00	45 00	68 00
Waldo, Unity Park Association.....	11 00	24 50	23 50	9 00	15 00	6 00	3 00	22 75	10 00	14 50
Washington County.....	4 00	16 00	4 00	8 00	4 00	-	-	-	16 00	-
Washington, West.....	56 00	94 00	99 00	12 00	-	50 00	-	-	-	28 00
Washington, Central.....	18 00	38 00	24 50	-	-	-	15 00	-	5 00	7 00
York, Shapleigh and Acton.....	-	-	11 25	-	6 00	28 00	-	6 00	45 00	12 00
York, Cornish Agricultural Association.....	40 00	103 00	69 00	8 00	151 00	65 00	6 00	14 00	60 00	75 00
	\$1,576 92	\$2,494 50	\$1,628 71	\$951 20	\$800 50	\$708 30	\$150 35	\$338 65	\$951 35	\$1,508 96

ANALYSIS OF AWARDS.

ANALYSIS OF AWARDS—Concluded.

NAME OF SOCIETY.	Amount of premiums awarded sheep.	Amount of premiums awarded swine.	Amount of premiums awarded poultry.	Amount of premiums awarded grain and root crops.	Amount of premiums awarded fruit and flowers.	Amount of premiums awarded bread and dairy products.	Amount of premiums awarded honey, sugar and syrups.	Amount of premiums awarded agricultural implements.	Amount of premiums awarded household manufactures and needle work.	Amount of premiums awarded objects not named above.	Total amount of premiums and gratuities awarded.
Maine State Pomological Association	-	-	-	-	-	-	-	-	-	-	-
Maine State Poultry and PetStock Association	-	-	\$2,573 50	-	-	-	-	-	-	-	\$2,573 50
Androscoggin County Association	\$40 00	\$3 00	35 00	\$85 00	\$75 75	\$35 50	\$15 25	-	\$75 50	\$211 00	\$1,115 00
Aroostook, Northern Maine Fair Association	213 00	65 00	135 50	129 65	82 10	47 50	34 00	-	201 40	378 00	2,869 15
Cumberland County	21 00	12 00	157 50	22 50	35 75	36 00	15 00	-	73 00	105 00	1,202 75
Cumberland Farmers' Club	-	7 00	100 75	42 25	35 00	9 25	-	-	43 65	10 00	475 90
Cumberland, Bridgton Farmers' and Mechanics' Club	13 00	5 00	16 20	26 75	15 00	18 00	5 00	\$26 00	40 00	87 50	687 45
Cumberland, New Gloucester and Danville	6 00	10 00	20 00	25 50	15 15	6 25	10 00	-	30 15	21 25	287 55
Cumberland, Lake View Park	-	-	65	16 15	-	-	-	-	5 05	-	38 85
Cumberland, Freeport Agricultural	2 00	2 50	9 05	6 05	12 75	3 25	2 25	-	12 10	64 95	175 90
Cumberland, Freeport Poultry Association	-	-	505 41	-	-	-	-	-	-	21 00	526 41
Franklin County	116 00	21 50	59 25	46 95	50 70	33 00	-	-	61 15	99 75	1,497 80
Franklin, North	39 50	2 25	2 50	13 40	5 90	3 95	7 10	-	18 00	1 80	249 10
Hancock County	10 00	10 00	12 00	75 00	15 00	12 00	10 00	-	25 10	2 00	432 10
Hancock, North	2 50	2 00	4 00	25 65	20 80	1 85	4 20	-	42 15	10 05	165 45
Hancock, Eden	-	3 00	7 30	35 00	24 90	-	-	-	10 50	-	122 20
Hancock, North EllsworthFarmers' Club	4 50	-	3 50	54 50	35 00	6 50	1 75	-	25 00	-	165 25

Kennebec County.....	28 00	18 00	93 75	32 00	93 50	38 50	35 00	-	24 00	115 00	989 75
Kennebec, South.....	3 00	-	5 40	11 10	17 35	3 70	1 00	-	29 60	-	378 65
Knox, North.....	5 78	2 10	8 56	17 50	22 84	7 61	7 61	-	24 78	43 89	359 89
Lincoln County.....	4 00	-	12 25	25 75	21 15	5 00	5 25	-	27 75	12 00	290 40
Lincoln, Bristol.....	2 00	-	4 00	6 15	5 40	1 75	-	-	20 45	14 00	65 75
Oxford County.....	75 00	28 00	105 50	74 00	172 50	40 00	17 00	10 00	93 10	315 00	2,107 10
Oxford, Riverside Park Association.....	12 00	11 50	4 50	12 05	8 40	12 15	-	-	21 40	50 00	642 35
Oxford, Androscoggin Valley.....	18 00	6 50	33 50	24 00	12 50	7 00	2 50	-	18 50	72 00	759 50
Oxford, West.....	10 00	15 00	17 00	8 00	10 00	10 00	6 50	-	17 00	91 35	911 85
Oxford, North.....	16 75	3 00	20 25	23 35	10 00	12 25	3 40	-	14 50	10 00	256 75
Penobscot, West.....	13 00	7 00	22 20	52 30	48 05	9 75	7 85	-	65 10	20 52	617 27
Penobscot, North.....	4 75	3 00	4 00	13 74	87 80	2 00	10 00	-	77 82	5 50	261 06
Penobscot, Orrington.....	-	2 50	2 25	11 60	23 55	1 75	5 25	-	29 50	6 25	116 15
Piscataquis County.....	14 00	4 00	18 00	-	-	-	-	-	-	-	268 00
Sagadahoc County.....	34 00	61 00	225 05	160 75	162 75	81 50	12 75	-	138 50	377 40	2,597 20
Sagadahoc, Richmond Farmers' and Mechanics' Club.....	1 50	-	2 50	11 70	9 85	2 10	2 30	-	10 15	1 30	62 90
Somerset County.....	35 75	-	16 30	13 90	2 45	1 25	-	-	23 95	2 65	311 50
Somerset, East.....	14 00	5 75	21 50	18 50	9 75	5 40	1 35	-	15 10	31 10	285 45
Somerset, Central.....	29 50	4 00	111 20	12 75	110 00	16 50	7 50	-	13 75	117 75	754 20
Somerset, Embden.....	2 00	-	-	4 00	2 00	-	-	-	-	-	44 00
Waldo County.....	-	-	-	-	-	-	-	-	-	-	*489 75
Waldo and Penobscot.....	75 00	20 00	29 75	74 50	62 75	29 00	10 00	-	130 70	19 00	1,201 70
Waldo, Unity Park Association.....	19 25	5 50	3 25	30 25	13 50	8 25	3 00	6 00	36 75	56 25	413 75
Washington County.....	4 00	3 00	4 00	29 40	12 25	5 25	3 05	-	5 60	-	145 55
Washington, West.....	91 00	31 00	32 00	251 50	63 65	28 00	-	-	216 95	34 25	1,478 35
Washington, Central.....	20 00	7 00	34 00	74 65	25 60	18 50	1 35	-	67 65	11 00	436 25
York, Shapleigh and Acton.....	1 00	2 50	15 00	75 00	39 00	7 50	8 00	-	36 00	80 00	378 25
York, Cornish Agricultural Association.....	4 00	4 00	84 00	24 00	37 40	5 00	-	-	32 95	11 25	882 60
	\$1,004 78	\$387 60	\$4,571 82	\$1,696 79	\$1,507 79	\$572 76	\$255 21	\$42 00	\$1,854 30	\$2,509 76	\$30,090 28

* Items not given.

ANALYSIS OF AWARDS.

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.
Maine State Pomological.....	\$1,000 00	\$44 00	\$89 27	-	-	\$1,133 27
Maine State Poultry and Pet Stock Association.....	1,030 09	47 00	-	-	\$1,415 52	\$2,492 61
Androscoggin County.....	520 61	40 00	500 00	\$350 00	1,329 39	2,740 00
Aroostook, Northern Maine Fair Association.....	1,047 20	33 00	-	520 00	7,964 47	9,564 67
Cumberland County.....	553 43	-	-	202 50	4,545 12	5,301 05
Cumberland Farmers' Club.....	244 35	102 50	-	195 00	1,181 13	1,722 98
Cumberland, Bridgton Farmers' and Mechanics' Club.....	338 56	-	-	110 00	1,185 90	1,634 46
Cumberland, New Gloucester and Danville.....	56 90	-	-	140 00	763 49	960 39
Cumberland, Lake View Park.....	-	-	-	40 00	280 45	320 45
Cumberland, Freeport Agricultural.....	120 61	1 00	380 00	83 75	683 72	1,269 08
Cumberland, Freeport Poultry Association.....	290 88	19 00	-	312 00	251 98	873 86
Franklin, North.....	96 22	267 00	-	211 50	869 49	1,444 21
Hancock County.....	147 50	-	125 00	110 25	1,960 73	2,343 48
Hancock, North.....	59 47	-	-	-	686 71	746 18
Hancock, Eden.....	47 97	-	800 00	20 00	772 04	1,640 01
Hancock, North Ellsworth Farmers' Club.....	86 98	6 00	-	13 00	287 00	392 98
Kennebec County.....	467 60	17 00	550 00	5 00	1,393 20	2,432 80
Kennebec, South.....	215 08	-	-	46 25	966 56	1,227 89
Knox, North.....	188 73	-	-	35 00	2,040 80	2,264 53
Lincoln County.....	129 83	26 00	-	102 00	1,474 30	1,732 13

Lincoln, Bristol.....	48 33	1 00	-	-	205 39	254 72
Oxford County.....	1,015 11	29 00	-	685 00	5,919 55	7,648 06
Oxford, Riverside Park Association.....	295 57	-	-	140 00	1,007 00	1,442 57
Oxford, Androscoggin Valley.....	216 84	1 00	230 00	122 50	1,671 69	2,242 03
Oxford, West.....	535 62	17 00	-	-	3,412 54	3,965 16
Oxford, North.....	139 84	-	-	-	598 79	738 63
Penobscot, West.....	376 99	43 00	-	345 00	1,504 75	2,269 74
Penobscot, North.....	108 60	-	-	-	391 90	500 50
Penobscot, Orrington.....	-	21 23	-	60 50	590 73	672 46
Piscataquis County.....	132 08	-	-	160 00	-	292 08
Sagadahoc, Richmond Farmers' and Mechanics' Club.....	37 31	-	-	-	134 05	171 36
Somerset County.....	147 87	-	265 00	155 00	622 53	1,190 40
Somerset, East.....	123 39	88 00	-	450 00	1,569 96	2,231 35
Somerset, Central.....	452 47	30 00	2,200 00	470 00	2,068 53	5,221 00
Somerset, Embden.....	-	-	13 78	-	34 34	48 12
Waldo County.....	207 55	20 00	200 00	170 00	1,710 75	2,308 30
Waldo and Penobscot.....	579 44	20 00	12 00	175 00	2,643 31	3,429 75
Waldo, Unity Park Association.....	196 35	-	-	233 50	675 00	1,104 85
Washington County.....	-	10 00	-	63 50	555 25	628 75
Washington, West.....	755 47	-	292 50	260 00	2,863 46	4,171 43
Washington, Central.....	183 90	1 00	-	173 00	2,298 74	2,656 64
York, Shapleigh and Acton.....	166 63	189 00	60 00	-	82 20	497 83
York, Cornish Agricultural Association.....	532 19	-	200 00	447 50	2,334 37	3,514 06
	\$12,893 56	\$1,072 73	\$5,917 55	\$6,606 75	\$62,946 83	\$89,437 42

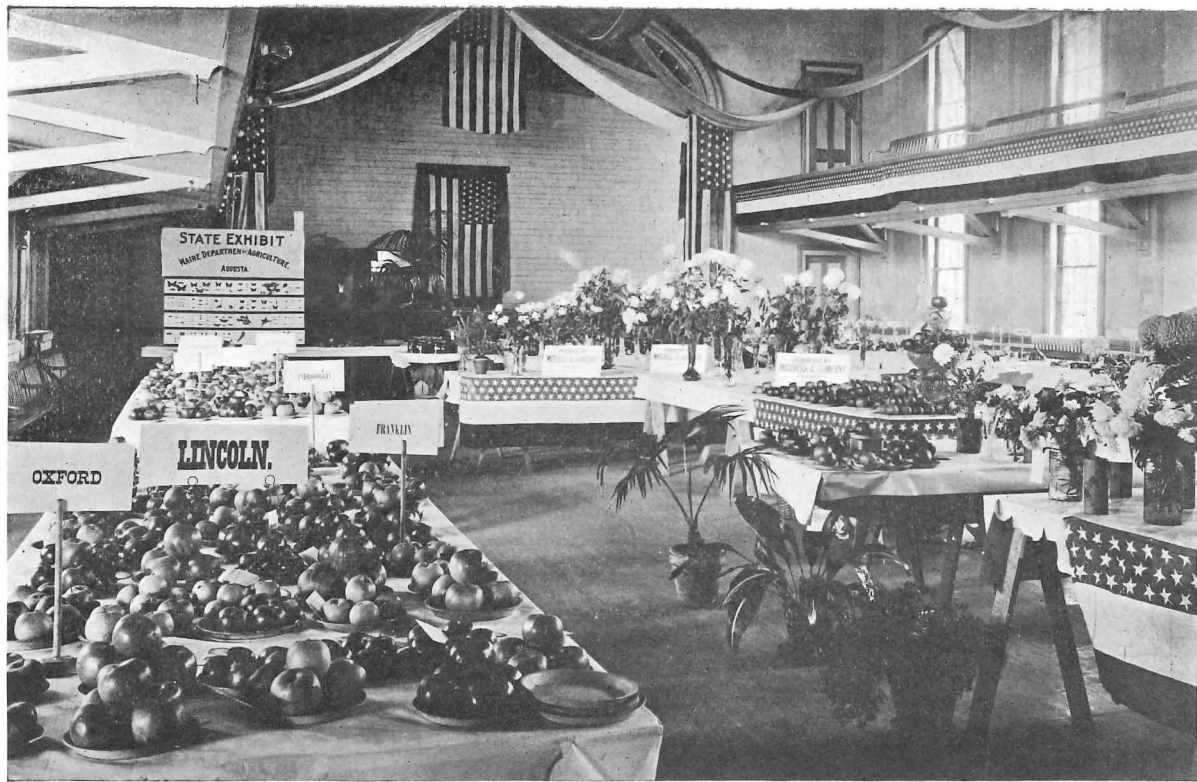
FINANCES.

FINANCES—Concluded.

	Amount expended in improvements.	Amount expended in trotting purses.	Expenses during the fair.	Amount expended for other purposes.	Total amount paid out including premiums and gratuities.	Value of property belonging to the society.	Amount of liabilities.
Maine State Pomological	-	-	-	-	-	-	-
Maine State Poultry and Pet Stock Association	-	-	-	-	-	\$1,690 00	-
Androscoggin County	\$350 00	\$950 00	\$375 00	\$650 00	\$3,440 00	1,850 00	\$1,000 00
Aroostook, Northern Maine Fair Association	1,620 98	1,300 00	1,419 69	1,954 85	9,164 67	2,000 00	700 00
Cumberland County	951 00	1,105 00	1,659 65	-	4,918 40	6,000 00	300 00
Cumberland Farmers' Club	125 00	585 00	281 53	200 00	1,667 43	3,000 00	75 00
Cumberland, Bridgton Farmers' and Mechanics' Club	95 00	650 00	130 00	48 00	1,610 45	4,000 00	2,000 00
Cumberland, New Gloucester and Danville	90 73	365 00	159 94	94 74	997 96	2,500 00	206 91
Cumberland, Lake View Park	35 81	113 00	63 07	7 40	258 22	700 00	-
Cumberland, Freeport Agricultural	156 22	373 75	165 27	380 59	1,251 73	1,800 00	1,075 00
Cumberland, Freeport Poultry Association	31 59	-	322 54	-	880 54	300 00	13 13
Franklin County	-	-	-	-	-	-	-
Franklin, North	-	410 66	125 00	566 51	1,351 27	2,000 00	2,230 00
Hancock County	500 00	577 50	890 45	-	2,400 05	5,000 00	-
Hancock, North	19 50	-	525 65	3 00	713 60	200 00	-
Hancock, Eden	800 00	102 75	256 20	327 39	1,608 54	2,000 00	1,300 00
Hancock, North Ellsworth Farmers' Club	74 00	129 50	75 00	-	443 75	2,000 00	300 00
Kennebec County	225 00	595 00	234 00	49 00	2,092 75	1,500 00	1,455 00
Kennebec, South	-	321 25	221 44	323 25	1,244 59	2,000 00	-
Knox, North	122 75	427 50	358 84	877 63	2,146 61	1,000 00	100 00
Lincoln County	-	490 00	450 00	519 16	1,749 56	2,000 00	422 85

Lincoln, Bristol.....	-	-	69 24	55 00	189 99	1,200 00	92 00
Oxford County.....	1,355 95	1,650 00	1,455 96	774 49	7,343 50	12,000 00	-
Oxford, Riverside Park Association.....	132 75	550 00	154 90	-	1,480 00	-	333 00
Oxford, Androsoggin Valley.....	326 59	735 00	250 00	293 68	2,364 77	4,500 00	3,084 71
Oxford, West.....	-	1,000 00	274 10	1,275 59	3,461 54	10,000 00	2,100 00
Oxford, North.....	50 00	45 00	20 00	366 88	738 63	1,500 00	105 00
Penobscot, West.....	167 25	785 00	345 80	202 00	2,117 32	5,700 00	4,600 00
Penobscot, North.....	50 00	-	75 00	25 00	411 06	-	-
Penobscot, Orrington.....	110 40	237 00	112 00	50 41	625 96	1,000 00	18 00
Piscataquis County.....	300 00	410 00	-	-	978 00	-	-
Sagadahoc County.....	-	-	-	-	-	-	-
Sagadahoc, Richmond Farmers' and Mechanics' Club.....	22 14	-	42 00	37 12	164 16	100 00	5 13
Somerset County.....	340 00	450 00	184 00	45 80	1,331 30	1,000 00	265 00
Somerset, East.....	225 00	1,200 00	118 00	387 00	2,215 45	2,000 00	765 00
Somerset, Central.....	593 49	1,400 00	954 07	285 48	3,987 24	-	3,000 00
Somerset, Embden.....	-	-	4 12	-	48 12	-	-
Waldo County.....	-	996 50	966 08	-	2,452 33	-	-
Waldo and Penobscot.....	243 18	1,105 60	1,793 10	-	4,343 58	10,000 00	750 00
Waldo, Unity Park Association.....	125 00	533 00	215 50	-	1,287 25	-	182 40
Washington County.....	41 00	683 20	67 50	96 65	633 90	-	-
Washington, West.....	77 65	250 00	1,267 53	361 26	3,834 79	2,836 00	1,401 19
Washington, Central.....	-	534 00	1,481 87	-	2,452 12	-	-
York, Shapleigh and Acton.....	-	-	36 65	-	414 90	2,000 00	-
York, Cornish Agricultural Association.....	-	945 00	599 87	500 00	2,927 47	4,000 00	400 00
	\$9,357 98	\$22,005 21	\$18,200 56	\$10,757 97	\$83,743 50	\$99,376 00	\$28,279 32

FINANCES.



Annual Exhibition at Waterville, November, 1908—State Pomological Society

APPENDIX.

Annual Report of the State Pomological Society

1908-1909.

OFFICERS FOR 1908.

President.

WILLIAM CRAIG, Auburn.

Vice Presidents.

EDWARD L. WHITE, Bowdoinham.

G. L. PALMER, So. Livermore.

Secretary.

W. J. RICKER, Turner.

Treasurer.

E. L. LINCOLN, Wayne.

Executive Committee.

The President and Secretary *ex-officio*; Charles E. Wheeler, Chesterville; Will E. Leland, Sangerville; F. H. Morse, Waterford.

Trustees.

Androscoggin County, Silas A. Shaw, Auburn.

Aroostook County, Edward Tarr, Mapleton.

Cumberland County, John W. True, New Gloucester.

Franklin County, E. E. Hardy, Farmington, R. F. D.

Hancock County, William H. Miller, Bar Harbor.

Kennebec County, E. A. Lapham, Pittston.

Knox County, Alonzo Butler, Union.

Lincoln County, H. J. A. Simmons, Waldoboro.

Oxford County, W. H. Allen, Buckfield.

Penobscot County, Samuel L. Boardman, Bangor.

Piscataquis County, C. C. Dunham, Foxcroft.

Sagadahoc County, J. H. King, Bowdoinham.

Somerset County, Frank E. Nowell, Fairfield.

Waldo County, Fred Atwood, Winterport.

Washington County, D. W. Campbell, Cherryfield.

York County, J. Merrill Lord, Kezar Falls.

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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.

Allen, Wm. H.	Buckfield	Knowlton, D. H.	Farmington
Andrews, A. Emery	Gardiner	Lapham, E. A.	Pittston
Andrews, Charles E.	Auburn	Leland, Will E.	East Sangerville
Arnold, C. A.	Arnold	Lincoln, E. L.	Wayne
Atherton, Wm. P.	Hallowell	Litchfield, J. H.	Auburn
Atkins, Charles G.	Bucksport	Litchfield, Mrs. L. K.	Lewiston
Atwood, Fred.	Winterport	Lombard, Thurston M.	Auburn
Averill, David C.	Temple	Lord, J. Merrill.	Kezar Falls
Bailey, W. G.	Freeport	Luce, Willis A.	Columbia Falls
Bennoch, John E.	Orono	Macaulay, T. B.	Montreal, Can.
Bickford, Lewis I.	Dixmont Center	Mayo, E. P.	Waterville
Bisbee, George E.	Auburn	McAllister, Zaccheus.	West Lovell
Blanchard, Mrs. E. M.	Lewiston	McCabe, George L.	North Bangor
Blossom, L. H.	Turner Center	McLaughlin, Henry	Bangor
Boardman, Samuel L.	Bangor	McManus, John	Brunswick
Briggs, John.	Turner	Merrill, Oliver F.	Gardiner
Burr, John.	Freeport	Mitchell, Frederick H.	Turner
Butler, Alonzo.	Union	Mitchell & Co.	Waterville
Chadbourne, C. L.	North Bridgton	Moody, Charles H.	Turner
Chandler, Mrs. Lucy A.	Freeport	Moore, William G.	Monmouth
Chase, Henry M., 103 Federal St., Portland		Moor, F. A.	Waterville
Corbett, Herman.	Farmington	Morse, F. H.	Waterford
Craig, William.	Auburn	Morton, J. A.	Bethel
Crowell, Mrs. Ella H.	Skowhegan	Munson, W. M.	Morgantown, W. Va.
Crowell, John H.	Farmington	Page, F. W.	Augusta
Dana, Woodbury S.	Portland	Palmer, George L.	South Livermore
Dawes, S. H.	Harrison	Parsons, Howard G.	Turner Center
DeCoster, Virgil P.	Buckfield	Pope, Charles S.	Manchester
Denison, Mrs. Cora M.	Harrison	Prince, Edward M.	West Farmington
DeRocher, Peter.	Bradentown, Fla.	Pulsifer, D. W.	Poland
Dirvanger, Joseph A.	Portland	Purington, E. F.	Farmington
Dunham, W. W.	North Paris	Richards, John T.	Gardiner
Dyer, Milton.	Cape Elizabeth	Ricker, A. S.	Turner
Emerson, Charles L.	South Turner	Roak, George M.	Auburn
Farnsworth, B. B.	Portland	Sanborn, Miss G. P.	Augusta
Frost, Oscar F.	Monmouth	Sawyer, Andrew S.	Cape Elizabeth
Gardner, Robert H.	Gardiner	Saunders, Ernest	Lewiston
George, C. H.	Hebron	Seavey, Mrs. G. M.	Auburn
Gilbert, Z. A.	North Greene	Simmons, H. J. A.	Waldoboro
Goddard, Lewis C.	Woodfords	Skillings, C. W.	North Auburn
Grover, Franklin D.	Bean	Smith, Frederic O.	New Vineyard
Hackett, Alfred G.	Storrs, Conn.	Smith, Henry S.	Monmouth
Gulley, E. C.	West Gloucester	Snow, Mary S.	Bangor
Hall, Mrs. H. A.	Brewer	Stanley, H. O.	Winthrop
Hanscom, John.	Saco	Staples, Geo. W., 904 Main St., Hartford, Conn	
Hardy, E. E.	Farmington	Starrett, L. F.	Warren
Harris, William M.	Auburn	Stetson, Henry	Auburn
Heald, U. H.	Paris	Stilphen, Asbury C.	Gardiner
Hixon, A. A.	Worcester, Mass.	Taylor, Miss L. L.	(Lakeside) Belgrade
Hoyt, Mrs. Francis.	Winthrop	Thomas, William W.	Portland
Jackson, F. A.	Winthrop	Thomas, D. S.	North Auburn
Keene, Charles S.	Turner	Thurston, Edwin.	West Farmington

LIFE MEMBERS—Concluded.

Tilton, William S.	Boston, Mass.	Walker, Charles S.	Peru
Townsend, Mrs. B. T.	Freeport	Walker, Elmer V.	Oxford
True, Davis P.	Leeds Center	Waterman, Willard H.	East Auburn
True, John W.	New Gloucester	Waugh, F. A.	Amherst, Mass.
Turner, E. P.	New Vineyard	Weston, Joseph	Gardiner
Twitchell, Geo. M.	Auburn	Wheeler, Charles E.	Chesterville
Vickery, James	Portland	White, Edward L.	Bowdoinham
Vickery, John	Auburn	Woods, Chas. D.	Orono
Wade, Patrick	Portland	Yeaton, Samuel F.	West Farmington

ANNUAL MEMBERS FOR 1908.

Armstrong, James B.	Harmony	Leavitt, R. D.	Auburn
Blair, Mrs. E. C.	Waterville	Lewis, C. E.	Orono
Bowers, John W.	Portland	Lincoln, Mrs. Lillian J.	Wayne
Bray, N. E.	Auburn	Lincoln, I. D.	Wayne
Bray, Mrs. N. E.	Auburn	Merchant, S. L.	Winthrop
Bryant, Mrs. H. H.	Waterville	Merrill, W. T.	Auburn
Campbell, David W.	Cherryfield	Miller, William.	Bar Harbor
Clement & Taylor.	Winthrop	Morse, W. J.	Orono
Cummings, R. S.	Waterville	Mudgett, D. G.	Albion
Cook, E. H.	West Paris	Nowell, Mrs. F.	Fairfield
DeCoster, Mrs. V. P.	Vassalboro	Osgood, E. S.	Auburn
Douglass, E. S.	Buckfield	Patch, Miss E. M.	Orono
Hendrickson, Peter	Douglass Hill	Rhoads, Reuben.	Troy
Hobart, O. B.	Yarmouth	Ricker, W. J.	Turner
Hitchings, E. F.	Auburn	Shaw, Silas	Auburn
Irish, Henry	Waterville	Shurtleff, S. G.	So. Livermore
Jones, Fred R.	Buckfield	Stewart, J. W.	Waterville
Keyser, H. L.	Mercer	Tarr, E.	Mapleton
King, J. H.	Greene	Thorpe, B. F. W.	Augusta
	Bowdoinham	Yeaton, G. A.	Augusta

REPORT OF THE EXECUTIVE COMMITTEE

A general idea of the work of the society can be obtained by reading the reports of the different officers and the papers and discussions given at the various meetings of the society.

The executive committee are glad to report a successful year for the society. Good programs were offered at all the meetings and we trust were helpful to those present. We can only regret that the attendance was not larger, for to do the work that the society is intended to do, it must get in close touch with the apple growers throughout the state.

A bill carrying with it an appropriation of ten thousand dollars to be used for the purchase of an experimental fruit farm, has been left in the hands of Dr. E. P. Turner of New Vineyard to present to the legislature.

It was also voted to bring the matter of laws governing the grading, packing and branding of apples before the legislature again this winter. The matter was left with Dr. G. M. Twitchell to prepare a bill and present it before the executive committee for their approval and then carry it to Augusta.

The finances of the society are in good condition, the permanent fund is all paid up and invested where safe and drawing interest.

The accounts of the treasurer have been audited and found correct and well kept.

RECEIPTS.

State stipend for 1908.....	\$1,000 00
Interest on permanent fund invested.....	69 00
Interest on permanent deposit.....	18 27
Membership fees—life	40 00
Membership fees—annual	41 00
	————— \$1,168 27

EXPENDITURES.

Executive committee expense	\$94 51	
Treasurer's expense	8 00	
Salary of secretary	150 00	
Salary of treasurer	25 00	
Local expenses of annual meeting	38 50	
Postage	29 42	
Traveling expenses of judges and speakers	147 61	
Hotel bill at Waterville	106 00	
Badges	9 00	
Freight, express and telephone	8 99	
Local expense of field meeting	14 05	
Printing and stationary	76 47	
Special committee	1 70	
Premiums awarded	278 75	
Stenographic report of annual meeting ..	55 35	
Overdrawn 1907	80 87	
		<hr/>
		\$1,124 22
Cash on hand		44 05
		<hr/>
		\$1,168 27

Respectfully submitted,

WM. CRAIG,
W. J. RICKER,
C. E. WHEELER,
W. E. LELAND,
F. H. MORSE.

REPORT OF TREASURER FOR THE YEAR 1908.

Ellis L. Lincoln, Treasurer, in account with the Maine State
Pomological Society.

RECEIPTS.

January 1,	Received from First National Bank, Farmington, interest.....	\$12 00
	Received from Stockton Spring Water Co., interest.....	22 50
July 2,	Received from First National Bank, Farmington, interest.....	12 00
	Received from Stockton Springs Water Co., interest.....	22 50
	Interest on Permanent Deposit.....	18 27
	Total interest.....	\$87 27
March 2,	Received from State, State stipend.....	\$1,000 00

LIFE MEMBERS AS FOLLOWS:

Frederick O. Smith, New Vineyard.....	\$10 00
U. H. Heald, Paris.....	10 00
Mitchell & Co., Waterville.....	10 00
Ernest Saunders, Lewiston.....	10 00
Total.....	\$40 00

ANNUAL MEMBERS AS BELOW.

John W. Bowes, Portland.....	\$1.00
O. B. Hobart, Auburn.....	1 00
W. T. Merrill, Auburn.....	1 00
N. E. Bray, Auburn.....	1 00
Mrs. N. E. Bray, Auburn.....	1 00
E. S. Osgood, Auburn.....	1 00
R. D. Leavett, Auburn.....	1 00
S. G. Shurtleff, So. Livermore.....	1 00
H. L. Keyser, Green.....	1 00
Wm. Miller, Bar Harbor.....	1 00
I. D. Lincoln, Wayne.....	1 00
Peter Hendrickson, Yarmouth.....	1 00
Fred R. Jones, Mercer.....	1 00
E. S. Douglass, Douglass Hill.....	1 00
B. F. W. Thorpe, Augusta.....	1 00
Mrs. H. H. Bryant, Waterville.....	1 00
James B. Armstrong, Harmony.....	1 00
J. H. King, Bowdoinham.....	1 00
G. A. Yeaton, Augusta.....	1 00
N. Charland, Waterville.....	1 00
Miss E. M. Patch, Orono.....	1 00
J. W. Stewart, Waterville.....	1 00
E. F. Hitchings, Waterville.....	1 00
W. J. Morse, Orono.....	1 00
C. E. Lewis, Orono.....	1 00
D. G. Mudgett, Albion.....	1 00
Silas Shaw, Auburn.....	1 00
Dr. J. W. Bowers, Portland.....	1 00
Henry Irish, Buckfield.....	1 00

W. J. Ricker, Turner.....	1 00
Mrs. E. C. Blair, Waterville.....	1 00
Clement & Taylor, Winthrop.....	1 00
David W. Campbell, Cherryfield.....	1 00
E. H. Cook, Vassalboro.....	1 00
Mrs. V. P. DeCoster, Buckfield.....	1 00
R. S. Cummings, West Paris.....	1 00
Mrs. Lillian J. Lincoln, Wayne.....	1 00
Mrs. F. Nowell, Fairfield.....	1 00
Reuben Rhouds, Troy.....	1 00
E. Tarr, Mapleton.....	1 00
S. L. Merchant, Winthrop.....	1 00
Total.....	\$41.00
Total receipts for the year.....	\$1,168 27

DISBURSEMENTS.

January 1, Unpaid allowances for the year 1907.....	\$80 87
Paid Elm House, order No. 1001.....	7 00
Paid Chas. E. Wheeler, order No. 1004.....	8 60
June 29, Paid Will E. Leland, order No. 1002.....	7 84
Paid V. P. DeCoster, order No. 1003.....	7 75
Paid W. J. Ricker, order No. 1005.....	2 80
Paid E. L. Lincoln, order No. 1006.....	2 00
Paid W. F. Cobb, order No. 1007.....	12 25
August 4, Paid W. F. Cobb, order No. 1008.....	2 25
Paid Will E. Leland, order No. 1009.....	7 90
Paid Wm. Craig, order No. 1010.....	9 15
Paid A. Sherman, order No. 1011.....	4 90
Paid Annie Barrows, order No. 1012.....	6 00
Paid E. L. Lincoln, order No. 1013.....	4 50
Paid V. P. DeCoster, order No. 1014.....	85
Paid Smith & Reid order No. 1015.....	7 50
Paid W. J. Ricker, order No. 1016.....	14 79
November 11, Paid Merrill & Webber, order No. 1017.....	30 70
Paid Maine Farmer, order No. 1018.....	8 25
Paid Wm. Craig, order No. 1019.....	8 50
Paid W. J. Ricker, order No. 1020.....	19 60
Paid Will E. Leland, order No. 1021.....	3 15
Paid C. E. Wheeler, order No. 1022.....	3 55
November 13, Paid Merrill & Webber, order No. 1032.....	12 00
Paid G. M. Twitchell, order No. 1033.....	1 70
Paid John Craig, order No. 1034.....	40 00
Paid Clark Allis, order No. 1035.....	39 50
Paid Waterville Sentinel, order No. 1036.....	7 50
Paid H. E. Judkins, order No. 1037.....	106 00
Paid W. J. Ricker, order No. 1038.....	55 60
November 14, Paid D. H. Knowlton, order No.....	2 50
Paid Wm. Craig, order No.....	9 00
Paid E. L. Lincoln, order No. 1023.....	5 50
Paid Whitehead & Hoag Co., order No. 1024.....	9 95
Paid V. P. DeCoster, order No. 1027.....	9 50
Paid V. R. Gardner, order No. 1025.....	9 30
Paid W. E. Leland, order No. 1026.....	10 00
Paid S. G. Shurtleff, order No. 1028.....	1 90
Paid J. C. Fuller, order No. 1029.....	20 50
Paid Dan S. Berry, order No. 1030.....	15 00
Paid S. C. Sears, order No. 1031.....	16 75
December 30, Paid V. R. Gardner, order No. 1039.....	4 65
Paid Maine Farmer, order No. 1040.....	2 52
Paid L. B. Raynes, order No. 1041.....	55 35
Paid P. Hendrickson, order No. 1042.....	8 10
Paid E. D. Sanderson, order No. 1043.....	9 01
Paid W. D. Hurd, order No. 1044.....	3 70
Paid C. E. Wheeler, order No. 1045.....	8 20
Paid W. A. Judge, order No. 1046.....	3 00
Paid orchestra, order No. 1047.....	6 00
Paid E. L. Lincoln, order No. 1049.....	25 00
Paid W. J. Ricker, order No. 1050.....	100 00
Paid Premiums Awarded, order No. 1051.....	278 75
Paid J. C. Woodsom, order No. 1052.....	1 04
Total disbursements.....	\$1,124 22
Cash on hand.....	44 05
	\$1,168 27

PERMANENT FUND FOR THE YEAR 1908.

December 31, By members as reported for the year 1907.....	\$1,710 00
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FEES RECEIVED FOR THE YEAR 1908.

Frederick O. Smith.....	\$10 00	
U. H. Heald.....	10 00	
Mitchell & Co.....	10 00	
Ernerst Saunders.....	10 00	
Total.....	<u>40 00</u>	\$1,750 00

PERMANENT FUND INVESTED AS FOLLOWS.

Four shares stock First National Bank of Farmington.....	\$400 00	
Two bonds Stockton Springs Water Co., first mortgage.....	970 00	
Deposit in Savings Banks.....	340 00	
Due permanent fund life fees for the year 1908.....	40 00	
	<u>1750 00</u>	\$1,750 00

Respectfully submitted,

ELLIS L. LINCOLN, Treasurer.

BUSINESS TRANSACTIONS.

MEETINGS OF THE EXECUTIVE COMMITTEE.

AUBURN, Jan. 17, 1908.

Meeting called to close up the business for 1907 and to make plans for 1908. Dr. G. M. Twitchell appeared before the committee and gave information on the position that other New England states were taking in regard to a standard box and barrel, also in regard to laws relative to the grading and packing of apples.

Voted, That Dr. Twitchell recommend from this society the Canadian standards of box and barrel in the conference with the other New England states.

The schedule of premiums was gone over and revised as seemed best to the committee.

Voted, That entries for premiums be made with the secretary at least three days previous to the opening of the meeting.

Secretary read invitation of Edward P. Mayo to hold the 1908 annual meeting in Waterville, also, an invitation from Twilight grange to hold the same meeting in Corinna. Secretary was instructed to look into the accommodations for holding the meeting in Waterville, also as to any inducements offered.

Voted, To hold two summer meetings, one with President William Craig at "Sunny Beach Farm" in June, and one to be decided on later.

"SUNNY BEACH FARM," AUBURN, July 1, 1908.

Secretary reported favorably on his visit to Waterville and it was voted to hold the next annual meeting in that city. The matter of program was left with the president and secretary.

Voted, To hold a field meeting on the 19th of August, at the farm of G. F. Terry of Waterville.

Voted, That at the annual meeting Mr. Leland have in charge the exhibition of canned fruits and jellies, also, of plants and flowers; and that he obtain a judge for these exhibits. He shall also have charge of all things coming under the head of miscellaneous.

Voted, That C. E. Wheeler have charge of the state and county exhibits, and V. P. DeCoster have in charge all exhibits of fruit not otherwise provided for and that they obtain judges for their departments.

ANNUAL MEETING.

WATERVILLE, MAINE, November 10-12, 1908.

After the opening exercises, on the evening of November 10, the President, Mr. Craig, gave an address, and

On motion of Mr. Wheeler, duly seconded it was voted that a committee of three be selected by the house to consider the President's address.

The following committee was appointed: John W. True of New Gloucester; chairman; F. H. Morse of Waterford; Dr. E. P. Turner of New Vineyard.

W. J. Ricker presented his report as Secretary.

Voted, That the report of the Secretary be accepted.

The Secretary read a communication from the Board of Trade of Auburn, inviting the Maine State Pomological Society to hold its next annual meeting at Auburn and also a communication from H. L. Keyser, inviting the Maine State Pomological Society to hold a field meeting at the Standish farm in Greene.

It was voted that these invitations be referred to the Executive Committee.

The Secretary also read a communication from Governor-elect Fernald expressing his regret at not being able to be present.

E. L. Lincoln presented his report as Treasurer.

Voted, That the report of the Treasurer be accepted.

In the absence of Charles S. Pope, who was to have given a report as a member of the Experiment Station Council, Dr. Woods was called upon to make a few remarks along that line.

After the discussion on the matter of asking the Legislature to appropriate funds for the purchase of an experimental farm, Dr. E. P. Turner was appointed as chairman of a legislative committee to take up this particular matter, with power to select and appoint his associates on this committee.

On motion of Dr. Woods, duly seconded, the following resolution was passed:

Resolved, That it is the opinion of the Maine State Pomological Society that the best interests of Maine's fruit industries demand increased work on the part of the Experimental Station along lines of pomology, and that in order that this may be possible we respectfully request the next Legislature to pass the bill which was referred to them by the last Legislature, whereby an experimental farm shall be purchased for the carrying out of orcharding experiments under the direction of the Maine Agricultural Experiment Station.

During the afternoon session of November 11, the following votes were passed:

On motion of Dr. Turner, duly seconded, it was voted that this Society accept the recommendations made in Dr. Twitchell's paper in regard to a proposed act, and that in addition thereto the proposed act shall contain a provision that the words or trademark "Maine Apples" shall go on the heads of the barrels, or on the outside of the packages, and that a poster on which the law is printed shall be placed in the inside of the barrel or package.

On motion of Mr. Leland, duly seconded, it was voted that Dr. Twitchell be appointed our committee to present this matter before the Legislature and if possible secure the passage of the proposed legislation.

On motion of Dr. Twitchell, duly seconded, it was voted that this matter, after being formulated by him be presented to the executive committee for their consideration and adoption and for their instruction.

ANNUAL BUSINESS MEETING.

November 12, 1908.

Meeting called to order by President Craig.

Election of officers for the ensuing year. Edward L. White and Will E. Leland were appointed by the chair as a committee to receive, sort and count ballots.

The following officers were elected:

President, William Craig, of Auburn; 1st Vice President, Edward L. White, of Bowdoinham; 2d Vice President, G. L. Palmer of So. Livermore; Secretary, William J. Ricker, of Turner; Treasurer, E. L. Lincoln, of Wayne; member of the Executive Committee for three years, F. H. Morse, of Waterford.

TRUSTEES.

Androscoggin County—Silas A. Shaw, Auburn.

Aroostook County—Edward Tarr, Mapleton.

Cumberland County—John W. True, New Gloucester.

Franklin County—E. E. Hardy, Farmington, R. F. D.

Hancock County—William H. Miller, Bar Harbor.

Kennebec County—E. A. Lapham, Pittston.

Knox County—Alonzo Butler, Union.

Lincoln County—H. J. A. Simmons, Waldoboro.

Oxford County—W. H. Allen, Buckfield.

Penobscot County—Samuel L. Boardman, Bangor.

Piscataquis County—C. C. Dunham, Foxcroft.

Sagadahoc County—J. H. King, Bowdoinham.

Somerset County—Frank E. Nowell, Fairfield.

Waldo County—Fred Atwood, Winterport.

Washington County—D. W. Campbell, Cherryfield.

York County—J. Merrill Lord, Kezar Falls.

Member of the Experiment Station Council: Charles S. Pope of Manchester.

Committee on Resolutions was appointed by the chair as follows: J. W. True and E. L. White.

It was voted that the Executive Committee be instructed to formulate some plan as to what shall be the duties of the trustees and send out circulars requesting prompt action.

Dr. Twitchell, to whom was referred at the last annual meeting the matter of a standard size for barrel and box, made his report thereon, and it was voted that it be adopted.

On motion of Mr. DeCoster, duly seconded, it was voted that this matter be added to the other matter, to which Dr. Twitchell is to attend at the coming session of the Legislature.

On motion of Dr. Twitchell, duly seconded, it was voted that the Executive Committee be instructed to arrange with Prof. Gardiner, and then in addition to arrange with our subordinate granges and provide for practical demonstrations in packing apples in boxes wherever possible during the coming winter.

NOVEMBER 12—AFTERNOON SESSION.

On motion of Prof. Morse, duly seconded, it was voted that the matter of national legislation on insecticides and fungicides be referred to the committee on legislation,—Dr. Twitchell to take the matter up with our Congressmen and push it in every possible way.

NOVEMBER 12—EVENING SESSION.

The chairman of the committee on resolutions presented the report of that committee, and it was voted to accept the report and adopt the resolutions.

A vote of thanks was extended to the orchestra.

RESOLUTIONS.

Resolved, That the Maine State Pomological Society wish to extend their thanks to the citizens of Waterville for their kind reception and the use of their two commodious halls that were so well fitted for our meetings and exhibitions. And the Society desire to express their appreciation of the faithful and efficient services of Daniel S. Berry and J. H. Fuller at the exhibition hall and the proprietor of the Elmwood Hotel for his efforts to make our stay in this city a very pleasant occasion and one long to be remembered. Also to Mitchell & Co. for the very enjoyable car ride to his extensive greenhouses and the attention we received on our arrival.

Respectfully submitted,

J. W. TRUE,
E. L. WHITE,

Committee on Resolutions.

MAINE STATE POMOLOGICAL SOCIETY, ANNUAL
MEETING.

WATERVILLE, MAINE, NOVEMBER 10-12, 1908.

INVOCATION.

Prof. HATCH.

We thank thee, our Father, for every opportunity that comes to us for the increase of our knowledge of the things of the earth and of the working of thy spirit throughout all the processes of nature. We thank thee that the call of God is a call to learn, to know. That is one of the first calls that came to man. By his own intuitions and by the necessities of his life was he called to go out and to subdue the earth. And we thank thee that in obedience to this call men have been subduing the earth by cultivating it, have been learning its secret processes and have been changing through cultivation the waste places of earth until they blossom and bring forth fruit. We thank thee, our Father, that thou art offering to man the gifts of the earth, for his cultivation, for his improvement. We pray that we may not forget that thou art offering to man also the fruits of heaven for man's cultivation, improvement, and for the working of them into his life until they become part of his very being. So we pray that in all our understanding and getting of knowledge we may get wisdom and understand thee, thy purpose concerning us,—not simply concerning our physical life, the material things which thou art showering upon us, but also concerning our soul, our spiritual life, and concerning the spiritual things which thou art showering upon us, offering to us in fullest abundance, that we may cultivate and develop life according to thy plan and purpose. We pray that these meetings now beginning may be of great inspirational value to those who attend, and that this value may come, enriched by the medium through which it comes, the heart and mind of those who attend, to others,—inspirational value for better work in the earth and concerning the things of earth, and also inspirational value concerning that spirit which is working in the midst of the earth, and in whose hands we are, and to whom we belong, and unto his name shall be the praise and the glory forever. Amen.

ADDRESS OF WELCOME.

Mayor BUNKER.

Mr. President, Ladies and Gentlemen:

In response to an invitation given to me this morning by your worthy President, I come here this evening as the representative of the citizens of Waterville to extend to you people who have gathered here this evening a cordial reception and welcome to the city of Waterville. It hardly seems necessary for this to be done, for when the invitation was given to you to come here, it must have necessarily been given in a sufficiently cordial manner to have warranted to you a warm reception when you came here, or you would not have accepted the invitation. But now that you have accepted that invitation and have gathered here, it behooves the citizens of Waterville to do all in their power to extend to you every courtesy possible. Our reputation as a city for hospitality and civic pride is well known, and if for no other reason than that we could not afford to allow our reputation in any way to be injured along this line, it behooves us all to endeavor to make your stay while in Waterville as pleasant as I am sure it will be profitable. We are always glad to welcome people to our city, whether they come here for the purpose of establishing for themselves a permanent home or come, as you have come, to consider these questions, industrial questions, which are so far reaching in their influence. We perhaps had a selfish motive in having you come here, and I trust that you will pardon us if it so seems to you. For we are well assured that by the influence of the meetings to be held here this week, by the questions that will come up for discussion, every person in this vicinity who ever desires to do any work along the line of fruit raising will be greatly helped and assisted. I was greatly surprised this morning when in conversation with one of your members, to find that this society had been in existence so many years. If I remember correctly it

was organized in 1873, and each year since then you have been holding your meetings and exerting your influence, travelling along these well marked lines toward helping yourselves, and not alone yourselves but your fellowmen. I believe the day will come when many, many acres of the State of Maine that are now going to waste and are unprofitable will be rendering a good profit to their owners by the production of fruits. And when that time comes I am sure that many thanks will be due this organization for the great influence that it has exerted. However, I did not come here this evening for the purpose of making any discussion in regard to your organization or your work, but I came simply as a representative of the citizens of Waterville to extend to you a cordial welcome, giving you the freedom of the city, and placing at your disposal whatever you may find of use to you therein, all of which I gladly do.

RESPONSE.

WILL E. LELAND, Sangerville.

Mr. President, Ladies and Gentlemen:

After listening to the cordial words of welcome to this beautiful city so fittingly expressed by your chief executive, it gives me pleasure in behalf of the members of the Maine State Pomological Society to offer a few thoughts in return.

This society has been organized thirty-five years and during that time its work has been carried forward, so far as state aid is concerned, with a very modest stipend. In fact, so much progress would not have been possible but for the generous support and hearty welcome which we have received from year to year.

The farmer's work is to grow trees, plants, animals. These are living organisms, consequently demand a higher intelligence to comprehend the laws that govern growth, selection, health and all the various conditions that pertain to the vital forces of living, sentient beings, than do other occupations that have to deal only with inert materials. It is the object of this society to encourage the fruit growing branch of our Maine farming, and our program is arranged to be instructive and helpful to

those directly interested. At the same time we trust that others may find entertainment and pleasure in this meeting, and give us the encouragement and support of their presence at these sessions.

“Give fools their gold, and knaves their power;
Let fortune’s bubbles rise and fall;
Who sows a field, or trains a flower,
Or plants a tree, is more than all.”

ANNUAL ADDRESS.

By President W. CRAIG, Auburn.

It is not my intention to take up much of your time with any extended address, but simply to point out a few necessary and specific requirements, emphasizing the lines upon which we must direct our attention in order to increase the usefulness of our society, and derive such benefits from the same as we would naturally expect.

As yet we are only a miniature form of a state society. Much credit is due those who have nurtured and guided our Pomological Society to its present state of efficiency; but changing conditions and the natural progressive evolution of the times demand more from us individually as well as from the society collectively.

Our members are increasing, but not as rapidly as we would expect, and I feel like joining with the poet in saying, “God give us men. A time like this demands strong minds, great hearts, true faith and ready hands.” Oh! for a few Marshall P. Wilders, who would be willing to devote their time and money towards raising our standards and enlarging our sphere of usefulness. We as a society cannot maintain efficient usefulness without continued effort to improve. You cannot balance a standing bicycle without either advancing or receding, so it is in our horticultural efforts as well as in our lives. We as a Pomological Institution should be an up-to-date missionary society, as it were. Its members and officers especially should be enthusiastic, well informed leaders, ready to go out at the call of our sister society, the Grange (with whom a closer

system of co-operation should be devised); or by assisting our fall fairs in making their horticultural displays more attractive, and eliminating the midway, the faker and the dancing girl, thus removing temptation from the direct path of our beloved young people, and inviting them to a closer acquaintance with the true and the beautiful.

But to return to our work in hand. Our programme is long and heavy. Too long perhaps for due consideration to all its parts, but our annual report, year book and various other channels through which our horticultural literature is disseminated, reach out over a broader field and are read by thousands who are not as yet members of the society. For this you will pardon a long program.

I await with interest the report of our committee on the standard package. Surely this question will be ripe now for action, and results are looked for.

The long expected experimental fruit farm must be purchased this year if at all, as the funds which are on hand for running it will soon be diverted into other channels. Other countries and states support several farms in different localities. I am fully of the opinion that if a judicious and careful selection is made, the farm ought not to be a burden but a glory to the State and practically self sustaining.

Following this on our programme is legislation to promote apple growing. I know our speakers, committee men and members will formulate a suitable measure to be presented before our next legislative assembly. These three measures if brought about will put us on a high and direct road to success.

"What's the trouble with the apples this year?" This pertinent question was asked by a local editor and is deserving of a reply. I would say that apples are only a chance or secondary crop in most parts of Maine. This year there happens to be a small crop, consequently the coddling moth and various other insects, including fungus diseases, had more disastrous results. The only sure remedy for this inferior fruit is to specialize. When we take as good care of the apple tree as a good dairyman does of his cows, or a flower lover of his plants, there will be no inferior fruit and these troubles will melt away like mist before the rising sun.

The Hood river people who have to ship their fruit nearly three thousand miles are supplying the best trade in our local markets. We who can grow just as nicely flavored fruit should not allow this to occur. I am informed that spraying is compulsory in those states, and when the owner fails to perform his duty in this respect it is done by the state and charged up to him. I bought a Hood River Jonathan today, paying five cents for the same; the box which contained 104 apples was bought from the wholesale house for three dollars, while our chance grown Nodheads were being retailed off the same bench for 10 cents per dozen.

The drought during the past season did not materially affect cultivated or mulched orchards but in grass orchards half the crop dropped before maturity. Business men, manufacturers, do not depend upon chances for the profits, they cooperate with each other in supplying their trade in the best possible manner, securing in consequence uniform and remunerative prices. Herein lies the secret of our success, and let us profit therefrom.

A kind Creator has endowed this beautiful land with grandeur beyond description. Can we not do our allotted parts in further ornamenting the shores of our crystal lakes and babbling brooks with healthy, prolific and verdant orchards holding their arms heavenward and whispering murmurings of hope and joy to us in this life and hereafter.

REPORT OF SECRETARY.

W. J. RICKER, Turner.

The apple situation of today presents itself in a very different form from that of a year ago.

Last year we were overburdened with a very large crop of not very fancy fruit; however, many sold at a remunerative figure, others shipped and failed to get returns and still others held for higher prices which never materialized. This year, on the other hand, we have but few apples which we can at any time throw on a market that is constantly growing stronger. The apples throughout this state so far as your secretary could ascertain, have been of a very superior quality, free from scab and in many localities, from the work of the codling moth.

Let us see why this small crop, for many trees blossomed well but produced only a few apples at harvest. We will go back a little. Did not these same trees bear heavily last year? This, together with the forming of fruit buds, left the tree with but little food stored up in its roots, trunk and branches, so this spring after leaving and blossoming it finds its food supply exhausted and gives up the attempt at fruiting for this season, but sets about making a new growth and laying by a supply of food for another year. This year above all other years to my knowledge, has been a year of droughts which together with the continued heat have caused a large per cent of our necessarily small crop to drop during the summer. It would thus seem that if we were more careful that our trees did not overbear in any one year and if we preserved a little more moisture in the soil, our hopes of a bountiful harvest would not be nipped in the bud so frequently.

It has been very gratifying to note that in many sections there has been more spraying done this season than for many years past. It is, however, too often the case that after a season of fungous invasion like that of a year ago, many take up spraying for a year or two and then, these years not being favorable to the development of the fungus and not seeing any marked advantage over neighbors who do not spray, the practice is given up and they fall victims to another bad year. There are never-

theless, many apple enemies which we have with us every year and which it is very necessary to keep down in order to produce a large per cent of fancy fruit. Many of these can be satisfactorily handled by spraying, at the same time we are insuring ourselves against the attacks of the fungus.

We have held in the past year two meetings. The first was held July 1st at Sunny Beach farm with our president, Mr. Craig. This meeting was very largely attended, fully 250 being present; the forenoon being given over principally to demonstrations in spraying and renovating of old trees. In the afternoon an instructive program was given covering many subjects. The second field meeting was held in Waterville on the farm of George Fred Terry. This meeting was not so largely attended but we trust was all the more beneficial to those present. The program was quite similar to that of the other meeting.

Only two meetings of the executive committee were held during the year, one at Auburn in January and one at Sunny Beach farm at the time of the field meeting, no special business coming before these meetings aside from the usual routine necessary to the workings of the society.

Reports of standing committee. (In the absence of Mr. Pope, member of Experiment Station Council, Dr. Woods was called upon to make a few remarks along the line that Mr. Pope would have taken.)

Dr. Woods. Ladies and Gentleman: I hardly know just what Mr. Pope would say if he were here. He would probably tell you that in April last the Experiment Station Council met—I wonder if you know what the Experiment Station Council is? It is a unique institution in connection with the Maine Agricultural Experiment Station. There is nothing like it, so far as I know, in connection with any other experiment station in the country. As you know, the Experiment Station is organized by the state as a department of the University of Maine, that is, under the control of the University of Maine, but they appoint a governing board which consists of the heads of staff of the Experiment Station, the President of the University,

the Director of the Station, three members of the Board of Trustees, and one member representing each of the various agricultural organizations in the state,—Commissioner of Agriculture, the State Dairyman's Association, the State Grange and the Pomological Society. And Mr. Pope is the member which you elected last year to represent you upon the Experiment Station Council.

Previous to the Council meeting the Experiment Station Director has prepared or obtained from his staff an outline of the work which they have been doing through the year and things which they would like to undertake, and that is typewritten, making perhaps twenty-five pages, and sent to each member previous to the meeting. Then when they come together at the meeting they do not take this matter up for the first time but it comes to them more or less familiar. And so all of the work of the Station for the year is discussed in the two days' meeting of the Experiment Station Council, and members make suggestions. We have had in the years past great respect to the recommendations that have come from the member of this Society, that we should undertake pomological problems, and the Station is ready to undertake more pomological problems than it has, provided it has an opportunity for doing the work.

We can help at present along certain lines which have to do with the diseases of the orchard and with the insect enemies of the orchard, but it is obviously impossible to do direct pomological work by way of investigations which must go over a series of years without having a definite orchard in which to work. Orono, unfortunately, is situated outside of the apple belt, so that work that could be done upon apple trees which are growing in Penobscot County would be of very little help and value to pomology in the state as a whole. In consequence we have had to do what little work we have done in orcharding that has been of much importance upon trees belonging to other people. For ten years, up to last year, the Experiment Station have been working in the orchards of Mr. Pope who very kindly placed them at our disposal. And certain kinds of problems could be undertaken. It is perfectly possible when we want to make experiments on potatoes or any kind of an annual crop, to go

upon somebody's land and make experiments which shall have some permanent value even though we have only a year's tenure upon the land. Experiments which need to be done in pomology are not experiments which can be made in a moment, nor one, or two, or five years. If we are ever going here in Maine to get at problems which are fundamental to our apple growing, we have got to do it upon land which shall be under the control of the experimenter, whoever he may be, for a long period of years. There are many problems which are not only of great scientific interest but of wonderfully profound practical importance, that cannot be solved perhaps in your lifetime or mine. But they should be undertaken and they should be undertaken fairly promptly. No one knows anything about the relation of scion to graft, for instance. We talk something about it, but one set of experiments which were made in France, entirely unsupported by anybody else, constitute all that we know of the relation of scion to graft—the relation between the stock and the scion. Now that can be carried out only through a long series of years of experimenting.

Two years ago this Society asked two things in resolutions. One was that the Maine Agricultural Experiment Station should give more attention in its work to pomology; and the second, in order that this should be possible, the State Legislature was asked to provide a farm in the apple belt which should contain orchards upon which the Experiment Station could work. Such a bill was introduced into the last Legislature in the Senate and referred to the Committee on Agriculture. At its hearing, every person that appeared was in favor of the bill. So far as I know every single member of the Legislature that ever heard of the bill was in favor of it, but for one of those reasons which are entirely unexplainable the committee in its wisdom reported that it should be referred to the next Legislature. The bill which is in the hands of the Secretary of the Senate, Mr. Dunbar, will come up in this next Legislature when it convenes, will be already there, and will probably be referred by them immediately to the Committee on Agriculture.

This farm is needed for many things. Don't misunderstand me. The Experiment Station is not asking for a farm. We don't want a farm from our standpoint. Only if Maine wants

us to take up pomological subjects, they must give us a place to work. We have funds that can be used for experimental purposes. But we have no funds with which we can rent land or buy land, and if we are going to do this kind of work it is necessary for us to have a place upon which to work. As many of you know, we were unable to retain Prof. Munson with us. He has been doing this work for many years. Another state offered him more money. We could have met that in the way of salary, but they offered him opportunities for work and we couldn't offer him opportunities for work in pomology because we had no place to set him at work, and we could not retain him. We have not filled Prof. Munson's position in the Experiment Station because we could only get men to come to us who would want to come for the sake of the salary, and we didn't want that kind of a man. We want men to come to us, like the rest of the Experiment Station staff, that are more desirous for work and opportunities than they are for money. We have upon our staff, and are retaining men that can get more money elsewhere than we are giving them, but they like their work, and we can give them opportunities for work such as educational institutions cannot give. They have the chance for investigation, for finding out new problems, and they stay with us. Give us a place for work and we can get a pomologist to come that will be ready to take up these problems.

Now, Mr. President, during this session in a business meeting I hope that we will pass a resolution reaffirming our position of two years ago, asking the Maine Agricultural Station to do more work in pomology, and that we respectfully ask the Legislature to pass the bill which is now in its hands which will give a suitable place for carrying out this work of investigation.

* * * * *

I want to explain why it is valuable for us to have the farm now and would be of no use if the state should do it two years from now. Through the efforts of the late Henry C. Adams, of Wisconsin, whom many of us remember as having come to the Dairymen's meeting some years ago, a bill was introduced into Congress and passed whereby the Agricultural Experiment Stations were further endowed by \$5,000, annually, to be increased \$2,000 each year until it should get up to \$15,000.

Our appropriation of this increased fund for this particular year was \$11,000, next year it will be \$13,000 from this new fund, the year after \$15,000, that being the maximum. As this money has come to us we have arranged for the expenditure of it. We have already planned for the expenditure of this \$11,000 in the work of the Experiment Station. After we have laid out a plan we cannot very well change without a large amount of loss. A farm given to us at this time will have at least \$4,000 that we can turn towards running it. Two years hence if the state should choose to give us a farm, if we were going to take it up to carry any experiments out we should need an annual appropriation from the state to go along with it. It is important if we are going to have it, to ask for it now. The Station itself does not need the farm. We have plenty of lines of work that we can take up that don't require a farm. But if the fruit interests want us to do work along their line it is necessary that we have this farm upon which we can work.

OUR PRESENT ORCHARD CONDITIONS AND A REMEDY APPLIED.

Professor E. F. HITCHINGS, State Entomologist.

The subject as announced is "Our Present Orchard Conditions" and I have changed it somewhat and taken the liberty to apply a little remedy occasionally. The orchards of Maine are as a rule in a very serious condition as the result of the extreme winter of 1906-7.

The very unusual weather conditions that prevailed over the greater part of the apple belt were never recorded before in the state. The climatic conditions of that winter were responsible for the general break-up of many of the most prosperous orchards in central Maine. The blow came when least expected and laid waste so many of the then thrifty trees that many of our orchardists gave up in despair, especially those who had good paying orchards established, upon which they depended for their life support. It was an especially hard blow to such parties who were well along in years and had planned and worked on what they supposed to be their stock in trade.

I have in mind many such orchards that will never be rejuvenated. In most sections there are still left standing the dead remains of what was once a flourishing orchard. One I recall in particular—I have a photograph of the same—where the trees are still standing, showing a once vigorous, healthy, paying orchard; now the bare trunks and bleached branches alone tell the oft-repeated story. The varieties were Ben Davis, Baldwins, Bellflowers, and Rhode Island Greenings.

Orcharding in Maine has never before had such a set back. We are now passing through a crucial period in the history of horticulture; some have bravely faced the music and with good old Yankee pluck have started in again to build up another orchard better than the first.

Never in the history of our "Pine Tree State" have the opportunities been so great for the advancement of those principles that go for the betterment of agricultural and horticultural interests. Never before was there so much need of a grain of leaven to enter the lump and permeate the whole commonwealth with its vital energy.

There is latent energy enough to satisfy even the most arrogant pessimist.

Why not lend your individual aid in the good cause and thus become a factor for good in the community in which you live?

There are names enough on the books of this Society to represent every section of the state. Of these how many are active workers in the good cause? Are you a silent partner in the concern and expect success to crown your efforts in behalf of rural betterment? What rate of interest do you expect on your investment?

President Roosevelt did a wise thing when he appointed a "Commission on Country Life" to investigate the conditions now existing, in order to suggest others that will tend to an uplift in our home life.

Not that there is more need of such an investigation in our farm life than in the city, but because the farm is the vital workshop of the nation and the more nearly this life approaches to the ideal, the better it will be for the health and happiness of not only the country life, but of the city as well.

There is no reason why each one of the fifty thousand farm-

ers in the state should not raise his own fruit. I have here outlined a diagram which shows that on one-half of an acre of ground enough fruit and vegetables can be raised to amply furnish a large family the year around with choice fruit.

The diagram shows a plot ten rods long by eight rods wide, laid off in checks one rod square. Select a good garden soil free from weeds. Line off in blocks two rods square, beginning one rod in from each edge. This will give room for twenty apple trees. Make a good selection of varieties to cover the apple season. When the apple trees are ordered, place on the list three cherry trees, three pear trees and six plum trees, together with six gooseberry, a dozen currant, fifty blackberry and fifty raspberry bushes, also two hundred or more strawberry plants.

Now you are ready for your orchard.

Line off the ground as before described. Set the apple trees first, then place the other trees as fillers in the following order: the three cherry trees in the centers of the first row of squares, followed by the six plum trees in the next two sets of squares, and the pears in the last row of fillers. Place the other small fruits in rows as suits your convenience and use the remainder as a vegetable garden. If this small patch of only one-half acre is well cared for each year, it will yield all the fruit, twice over, that any family can use. Of course you will have to wait a few years for the trees to give much yield, but try the experiment and you will be surprised at the result.

In whatever town our annual meeting is held, a few names are added to the list. Ninety per cent of these give because they do not wish to refuse when asked for a dollar to aid in the good work. They give a dollar, they hear the song, they forget the singer.

Why is there such an apathy among our farmers regarding orcharding in Maine? In nine out of every ten cases it is indifference, pure and simple.

There are some apple trees to be found on each of the fifty thousand farms in the state. There may be orchards on twenty per cent of these; that is, a collection of trees numbering from fifty upward. Of these ten thousand or more aggregations of trees, how many could be rightly called orchards? Perhaps fifty per cent.

Of these five thousand orchards, how many have modern or up-to-date methods of care bestowed upon them? Not one-tenth of one per cent. Do you dare contradict that statement? I cannot verify it but I believe it.

Now it is up to you, members of this Society, to bring about a radical change in the orchard conditions in the state.

There are grave problems to be faced. There are questions to be discussed at our firesides during the coming winter months, in your grange meetings, and wherever you may meet a brother farmer.

And right here I want to emphasize a statement made at the meeting last evening. Those of you who were present know that a chairman was appointed for a special work. That person was no other than Dr. Turner, one of our enthusiastic orchardists, and the sentiment expressed last evening was that each member of this Society must work with a certain end in view, and commence right away, not leave off with last evening's arguments but start right in this morning and keep it up. The idea was that we must have an experiment orchard in the state of Maine that can be handled, and in which experiments can be carried on, by the Experiment Station staff at Orono. Now the sooner this comes, the better it will be for the interests of Maine orcharding, and we must have it right away. I wish to emphasize the fact, and I would hold up both hands in favor of legislation this winter to that effect. Now let each member of this Society put his right foot forward, make an effort; use your own personal enthusiasm, whatever you may have,—get some more if you haven't got enough, and push the thing through with the aid of this gentleman who will see to it that everything will be done to further the cause.

I would recommend the appointment of an orchard committee in each subordinate grange whose duty it should be to arrange for an all day or evening meeting, to be held for the purpose of advancing the orchard interests of the state; fruit to be exhibited and papers read. A speaker might be secured where deemed expedient, or a general discussion could be arranged.

The fruit might be donated, sold at auction, and the proceeds go to pay the premium.

Although the present orchard conditions may seem discouraging, yet there is all the more reason why we should exert ourselves to regain what we have lost. Our failure should not put a damper on our effort to win. If we would apply the same sturdy, common sense methods to our orchards that we do to our other farming operations, success would surely reward our efforts.

We have the best of soil, the best of locations, and the best of climate for many varieties of apples. All we lack is a good honest application of first class stick-to-it-iveness, applied with a brush of business methods and a good blending of common sense.

What is the present condition of our orchards taken as a whole? Many trees, both young and old, are dead. A large per cent of the remaining ones are in a dying condition, many of these through lack of attention. Some could have been saved if they had been attended to in season, but a large per cent received their death blow in the winter of 1906 and 1907 and have lingered along, some dying last year, many more this season, and some will follow another year.

During the past season we have investigated by request about sixty orchards located in thirty different towns in the state. When I could not attend to the calls personally, a trained orchardist was sent to make the examination. In most cases the conditions were much the same. Trees were found dying, either as a direct result of the cold winter above mentioned, or by the presence of canker. Canker is a well known fungus disease of the apple, while fire blight is a bacterial disease. Both show on the specimen exhibited. Canker occurs in spots on the limbs, on the trunk, or in the crotches of the limbs. The bark is sunken and turns a dark brown, and may spread over the limbs, causing the death of the tree.

This disease may start where the bark has received an injury, either mechanical or as a result of severe cold.

Almost invariably some canker was found associated with the winter injury. The area covered included orchards in the following nine counties: York, Cumberland, Androscoggin, Sagadahoc, Lincoln, Kennebec, Somerset, Penobscot and Hancock.

The following treatment was recommended: Remove all dead and dying branches, scrape off all decaying or diseased bark, being sure to carefully clean up all infested canker spots. As a precaution, apply a strong solution of copper sulphate, and when dry paint over the exposed surface with a good coat of white lead and oil, to be renewed when the first is dry. This will keep out the air to prevent further decay. Of course the copper solution is to be used simply, you might say, as an insurance measure, to be sure that you have destroyed the spores or germs of the canker disease.

In cases where this treatment has been applied the effect upon the health and vigor of the tree has been very marked. Associated with this treatment should be a very judicious system of pruning so as not to leave too much top to tax the reduced energy of the tree. For example, if the bark on one-fourth of the trunk was dead, at least one-fourth of the top would need to be removed in order to restore in part the equilibrium of the tree.

In renovating old orchards I would remove all dead trees, root and branch, cultivate and fertilize for two or three years and refill with young trees.

Of course if only a few trees remain to the acre, it might be best to clean up and start anew in a different location. If fifty per cent of the trees have to be removed it would be a good investment to give the rest first class care, providing the remaining trees are healthy. A very low estimate for the value of a healthy, vigorous tree of good commercial variety, twenty to forty years old, would be \$20 each. With twenty trees left to the acre their value would be \$400. It would hardly be worth while to remove these and start over.

This may seem to be excessive but one has only to estimate a tree in value at the amount on which it will pay six per cent interest. Let us for a moment consider the actual expense per acre of keeping an orchard in an up-to-date condition. We will assume that the trees are set two rods apart and are of good size and in vigorous condition. The actual expense we will estimate as follows:

Cost:

Pruning	\$5.00
Cultivation	5.00

Cost:

Fertilizer	6.00	
Spraying	6.00	
Incidentals	3.00	
Totals	—————	\$25.00

Receipts:

2 barrels per tree—80 barrels	
80 barrels at \$1 net	\$80.00

Eighty dollars minus twenty-five dollars equals fifty-five dollars profit on forty trees, or at six per cent would give the value of a tree at about \$23 or \$920 per acre.

If you wish to figure it out in any other way, why figure it out in your own way, but figure it by some plan, estimate the value of your tree, and then go to work and do as thorough work as you do with your corn patch or potato field, and you will get results. I had the great pleasure of visiting some extensive orchards this fall. One orchard in particular, the oldest in that section—some of the trees were planted by the Indians—had the record of over a hundred years, and that one orchard will pay this year a net profit of \$6,000. Another orchard in a good vigorous condition—as you looked down the rows of trees you could see them loaded with apples, the branches bending under their weight—that orchard will net its owner this year \$14,000. Why, we had one owner here in this state show a check for \$3,001 for his apples, and yet we say that we cannot raise apples in Maine, that it doesn't pay. Now it does not pay to buy trees like some I examined last spring. I examined one lot of two thousand trees bought by one man here in the state this last spring that I wouldn't set out for them. They cost the man \$7 a hundred. If you pay seven cents for a tree, what can you expect to get? I would rather pay 15 cents and get a first class tree of some size, some vigor, some vitality. I will guarantee that half of those 2,000 trees are dead today. The man set them out at night, took about a month to set those trees, his good wife holding the lantern for him at night. They were set in grass land, a furrow was plowed where he wished his trees to set. The same gentleman set a thousand trees two years before and I don't believe there are ten trees out of that thousand that you would accept as a

gift. What is the use to do business in that way? No wonder we have poor orchards and we will have them just as long as we use such methods. We must get down to good common sense methods in orcharding just the same as we do with our corn and potatoes. If we don't we never will succeed in that line.

Now for the conditions: Accept the inevitable, be optimistic, have faith in the future. Plan for better orchards and see that such plans are carried out in the near future. Apply all the remedies that are effective and believe that "eternal vigilance is the price of success" in orchard management.

ORCHARD CULTURE.

By WILLIAM D. HURD, Dean of the College of Agriculture,
University of Maine.

That the apple industry of the state of Maine is a neglected one is only too well known by all who are interested in every branch of Agriculture. Having had opportunity to become quite familiar with two prominent orcharding states—namely, Michigan and New York, being employed one season in the apple growing region bordering the foothills of the Ozark Mts., and having been engaged for short periods of time in the other New England states where I have had a chance to observe closely the orchard practices of our nearby neighbors, I am more firmly convinced than ever that our state has the climate, the atmosphere, the available land, both in quantity and quality, and the natural conditions necessary to produce apples of better keeping quality, more free from disease, and insect injury, of a higher color and in larger quantities to the acre than any of the other states in which I have lived or with which I am familiar.

There is but one other crop in Maine that can approach the apple orchard in value per acre and that is the potato crop, with perhaps sweet corn as a close second. Statistics show that the value of potatoes in Maine last year was \$81.20 per acre; corn \$27.75; wheat \$26.50; oats \$22.26; hay \$18.75, while a

conservative estimate of the returns from an acre of land in a well cared for orchard, 30 trees to the acre, would be fully 100 barrels worth in any year at least \$150.

A short time ago I took occasion to note while on a trip covering about one hundred miles in a certain section of this state how many apple trees were to be found on the farms I passed and the condition of them. I saw place after place without a single fruit tree, and very few having more than a dozen. These I am sorry to say showed signs of the most utter neglect,—were scraggly, uncared for, sick. Men otherwise thrifty, neat, and who take pride in keeping good animals and these in good shape, seem to think that a tree can shift for itself. Trees respond quicker, and more easily to the touch of the pruning knife, the cultivator, or to careful feeding at the hands of man than any other object with which I have had to do.

Technically speaking I do not pose as an Horticulturist, although I shall have to confess to teaching, at one time, classes in most subjects pertaining to this branch of agriculture, but the subject of orchard culture, tilling and feeding the orchard, is a subject in which I am most intensely interested at present.

If you have been reading the leading agricultural and horticultural papers you must have noticed that there is great difference in opinion as to which is the best of the three or four principal orcharding methods to follow, and the question is far from being settled as yet. We must realize that successful orcharding depends on several things.

1. Proper selection and preparation of the soil.
2. Selection of proper varieties for the locality, climate, and that soil.
3. Proper care of the orchard throughout its growing period—this includes pruning, fertilizing, spraying, etc.
4. The marketing of the products when once produced.

I am afraid that lack of attention to selection of soil, varieties to plant, and the important fact that there is a certain amount of individuality in varieties and even in single trees is responsible for many failures. The proper preparation of the soil before the land is set to trees cannot be too strongly emphasized. Two, and better three, years before the trees are set the land should be plowed deeply, drained if necessary, and

a rotation of crops practiced which will put this land in the best possible shape, for after the trees are once set this cannot be so thoroughly and cheaply done. But granting that *you* as a Maine apple grower have given careful consideration to these important fundamental principles, what shall your system of cultivation and fertilization of that orchard be? These two things are all that I am to speak of today but I hope that everyone of the others I have mentioned will receive due consideration at this meeting.

There are at least four systems recognized and practiced by orchardists in orchard culture.

1. Growing the trees in sod, and leaving them entirely neglected.
2. Growing in grass land, cutting the grass for hay and removing it.
3. Growing in grass, cutting this grass, and piling it under the trees as a mulch.
4. Growing cover crops, turning these under, and tilling the orchard for a part of the year.

It is necessary in Maine too, to recognize that orchards are grown under two distinctly different conditions, namely: on land comparatively free from rocks, and that can conveniently be tilled; and secondly, on rocky, ledgy hillsides where cultivation is practically impossible. It is obvious that different systems must be adopted for these lands, and I shall try to keep these two conditions in mind.

It is needless to spend time to discuss the first system where trees are set in some place not considered valuable enough for other purposes and neglected. The sight of such trees is familiar to all, but anyhow this is not orcharding.

The second method, growing the orchard in grass, cutting this, and removing it for hay is a questionable and dangerous practice, and we see few orchards under these conditions which would be pronounced first class. The exception to this is now and then a case where large quantities of stable manure or commercial fertilizers are applied to more than replace the plant food taken out by the hay and the trees. The question for every orchardist practicing this method to ask himself is this: Am I in the hay business or am I in the orchard business?

Few realize that a ton of mixed hay such as we commonly find growing takes fertility out of the soil in large amounts. The following figures tell the story.

Nitrogen	Potash	Phosphoric Acid
1.37%	1.54%	0.35%
		20 cwt.
27.4lbs.	30.8lbs.	7lbs.
18c	4½c	5c
\$4.93	\$1.38	\$.35

Total = \$6.66 for plant food in 1 ton hay.

This taken together with that which goes to building up the tree, the leaves, and the fruit, shows how large the drain on the fertility is under this system of management. Hay is the curse of the apple business as well as the run-down farm in the state of Maine today.

The third method, that of growing the orchard in grass land, using all the grass as a mulch under the trees, has been widely discussed, being championed by Mr. Hitchings, of New York state. Mr. Hitchings' farm is naturally good grass land, and a visit to the place is well worth the expenditure of time and money. Heavy hay crops have been piled under the trees for years until a thick pad or mulch of decaying vegetable matter has been formed into which one sinks ankle deep when he walks through the orchard. The windfalls drop and are unbruised, the trees are low headed and thrifty, the pruning is done so that the trees are open and the fruit takes on a high color. The fact that apples from this orchard have taken first prizes at St. Louis, Buffalo, and the Paris Expositions in competition with others grown under different systems causes one to wonder why the method is not adopted on a larger scale.

The fourth system, that is, growing cover crops, turning these under, and practicing clean cultivation for a part of the year, seems to be the best method to use on lands which can be easily plowed and harrowed. The beneficial effects of tillage are the same in an orchard as in the open field, namely, that tillage renders the mineral elements in the soil more available,

increases the moisture-holding capacity, forms a dust mulch thereby lessening the loss by evaporation, improves the texture of the soil, gives opportunity to incorporate more humus in the soil, increasing the growth of bacteria and their action; and what is perhaps exceedingly important in orcharding is the fact that stirring the soil disturbs and turns up to destructive agencies many thousands of larvæ or the injurious insects themselves which may be hibernating in the soil.

In considering the fertilizing of orchards we must not forget that nature has provided a vast store of plant food in the soil largely in an unavailable state, which can be brought into use most economically by the use of the plow and harrow.

Somehow the impression seems to be abroad that orchards take very little from the soil. As a matter of fact they deplete the fertility of soils to a greater extent than most grain crops. While the area from which the tree gathers its food is larger, the fact that no rotation or change of crops can be practiced makes this depletion even greater after a period of years than in the case with other crops.

The following figures clearly show what the comparison between the orchard and a wheat crop, for example, is:

20 years' apple orchard — trees 35 feet apart — 10 crops, removes

Nitrogen	Potash	Phosphoric Acid
1,336 lbs.	1,895 lbs.	310 lbs.
18c	4½c	5c
<hr/>	<hr/>	<hr/>
\$240.48	\$85.28	\$15.50
Total = \$341.26.		

20 years' wheat, 15 bu. grain and 2100 lbs. straw to the acre, removes:

Nitrogen	Potash	Phosphoric Acid
658 lbs.	210 lbs.	128 lbs.
18c	4½c	5c
<hr/>	<hr/>	<hr/>
\$118.44	\$9.45	\$6.40
Total = \$134.29.		

No one would think of growing potatoes or corn twenty years in succession without fertilizer. Is it any wonder that old orchards do not yield well?

In no branch of agriculture is there a better chance to avoid paying 18c. a pound for nitrogen than by allowing bacteria to trap nitrogen from the air and store it up in the roots of plants grown as cover crops. For years the orchard at the University had the following treatment. The land between the trees was plowed early in the spring and frequently harrowed until about July 15th. Crimson clover, winter vetch, or rye was grown and allowed to occupy the land until the following spring when the same thing was repeated. The clovers and the vetch both belong to the family of plants in the roots of which certain bacteria store up nitrogen taken from the air. In our case the vetch proved the hardier and better of the two crops.

An ordinary crop of crimson clover in the green state (8 tons to the acre) will carry to the soil—

68 lbs. Nitrogen
20 lbs. Phosphoric acid
78 lbs. Potash

Worth in all about \$17.00.

Vetch will return (8 tons to the acre green)

102 lbs. Nitrogen
23 lbs. Phosphoric acid
64 lbs. Potash

Worth about \$22.00.

Red Clover returns (8 tons to the acre green)

68 lbs. Nitrogen
22 lbs. Phosphoric acid
78 lbs. Potash

Worth about \$16.00 as a fertilizer.

Every other year or once in three years rye was used in place of the vetch in order that the soil should not become too rich in nitrogen, causing too much soft wood growth in the tree. By carefully watching the trees, how often the nitrogen gatherers should be sown can be determined. The potash and phosphoric acid costing much less than the nitrogen can be supplied in chemical form. More than the supplying of the nitrogen or the conserving of plant food and water which otherwise might

be lost, this sowing of a vigorous "hungry" crop in midsummer stops the rapid growth of the trees caused by early tillage, by taking into itself the plant food which would otherwise be taken by the tree, the new wood hardens down before freezing weather, and there is far less danger from winter killing. The heavy matting of vegetation protects the soil, holds the snow, and prevents washing and gullying during the winter.

Comparing this system of cover cropping and tillage with the opposing system of grass or mowings Experiment Stations have found interesting and valuable results. Let me quote the results of the investigation of the Nebraska Station in this direction. Their report says "Trees in cultivated ground suffered less from drought and drying winds than in sod. No yellowing or dropping of the leaves was noticeable in the cultivated plots. The apples in the cultivated orchard averaged 14% larger in weight than in the pastured orchard, and 17% larger than where the land was mowed."

Other stations have found that trees grown under cultivated conditions have superior root systems to those uncultivated.

At the Woburn Experimental farm trees set in sod made from 35% to 41% less wood growth the first year, and from 74% to 87% less wood growth the second year than trees under cultivation in the same orchard. More than this, the first year these trees bore fruit the yield of the trees in sod was reduced 71% and the value of the fruit 82%.

Instead of being used to encourage the growth of trees, sod or grass is used to check growth and may for the time being induce fruitfulness.

If you do not desire to cultivate your orchard, at least keep five or six pigs per acre and let them do the cultivating and devouring windfalls containing eggs of insects which may cause trouble later on. That it pays to cultivate and care for an orchard is shown by the photographs which I submit for your inspection.

While I have condemned the practice of growing hay in an orchard and selling it, I would not say that cropping an orchard with cultivated crops was not desirable or not a commendable practice. Providing proper fertilizers are used in the right quantities, certain crops can be grown in an orchard, especially

in a young orchard, and these crops can be made to more than pay for the labor put on the whole. Potatoes, corn, beans, small fruits, and root crops are all well suited but be sure that these crops do not rob the young trees of the plant food which belongs to them. Decrease each year the number of rows as the trees grow, and dig up around each tree so that the entire area receives cultivation. This practice gives the necessary tillage and often almost as much can be secured on this land as when unoccupied by the fruit trees. This cropping of orchards need not be confined to young orchards, in fact one of the best 25 year old Baldwin orchards I ever saw produced between the rows of trees enough silage corn each year to feed 26 head of dairy cows, but the dairy herd in this case was kept for the support of the orchard primarily, all the manure being used to feed the trees—very little commercial fertilizer being purchased.

So much, then, for the culture of orchards where tillage and cover cropping is possible. But how about the Maine orchards—and there are many of these—where cultivation is impossible, those on rocky hillsides where the soil is shallow and likely to dry out frequently? There are thousands of acres of land in this state which, in my judgment, never should have been cleared; but now that this has been done it would seem that since they are too rough to be profitably tilled they should either be planted to apple trees or reforested. I have tried to show that cultivation of orchards was a method of feeding them. How shall this orchard that cannot be cultivated be fed?

It must manifestly be done either by using stable manure as a top dressing or by the application of commercial fertilizers. Nitrogen, potash, and phosphoric acid and possibly lime are the elements most needed. While not positively understood at present, it is supposed that these four elements influence the growth of fruits as follows:

Nitrogen causes wood and foliage growth so essential to the life of the tree and its power of production.

Potash is supposed to directly affect the size and quality of the fruit, constituting more than half of the ash, and combining to form salts with well known acids.

Phosphoric acid is supposed to affect quality and in excessive quantities to help in the coloration as well as to hasten maturity of fruit and branch.

Lime seems to strengthen the stems and wood, shortening the period of growth, and also hastens the ripening. At any rate trees grown on soils containing lime have these characteristics over trees grown on soils, especially clays, lacking this element.

Care should be exercised in using soluble forms of nitrogen as a top dressing that excessive quantities are not applied at any one time. Potash and phosphoric acid, on the other hand, are not easily lost and better fruit is usually obtained where larger amounts of these two elements are used than is needed.

This matter of care in the use of nitrogen leads me to call to your attention the so-called "Fisher Formula" which has been used quite widely in this state. It has the following composition:

8.6% nitrogen
3.3% phosphoric acid
11.9% potash

and was recommended to be made from the following materials in the proportions as here given.

350 lbs. nitrate soda
150 lbs. sulphate ammonia
230 lbs. sulphate potash
200 lbs. acid phosphate
50 lbs. Kieserite

Experiments covering four years by the Maine Station (work of Professor Munson published in several bulletins) proved that this percentage of nitrogen was altogether too large and was no doubt a waste of money.

Probably a fertilizer analyzing about 4½% nitrogen, 7% phosphoric acid, and 10 to 12% potash would give just as good returns. Make this from soluble materials like nitrate of soda or sulphate of ammonia to furnish nitrogen, acid phosphate as a source of phosphoric acid and muriate or sulphate of potash for this element. The following formula might be suggested:

600 lbs. nitrate soda (15% nitrogen)
1000 lbs. acid phosphate (16% phos. acid)
400 lbs. muriate potash (50% potash)

But I should emphasize here again the practicability of getting nitrogen from leguminous cover crops whenever possible and thus saving a large part of the cost for nitrogen in this fertilizer.

Apply 10 to 15 lbs. broadcast under the trees early in the spring over a little wider area than that covered by the spread of the tree.

Do not use ground bone, tankage, or other animal products as a top dressing as much of their value is likely to be lost before they become available to the plant.

In closing perhaps I should reiterate what I said at the beginning, that orchard culture and fertilizing are but two of the things that should receive careful attention by the progressive orchardist. The first step toward a profitable orchard is the growing of a strong, vigorous, healthy tree. Proper preparation of the land before setting the trees, proper cultivation, the addition of humus and fertility by means of cover crops, tillage to liberate the mineral elements and the judicious application of plant food to orchards so situated that cultivation is impossible, are the fundamental factors which place within the tree itself the power to thrive and grow, and yield fruit which will command top price in the market and bring back to the grower satisfactory returns.

Mr. THORPE: I feel that it is a big loss to the state, and especially this section of the state, that there are not five hundred or more farmers and apple growers present. We are glad to see all that are here, but I can't understand why five hundred that are within ten miles' driving distance are not here. Now when I was growing apples, or trying to, I didn't let such chances pass, and I got results. Many points of value to orchardists have been brought out in these papers. I was especially interested in the matter of cultivation taken up by the last speaker, that is, the effects of cultivation as shown this summer and at other times. I believe most thoroughly that if we can cultivate an orchard, as he expressed it, and at the same time get other crops from that orchard by putting back the fertility that is taken, that is the way to grow fruits; especially when we get the drought that we have had this summer, and frequently get. By this cultivation we can control the moisture, as has been shown by the abundant crops of potatoes grown this summer. We can control it in this way as we can in no other way. I have been over the state quite extensively this summer, and it has never been brought home to me as fully as

this summer what effect cultivation and frequent crop rotation, short crop rotation, have on the soil, securing the growth of hay and other crops rapidly before the moisture has been depleted by the drought. I was at a grange in Penobscot county this fall and tried to speak to them a little on this matter, and when I got through some questions in regard to some of these things came up and I was most agreeably surprised to find that a goodly number of those farmers present were fully as well qualified to talk on that subject as I, and I had been giving it a little special attention; but they got right hold of the heart of the matter. And the point is, as I found it, there isn't a lack of knowledge in many of these lines, but we don't make the application.

MAINE ORCHARD DISEASES IN 1908.

W. J. MORSE, Plant Pathologist, Maine Agricultural Experiment Station.

During the past summer my associate, Doctor Lewis, and I have spent considerable time in studying conditions with regard to fungus diseases as they occur in Maine orchards. The following towns have been visited at least once and some of them several times:—Auburn, Lewiston, Turner, Monmouth, Leeds, Winthrop, Readfield, Manchester, Augusta, Hallowell, Gardiner, West Gardiner, Standish, Baldwin, Anson, Waterville, Dover and Foxcroft. Members of this Society have assisted us materially, either in sending us names of orchard owners or in personally giving their time in taking us to other orchards or in showing us over and pointing out interesting features in their own. We are also considerably indebted to several members, particularly to the President and Secretary for sending us various specimens of fruit and leaf diseases as they came to their notice.

As a result of our observations certain facts are very evident. One is, that while there is plenty of need for investigation along the lines of orchard pathology there is a much greater

need of intelligent application by the fruit growers of the knowledge already at hand, particularly with regard to the treatment of the more common and destructive diseases of the apple. For example, it is well known that thorough pruning out and burning of all diseased, dead, and decaying wood, the immediate removal from the orchard and destruction of all diseased fruit, and yearly spraying of the trees are most effective methods of combatting scab, the various forms of fruit rot, limb canker, etc., but how many men do you know who ever make an honest attempt to do these things as they should be done? I do not mean by any means that there are no well cared for orchards where we have been. I have seen several and there are scores of others, but there is no reason why there should not be many times the present number. Frequently this apparent neglect is due to the scarcity of efficient help, and again the orchard may be only a side line, the owner being content to take what he can get of third-rate fruit without any care in return. As a people we New Englanders believe in the gospel of the "square deal," but is it a fair thing to dig a lot of holes in the greensward, frequently too close together, put an apple tree in each hole, call the collection an orchard and then leave it alone, trusting to the Lord to do the rest? Is it not asking a little too much of the Lord? Yet that is the way that most New England farmers do—good farmers, too, who look after their other crops and their stock in the most careful manner. I confess that that was the kind of orcharding that we used to practice when I was a youngster on the home farm and all our neighbors did the same.

Every man who has a dozen apple trees or grows a half-acre of potatoes should own, hire or borrow a spray pump *and use it*. Bordeaux mixture should be used every year whether there is a prospect of a crop of fruit or not. It should be looked upon as a form of insurance. It is more than that, for it not only protects the fruit crop from diseases in unfavorable years but it also helps to keep the foliage healthy, thus making the trees more strong and vigorous. With some plants, like the potato, it actually appears to stimulate the plant, giving a darker and healthier green to the foliage.

In this connection it is only fair to state that under certain conditions of the weather, not fully understood, bordeaux mixture may cause some injury to the foliage of the apple. This happens only occasionally with us and apple scab alone causes far greater injury yearly than does bordeaux mixture, in the infrequent seasons that such injury occurs. To avoid spray injury, Hedrick who has made an exhaustive study of the subject makes the following practical suggestions:

“Use less copper sulphate; give the 3-3-50 formula for bordeaux mixture a thorough trial. Spray in moderation; spray to cover the foliage and fruit with a thin film and yet not have the trees drip heavily. So far as possible the bordeaux mixture should be used only in dry weather. Use equal amounts of lime and copper sulphate (I might add for myself, use scales and not guess-work in measuring the ingredients). Some varieties of apples may be sprayed without much fear of injury. Others must be sprayed with great care. Distinguish between varieties in spraying operations.”

For a list of varieties classified as to immunity to bordeaux injury see page 142 of Bulletin 387 of the New York Experiment Station. A copy of this publication can be obtained gratis by addressing the Experiment Station, Geneva, New York.

Before taking up some of the fungus diseases which we have found destructive in Maine orchards it may be well to consider briefly what fungi are. Fungi are forms of vegetable life not so highly developed as the more conspicuous plants with which we are familiar. They are without green coloring matter, and are thus unable to manufacture their own food materials. Hence they are dependent upon the higher plants or animals for their food supply. The majority may be divided into two great classes: The *parasitic*, which secure their nourishment directly from living organisms, like the apple scab fungus, and the *saprophytic*, those which live on dead organic matter as is the case with the blue mould on the jelly tumbler, or certain fungi which cause decay of dead wood. There is no real hard and fast line between these two divisions for many parasites can adapt themselves to a saprophytic existence. Some typical saprophytes may act as parasites as in the case of some ripe

rots of fruit where the fungi are capable of penetrating the thin skin and invading the living cells. Others can only get in through bruises or wounds in the fruit. We also have a class of fungi which normally are confined to dead wood but wherever there is a cut or a bruise on the tree, for example, a pruning cut which is improperly protected, then these fungi may get in and actually cause a slow destruction of the tree. These slow acting fungi do much more damage in the orchard than is usually supposed.

Fungi are made up of little threads, usually colorless, which in the case of parasites penetrate the tissue of the fruit, leaves, or wood, killing the living cells and drawing their nourishment from them.

Fungi are reproduced by means of minute bodies called spores which take the place of the seeds of higher plants. Many fungi produce more than one kind of spores, and frequently special bodies are formed for the production of spores, for example, the little black spots on the surface of an apple affected with black rot contain and give off hundreds of spores. The shelflike growths on the trunk of an old apple tree are but spore bearing organs of a fungus growing within and causing decay. These spores are carried about and distributed by wind, water, insects, etc., and when they fall upon other plants or other parts of the same plant under right conditions, germinate and enter the tissues to continue their destructive work.

In this hasty discussion of fungi there are one or two things which I wish to emphasize. *First, that every decaying limb, every rotten apple on the tree and on the ground, every bit of rubbish allowed to collect and remain in the orchard may be a breeding place of trouble and daily give off thousands of spores, each capable of causing a new center of disease.* That picturesque shelf-like growth on the old neglected apple tree in the fence row or by the roadside, or that rough light colored growth on the under side of a limb killed by the frost two winters ago, or that untreated limb canker is yearly producing a crop of millions of little spores, each ready to fall in the exuding sap of a wound in some nearby tree, germinate therein, and throw out little tubes and threads to penetrate the heart wood and thus begin the slow but sure process of decay right

over again. Hence, we should remove and burn all spore producing material. This should be supplemented by spraying, to cover the healthy portions of the tree with a material like bordeaux mixture, which is fatal to fungus spores whenever they come in contact with it.

As might be expected, we find that apple scab in Maine is responsible for more loss in dollars and cents than is any other fungus. The loss from this disease is largely in reducing the percent of No. 1 apples and not in the destruction of the fruit, as is the case of most fruit parasites. However, scab may open an avenue for entrance of other fungi, like the pink rot, which do cause decay. Last winter we had a manifestation of the work of the apple scab fungus which was new to most of us. Ordinarily there is no marked development of scab after the apples are picked, but a year ago following a very wet summer, in many cases No 1 apples taken out of storage after several weeks were found to be covered with many minute black spots the size of a pin head and smaller. These did not appear to be characteristic of apple scab but examination showed this fungus to be apparently the only one present. It is probable that most of this trouble could have been prevented by proper spraying during the summer. Scab may also do considerable injury to the leaves of certain varieties of apple trees, even causing defoliation. It is safe to say that 75 to 95 per cent of the loss from the scab fungi might be avoided by proper spraying.

The black rot fungus without doubt is entitled to second place as to distribution and destructiveness. It causes a complete and rapid decay of the fruit, often while still on the trees; it is claimed to be responsible for serious injury to the leaves by spotting, thus weakening the entire tree, and in Maine it causes our most common canker on the limbs. Black rot on the fruit is easily recognized. It first appears as a light brown circular decayed spot on the surface of the apple which rapidly widens showing rings or zones. Later this decayed area becomes darker and concentric circles of little black dots appear, beginning near the center and working outward. Still later the black spots may extend pretty well over the surface and the skin becomes wrinkled and often quite black in places. The little spots are the fruiting portion of the fungus and contain hun-

dreds of little spores ready to fall out and infect other apples. On October 17, Doctor Lewis and I saw a young Alexander tree near Lake Grove, Auburn, where the entire crop of at least four bushels had been entirely destroyed by this fungus. Some still remained on the tree but every apple was either more than half or wholly decayed. Here again, spraying along with the removal of diseased apples and all cankered areas from the limbs of this and surrounding trees would have insured a sound crop in the place of total loss. We have also found black rot on pears taken from a tree in Manchester and on quinces on sale at an Orono market, but grown outside the State.

We are now working upon the fungi which cause the decay of apples in Maine and find that there are more of these than we had any idea of. Doctor Lewis has isolated at least seven different species of fungi which apparently cause or are capable of causing decay of healthy apples on inoculation.

Some of these fruit decaying fungi were isolated from diseased spots on the leaves, some from decaying fruit and some from both fruit and leaves. In this work one interesting conclusion has forced itself upon us, namely, that it is not always safe to look at a diseased spot on an apple and say off hand that it is caused by a certain individual fungus. For example, out of one small decayed spot, Doctor Lewis isolated eight different species of fungi, and at present there is some evidence to indicate that at least four of them can probably, under favorable conditions, cause more or less decay independent of each other. This is not an exception for several other cases have been found where there were several fungi associated with a single decayed area. It is possible, also, that certain fungi can only cause decay when growing associated with certain others. We know that pink rot makes use of scab patches to gain an entrance to the fruit. Again the lesson comes home to us that thorough spraying will tend to remove the danger of fruit decay by killing off the spores and keeping the fungi in check during the summer. It also emphasizes the necessity of careful handling of fruit, for many of these fruit decaying fungi are unable to gain entrance except through wounds, bruises, or punctures and tunnels made by insects.

Another line of inquiry which we have been following up this season is with regard to the amount, distribution, and causes of leaf spot of the apple. We find that this trouble is almost universal in Maine, no locality or variety being free from it except, possibly, in the case of some of the varieties grown under conditions in Aroostook. In very many cases it has been found to be very severe, even causing considerable defoliation, and without doubt does much to weaken the vitality of the trees. By the leaf spot I mean the little dead, reddish-brown areas, usually nearly circular in outline, which are found scattered over the leaves. Other names such as "frog-eye," "brown-spot," "leaf blight," etc., have been applied to it. Recently it has been shown that the same fungus (*Sphaeropsis malorum* Pk.) which, as has already been stated, causes the black rot of the fruit and the more common limb canker, is also responsible for a simliar if not identical leaf spot in the Ozark apple region. This is a very important fact and we felt that we should at once determine if the same thing is true in the Maine orchards. If it is, a campaign waged against one of these maladies should be directed also toward and be effective against the other two. If it should happen that other fungi with us may also cause leaf spot we should determine this fact and thoroughly study the fungus in question so that we may be able to intelligently take up the question of its control. Leaves were obtained from 9 different towns, sometimes from several different orchards in a town, representing the counties of Cumberland, Kennebec, Penobscot, and Piscataquis. A surprising number of different fungi were secured from these spots, but doubtless the majority of them are saprophytes following along after the tissues are killed. The only way we can be sure of which of them are responsible for the injury is to spray the spores on healthy leaves and see which produces the disease. Unfortunately it was so late in the season when the work was started that all inoculations in the field failed to produce results. However, we now have a small greenhouse at our disposal and have made arrangements to fill it up with seedling apple trees this winter upon which we shall test out the cultures. If we

are successful we hope by another summer to be able to say just what fungi cause the leaf spot in Maine.

In closing I wish to repeat and emphasize what has already been called to your attention; namely, that anything in the line of specimens of fruit rots, leaf spots, or fungous diseases of any kind which you may send to the Station will be very much appreciated. In this way you will help to make the work of our department more effective and helpful to the pomologists and all others who are growing crops in Maine.

THE CHERRY.

By S. G. SHURTLEFF, South Livermore.

While the transactions of the Maine Pomological Society have included ample discussions of the various fruits grown in this State, these discussions have not, so far as I have observed, included the cherry. It is exceedingly strange that so desirable a fruit, a luxury within the reach of any person who owns half an acre of ground, should be so underestimated. Its value is recognized in Europe where it is universally grown, in some countries, it is said, more than any other fruit. In this country it is not grown to any extent; in most sections seldom found in the farmer's garden. In Maine it is perhaps less grown than in any other state.

In recent years canned fruits have become an important branch of domestic economy. Among the various fruits used for this purpose none are more valuable than the cherry. Many fruits lose in flavor in canning. Not so with the cherry; some varieties improve in flavor in canning, especially the sour varieties. For this purpose alone this fruit should receive more attention.

Again, in early summer at the commencement of the hot season, the appetite is capricious, it craves fruits, especially acid fruits. It is at this season the cherry ripens; and it is exceedingly welcome, not only on account of its delicious flavor, but also because it is exceedingly wholesome. As an article of diet the red varieties seem to supply just what nature calls for.

What sight on the farm is more beautiful than a tree loaded with big, ripe cherries? What fruit on the farm so delights the children? Why, then, is a fruit so desirable not more generally grown? The first reason is because of an impression quite prevalent that it is more difficult to grow than other fruits. The black knot, it is said, will put in an appearance, weaken, and soon destroy the tree. If the tree escapes the black knot the birds are sure to take the cherries; so the farmer selects fruits not subject to these drawbacks. Some varieties of cherries are too tender to endure our severe climate, and failure has sometimes resulted from the selection of wrong varieties.

The cherry, it is true, requires somewhat different treatment than other fruits. Of course it is expected that the more delicate fruits like the plum and the cherry require higher cultivation than the more common fruits like the apple. Also the cherry requires higher cultivation on our thin worn-out soils here in Maine than on the more fertile soils farther south. Under suitable conditions, however, the cherry is not difficult to grow. While the farmer seldom undertakes to grow the cherry, it is a common thing for him to grow the plum. Now it has been my experience that the cherry is more easily grown than the plum. The tree is hardier, more prolific, longer lived, and less subject to the black knot. But it will not thrive on all soils and under all conditions. It is more particular about soils and conditions than many other fruits. It is because this is not more generally understood that many have met with failure.

There are certain conditions essential to successfully grow this fruit and these conditions must be observed. This point I wish to emphasize: The soil must be deep, the deeper the better. It must also be dry, light, mellow soil, no matter if somewhat inclined towards sand or gravel, if deep. No other tree is so impatient of moisture. It will not thrive in wet impervious soils. The soil should be porous well down into the subsoil. The character of the subsoil is of as much importance as the surface soil, perhaps of more importance. The drainage must be perfect; and for this reason sloping ground is better than level ground as the water after a rain can more readily drain away.

If, then, success depends upon deep, dry soil, if the ground is not already in that condition it must be made so. More usually depends upon the preparation of the ground before the tree is planted than upon after cultivation. This does not mean that the cherry costs more than other fruits used in canning. The cultivated raspberry and blackberry require annual care. The strawberry must be reset every year and requires constant care to keep the weeds down. The plum is a short lived tree and an uncertain bearer. But the cherry, once properly planted, will yield fruit thirty or forty years often without further care.

Is the cherry hardy enough for this latitude? It is true that most of the sweet varieties are tender and will not endure our winters. Central Maine is near the northern limit of fruit growing and many fruits are liable to suffer from the severity of our climate. The sour varieties and possibly the Blackheart of the sweet varieties seem to be quite as hardy as the common varieties of the apple, as the Baldwin or Greening.

The sour cherry has been growing in my neighborhood for more than eighty years and the Blackheart for fifty-five years, apparently perfectly hardy and seem as thrifty today as fifty years ago. The Governor Wood, Downer's Late and May Duke, sweet varieties, have done fairly well in favorable situations but cannot be depended upon.

Every set of buildings, whether on the farm or in a village, should have shade trees near to give variety to the surroundings and make them more attractive. There is a sort of a desolate look where there is not a tree or shrub to break the monotony. Now the cherry is a sort of a domestic tree. It delights to grow near the buildings. The cellar, being so much deeper than ordinary drains, furnishes excellent drainage for quite a little distance. So also does the well. The earth thrown out in digging the cellar furnishes a deep soil in which the roots of the cherry tree readily penetrate. These seem to be ideal conditions for the cherry. No better tree can be selected for such shade trees than the cherry as it combines both the useful and the ornamental.

Fifty-five years ago my father planted several Blackheart trees in the front yard of our dwelling. Two of our neighbors having no shade trees in their front yards did the same. These

trees made rapid growth and bore fruit abundantly nearly every year for about thirty-five years. There were so many trees in the neighborhood that the birds caused no annoyance, making little impression on the quantity of fruit. On one place in the neighborhood the sour cherry has been growing for more than eighty years on the same spot and the trees were loaded with fruit the past season. All the aforementioned trees after they were planted received no further care. As the late L. B. Peirce said of his trees: "They came nearer working for nothing and boarding themselves than any fruit I grew." Other neighbors are growing the Montmorency cherry—the oldest trees in bearing, planted thirty years ago. There are thousands of homes in Maine, both on the farms and in villages, where there are, around the buildings, spots of more than ordinary fertility suitable to the cherry, where, once planted, it would thrive without further care. It is one of those things, now neglected, that would help make farm life more attractive. These seems to be an awakened interest in regard to its cultivation in other states. Prof. F. H. Bailey says: "There seems to be a general inquiry among farmers and fruit growers concerning the care of cherry orchards, the most desirable varieties, the diseases, and the best methods of handling and marketing the crops. As these matters become better understood the cherry industry may be expected to reach a prominent position among other horticultural industries."

Wherever in other states it has been grown for market it has proved a most profitable crop. In the present number of *Green's Fruit Grower* (November, 1908) a writer says: "From one hundred trees I sold the present season one hundred and fifty bushels of cherries at three dollars per bushel." This may be a large yield from less than an acre, but the cherry responds readily to intensive culture. Profits of forty dollars or thereabouts are reported from trees planted near the buildings as shade trees. Wherever the sour varieties have been grown for canning the demand has always exceeded the supply; and the demand will become more urgent as its value for this purpose becomes more generally known.

It won't pay to grow but one tree of any variety. It will only prove a vexation. There will be only about what fruit the

birds want. Plant several trees so that the fruit will be so abundant you will not begrudge the birds their share. They molest the sweet varieties much more than the sour. Where one has several trees of the sour varieties the birds will cause but little annoyance; for market and for canning the fruit is gathered before the birds begin to molest.

There are two classes of cherries each having distinct characteristics. The heart cherries, so called because heart shaped, are sweet and fine for dessert, the tree large, attaining a height of about forty feet. The sour varieties are best for cooking and canning, and when fully ripe quite good eating from the hand. The tree is of smaller size and the fruit more easily gathered. The best varieties are English Morello and Montmorency. The English Morello is a dark red cherry becoming nearly black when fully ripe, tender, juicy, quite acid but rich, one of the best for canning. The tree is of dwarfish habit and comes early into bearing, often in four years under good treatment. The best variety for domestic use or for market is the Montmorency. The tree is hardy, healthy, quite free of the black knot, very productive and comes quite early into bearing. The fruit is large, red, tender, juicy, unexcelled for canning, and when fully ripe, of high flavor, with just enough acidity to be particularly refreshing.

This young cherry tree when planted should be pruned differently from most other fruit trees. The buds on the shoots are stronger and more active nearer the terminals and feebler nearer the stock. Hence in shortening back with other trees you remove the strongest buds. With the cherry this should not be done. Some shoots should be left the whole length; while the shoots removed should be cut back close to the stock.

LEGISLATION TO PROMOTE APPLE GROWING.

Dr. G. M. TWITCHELL, Auburn.

Mr President, Ladies and Gentlemen:—Perhaps it may be well for me to preface what I say with just a little explanation of what has been done in the past. Four years ago, after a thorough discussion of the question of grading, packing and branding, it was thought best to appoint a committee of one to take up the matter with the other horticultural and pomological societies of the country and see if some steps could not be taken looking towards legislation. That matter was placed in my hands and I at once opened a correspondence with the officers of every society of which I could find any record, and we found of course a general feeling of desire for something to be done, and with that, considerable opposition. As the years passed it was thought best to confine ourselves to New England, and we have held four meetings of the representatives of the pomological and horticultural societies of New England for the sole purpose of talking over this matter of legislation to insure more complete and perfect branding, grading and packing of our fruit. So much by way of explanation.

Years but make clear the absolute necessity for some restraining influence which will insure to the grower of apples that position which the quality of Maine fruit might make permanent. Today we suffer because of that commercial spirit in the past which has packed our apples as close to the line of refusal by buyers as possible, and last year brought sad havoc to pocketbooks and greater to reputation. Whether the sorting and packing is by growers or dealers the fact stands clear that the brand must be a guarantee, not of the face but of the contents. For years we have been satisfied to receive from fifty cents to one dollar per barrel less in European markets than the Canadian growers, and overlooked the significance of the Fruit Marks Act, which has insured them their position.

Buyers are entitled to what they pay for and the brand and name on the outside of the package has but to tell the truth regarding variety and grade for reputation to be established.

In far too many instances this has not been the case in the past. The time has arrived for growers to protect themselves and to do this we must take such steps as will insure a clean, honest pack. Buyers who deal on commission will pack to our injury as growers. Maine fruit suffers today for want of the certainty that every barrel is honestly packed and branded. Nova Scotia lost its market and reputation in the same manner, and it was only by the application of the most stringent rules and a patient adherence to them for several years that the old-time position was won back.

The Fruit Marks Act of Canada has in the past seven years brought about a degree of uniformity upon a high level never thought possible before. Their standard for No. 1's is that every apple shall be true to name, not less than 2 1-2 inches in diameter, free from defects but with an allowance of ten per cent for rapid work. This is not an arbitrarily high standard yet it has radically changed the condition and reputation of Canadian apples. We have not their form of government and cannot reach results by as direct methods. For this reason this society four years ago took up this question instructing your committee of one to correspond with all societies and assist in bringing about unity of action. It gives me great pleasure to be able to report today that there is a general sentiment in favor of united action in the New England States. I soon found that to accomplish anything there must be a frequent coming together of representatives of the several societies for discussion and conference and this led to the creation of the New England Conference of Fruit Interests.

For three years we have been meeting and discussing this question, the sessions being held in connection with some one of the New England societies at annual sessions. The result has been the bringing together of interested workers who have assisted in the regular work of these sessions and already there is seen a focusing of thought and purpose upon certain scientific lines of work most valuable and necessary for the success of the industry in this section of our broad domain.

At the late gathering at Milford, N. H., it was unanimously voted to refer to each state society the following as the substance of legislation thought advisable at the present time with

the suggestion that when modified or adopted it be put in legal form and presented to each New England State legislature and favorable action secured.

PROPOSED LEGISLATION.

Bill to Insure Uniform Grading, Packing and Branding of
Fruit.

Sec. 1. Be it enacted that on all closed packages—barrels or boxes—intended or offered for sale, at home or for shipment, there shall be marked upon the outside in plain letters, not less than one-half inch in length, the full name and address of the owner at time of packing, together with the name of the variety and the grade whether No. 1, No. 2 or No. 3.

Sec. 2. In case of any attempted evasion or violation of the above section on the part of any owner or packer, either as to name of owner, name of variety or grade, it shall be the duty of the secretary of the State Department of Agriculture, upon receipt of the evidence, to bring action for fraud, and recover damages from all guilty parties.

This Conference also perfected its organization and in the future proposes to work in conjunction with the State organizations for the furthering of any measure of value to our fruit interests.

Within the past few days there has come to me a bill aimed at the same result, more explicit in its provisions and penalties, and I wish to submit that for your consideration. What we should require is a moderate measure aimed at specific results and free so far as possible from the machinery of office. I firmly believe in the educative features of such a measure but these will not suffice. That bill is as follows:

“Section 1. Any person, firm, association or corporation engaged in growing, selling or packing green fruits of any kind within the state of Oregon, shall be required upon packing any such fruit for market, whether intended for sale within or without the state of Oregon to stamp, mark or label plainly on the outside of every box or package of green fruit so packed the name and post office address of the person, firm, association or corporation packing the same; provided further, that when the

grower of such fruit be other than the packer of the same, the name and post office address of such grower shall also prominently appear upon such box or package as the grower of such fruit.

Section 2. It shall be unlawful for any dealer, commission merchant, shipper, or vender, by means of any false representations whatever, either verbal, printed or written, to represent, or pretend that any fruits mentioned in section 1 of this act, were raised, produced or packed by any person or corporation or in any locality, other than by the person or corporation, or in the locality where the same were in fact raised, produced or packed, as the case may be.

Section 3. If any dealer, commission merchant, shipper, vender or other person, shall have in his possession any of such fruits so falsely marked or labeled contrary to the provisions of section 1 of this act, the possession by such dealer, commission merchant, shipper, vender or other person, of any such fruits so falsely marked or labeled shall be prima facie evidence that such dealer, commission merchant, shipper, vender, or other person, has so falsely marked or labeled such fruits.

Section 4. Any person violating any of the provisions of this act shall be deemed guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine of not less than \$5 nor more than \$500, or by imprisonment in the county jail not less than ten or more than one hundred days, or by both such fine and imprisonment, at the discretion of the court."

During the last year a bill was presented Congress and is now before that body aimed at the same results, but more drastic in its details. Such a bill will some day receive a passage, but not until the whole subject has been threshed over and the combined influence of those interests set only for personal or corporate gain brought into line.

It seems to me that one of the arguments to make in favor of a step in this direction is the radical change which is taking place in methods of fruit growing—the opening, widening competition which is making the Western fruit from the irrigated section, uniform in size, uniform in color, beautiful to look at, sell today in my own city for five cents apiece, and yet it lacks the good qualities of our own Maine grown fruit. But

this fruit has come in, and is coming in in larger and still larger measure to compete with ours for a place in our own home market. This it seems to me suggests and forces the consideration of the question of protection. And that protection must come by raising the standard of our home fruit by all the means possible in growing and selection, care and attention, but also by raising the standard of that fruit in packing so that every package shall go upon the market for just what it purports to be. And when we do that, then I think we can rest content and feel that we can maintain ourselves in the market. We must meet that condition. We cannot much longer continue to sell our apples to the dealers and the packers who go about the country and expect to realize the price which should be paid for choice Maine grown fruit. And I say this forces upon us the consideration of questions which once did not hold, and if by the passage of some such measure which shall be not burdensome but a wedge perhaps for future further legislation when the time comes and we are ready to ask for it and insist upon it—if by the passage of some such measure we may take the initiative and open the way for the protection of the man who packs his fruit honestly and brands it true to name, and prevent that commercial packing which has so largely in past years injured our fruit,—it is a step surely to be urged and I believe to be taken. It was my good fortune, or poor fortune, last winter on several occasions out of the State to see a barrel of Maine apples opened on the platform and I confess to you gentlemen, it made me feel mighty mean.

They were taken out of commission houses and I couldn't find where they were grown or who packed them. Evidently they were not graded and not packed by the owners but had been sold to be packed by dealers, and when they were emptied out on the platform by the side of other fruit the reputation of Maine suffered. Now that being an objection we must meet it, and some steps must be taken which will bring about a more uniform as well as a higher standard of packing.

Until that time we must depend upon State legislation and secure there what will best promote the growing of choice fruit here in New England. No one would for a moment think of restricting the rights of any grower for those rights are mutual,

but there must be a coming together and working together that in the end every barrel of apples packed shall be true to name, true to grade, and reflect credit upon the man whose name is plainly stamped upon the outside of the barrel or box. When that day arrives, as come it must, the apples of Maine will stand at the head of the line, for nowhere upon this broad earth can fruit of better quality be produced than upon the hills of the old Pine Tree State.

DISCUSSION.

Dr. Turner. Mr. President:—In listening to the paper which we have just heard by Dr. Twitchell, it occurs to me that what Dr. Twitchell has done has been a good deal of work for him, and for him to undertake to carry it all through without the support of the Pomological Society or somebody else, it becomes a good deal of labor with very little thanks in it. If everybody was honest, and if all the apples sold in the State of Maine had been honestly packed, there would be no necessity for any legislation. The trouble is that people are dishonest in packing apples, if in nothing else. Probably a man who would not steal—he wouldn't take anything that belonged to somebody else, perhaps he wouldn't tell a lie about an ordinary business matter,—will cheat on packing apples. It seems to be the hardest thing there is to do, to pack a barrel of apples honestly. When you sell to buyers and they send out their men to pack, they have no interest in it. My opinion is that the best thing for a man to do is to pack his own apples and then they are packed his way.

Now, then, if he is not going to be honest and pack his apples honestly and squarely, *he* ought to be made to suffer in some way,—not the man who buys them. If a man wants to stake his reputation on a poor pack, then he ought to be able to take the consequences when he gets his money. It is the money part

This paper that we have just heard has mentioned two or three forms of a law to regulate this packing of apples. The first one seemed to me to be the least complicated and perhaps as reasonable as any. My own opinion is that it would be better to have this law within our own State and not undertake of this thing that is going to make us all straight. A man will

be honest if he finds that he is getting more money by being so. to mix ourselves up with New England. We want to make a reputation for Maine and for Maine fruit. I don't know that it is our business to go out and try to make a reputation for the whole of New England or the whole United States. We believe in honest, square packing, no matter where it comes from, but especially we want it so from this State, so that when our apples go out every barrel shall have a guarantee with it. The first regulation we heard mentioned in this paper would seem to me to be all right. But I would go a little bit further in that same one and add a trademark; a trademark on the outside of every barrel and a trademark on the inside of every barrel, and that trademark shall be, "Maine Apples."

Now in order for a man to use that trademark, the State of Maine makes certain rules and regulations, that he shall put his name and address plainly on the head or outside of the package (he may also put his name and address plainly on the inside of that package), that he must state the variety and quality of fruit inside that package. There should be a law to go with that, so that if a man uses this trademark, "Maine apples," he must fulfill these requirements, and if he doesn't there is a penalty, whatever seems best. Also, in order that everybody may understand it, the law should be printed on a little slip and placed on the outside of that package and also on the inside, so that carries its own inspection. You haven't got to hire a man to inspect that barrel. You have already said what it should be if it has "Maine Apples" on it. Now you put the law right in so that everybody can see what the penalty is. Then if a man gets cheated and he does not look the matter up, it is his fault; and if you undertake to cheat him and he does look the matter up, it is your fault. In case you don't want to use the brand, "Maine Apples" on your barrel, you can pack them just as you please. But as long as you use that trademark the reputation of the State of Maine is at stake and we must protect it and will protect it with a penalty sufficient to hold everybody up to the standard.

Letter read by Dr. Twitchell.

OTTAWA, CANADA, October 1, 1908.

Mr. G. M. Twitchell, Monmouth, Me., U. S.:

DEAR SIR:—I am in receipt of your letter of the 30th ultimo. I am enclosing herewith Bulletin 11 containing the amendments made last year to the Inspection and Sale Act, Part IX (the Fruit Marks Act). The features covered by these amendments are, first, the definition of grade No. 2 is changed by adding the phrase, "includes no culls;" and culls are defined as you will note in the inserted page. The second change is imposing a fixed sum not less than \$10 for the first offense instead of the old method of so much per package. It was found, in practice, that it was difficult to discover a violation covering a large number of barrels; and, as a consequence, after a man was fined once and his reputation was of no particular consequence, the money consideration would not weigh much with him.

We have our definitions now not exactly, perhaps, in the form in which I would like them, but nearly so. We have a good practical definition of a No. 1 apple, which is substantially a perfect apple with a 10% allowance for rapid work. The No. 2 as now defined is a good merchantable apple. Every apple in this grade may, of course, be defective but not to the extent that it becomes objectionable for market purposes with the great apple consuming class.

I am not sure that it would be wise at the beginning to draw the lines quite so close as we are now drawing them in Canada. We have found that the Act is working for the benefit of all classes, except the unscrupulous apple operator. "He" is so few in number and so altogether unworthy of respect that his attitude towards the thing need not be considered. It is noticeable that, while we have a great deal of grumbling among certain classes of operators and even certain fruit growers, no one has yet been found who dares to advocate the repeal of the Inspection and Sale Act (the Fruit Marks Act) upon a public platform or in the public press. What little criticism there has been in the public press is directed solely against the administration of the Act, and these criticisms are really never seriously considered by the public.

Last year demonstrated the value of the Act. It showed, however, some of its weak points. During the preceding years, when the fruit was fairly good and market conditions favorable, everything worked smoothly and we had little cause for complaint and, therefore, very few convictions. Last year everything combined to make it a year of special temptation to apple operators. The excitement for buying at the beginning of the season induced a large number to offer high prices for fruit of any kind. The reputed short crop induced buyers to store everything that grew on an apple tree, except some of the twigs. Before these apples were sold prices had fallen until it was impossible, even had the fruit been all good, to come out even. At least one-third of the fruit stored would grade below No. 2, but the price paid for it was as high as was later offered for No. 1's. You can readily imagine then how hard it was to resist the temptation of packing in a certain quantity of these inferior apples and marking them No. 1 or No. 2.

We had during last season over two hundred convictions. These convictions unfortunately did not have much effect on last year's trade from the fact that many of them could not be made until the season was pretty well or altogether over, but they have had an evident bearing upon the apples of the present season, which are going forward now with a very small percentage, indeed, of fraudulently packed or marked apples. Unfortunately, the weather conditions are such as to put the fruit out of condition, but so far we have had no complaints from Great Britain as to the marking and packing, in marked contrast to last year.

I am thoroughly satisfied that the Act is doing splendid work. Its effect is not confined to the apple operators. The farmer who needs a little spur to induce him to take proper care of his fruit is receiving it through the Inspection and Sale Act (the Fruit Marks Act) indirectly. An apple operator comes to a neglected orchard, passes it by or offers such an exceedingly small figure for it that the farmer has to ask for a reason, and it comes in this way: "You have so many scabby and wormy apples that we could not grade more than 10% of your orchard No. 1 and, therefore, your orchard is of no use to us. The

Fruit Marks Act would not allow us to grade more than 10% No. 1 out of such fruit as yours."

If the farmer is fairly intelligent, he sees the force of this, and next year will spray his orchard or get rid of it altogether. If he happens to be a chronic kicker, he may set up a howl that the Fruit Marks Act prevents him from selling his fruit, but this is usually received with the sarcastic reply from his neighbors: "It is fortunate for us that we have a Fruit Marks Act." And, lacking sympathy, the chronic grumbler is seldom heard from the second time.

The present dry spell has injured the apple crop perceptibly, both by limiting the size and causing a great many apples to drop prematurely. The crop of winter apples is likely to be very short in Canada by the middle of January. I would not be at all surprised to see the exports from Canada after January 15th curtailed by one-half.

Do not hesitate to call upon me for any information which I can give you with reference to specific features of the Inspection and Sale Act, which I can assure you is working for the very great improvement of the Canadian apple trade, but doing it indirectly and, therefore, perhaps without as much credit as it might otherwise get.

Yours very truly,

A. McNEILL,

Chief, Fruit Division.

THE APPLE CONSUMERS' LEAGUE.

By E. P. MAYO, Waterville.

Mr. President:

The subject assigned me for discussion at this hour, the Apple Consumers' League, is to my mind one of the greatest importance from the apple producers' point of view, for next in importance to the production of good merchantable fruit must be the successful marketing of it for the high dollar.

We have been educated to look to Europe for the best market for our fruit, and the time was when we could do this with safety and assurance, but owing to the abuse of the foreign market by unscrupulous packers and shippers, that market has gone, for the present at least, and until we reassure the English buyer and consumer by again adopting honest practices in sorting, grading, and marking our products we must look elsewhere for an outlet for much of our choicest fruit.

For various reasons a home market is much to be preferred to exporting our goods. But how can we get a satisfactory home market? I will answer that query as best I may in the limited time at my disposal.

To commence with, the best way to get a satisfactory home demand for our apples is to see to it that we produce a better article than has ever been put on the home market. It should be uniformly good, not good in spots and occasionally satisfactory, but true to grade and stencil, always and ever. So that the stencil will be a guarantee of the quality as the size of the package is a guarantee of the quantity.

With this point made certain and secure we now approach the real subject matter assigned for me to discuss briefly—the Apple Consumers' League.

It must be admitted of course on the start, that no one ever attended a meeting of this much advertised organization, nor do we know where their place of business could be found. While its membership is a good deal smaller than it ought to be, notwithstanding its great respectability, we have great hopes for its ultimate success, both in point of numbers and the scope of

its mighty influence. Just who its regularly installed officers are I do not know. Our friend Brother Collingwood of the Rural New Yorker claims to have been its original promoter and patron saint, and I never have known any one able to successfully contradict Brother Collingwood's claim.

But all this is immaterial. What is the society doing to justify its right to live and claim the attention of the fruit lovers generally? According to the solemn oath taken by all regularly constituted members it becomes their duty, not to say privilege, never to sit at meat at any public table where apples are not served, without calling for them. Strict adherence to this cardinal principle of the organization has resulted in the sale of thousands and thousands of barrels of choice fruit. Just in proportion as the number who thus makes this call increases the sale of our Maine fruit increases, for no state in the Union produces better fruit than we do.

The best thought of the mercantile world is given to increasing the market for goods. Why should the Maine apple producer be an exception to this most commendable practice?

I have no fear of successful contradiction in predicting that if every lover of the Maine grown apple here present at this hour would enroll themselves in this organization and live up to their pledge, our home demand for choice fruit would increase by more than 50 per cent in the immediate future, and this is surely worth trying for. If it were necessary I could cite medical authorities without number to show the value of apples at meal time, from an hygienic point of view, but surely nothing of the kind is called for at this time, as probably all here are strong believers in their benefit as a tonic and an aid to digestion.

Let us have a revival of the good old fashioned sort in the Apple Consumers' League. Let us have a lot of ardent new recruits as well as a return of the old blacksliders, and the demand for the best fruit that ever was picked from a tree since Adam partook and stood treat, will have a veritable boom and the Maine apple grower will be the gainer thereby.

DEMONSTRATION IN APPLE PACKING.

By Professor GARDNER and Orono Students.

Mr President and members of the Pomological Society:—Just a few words about box packing. I have here the standard apple box of Canada, 10 x 11 x 20 inside measurement. It holds 2200 cubic inches, a little bit more than the number of cubic inches called for in the regular bushel, although different from what is called for in the bill before Congress that has just been read. The question was asked as I was coming up here, how we can grow apples to just exactly fit the box. Now (illustrating) there are four apples which just exactly fit across the bottom of that box. Supposing the apples run a little bit smaller, instead of putting four across the bottom we put five across. Sometimes you will get apples that run somewhat between these in size. Instead of putting them all across edgewise, turn one or two flatwise in order to make them fit in exactly tight; so what is called the straight pack can be adapted to fit almost any apple. Now we have another style of packing which would accommodate apples of still different sizes. Suppose we put three apples on the bottom with a space between them, then the next apples would come in against the spaces left by the other three, and in the next tier there would be three across the bottom, the next two, the next three, and so on. There would be slight spaces left but they dovetail or wedge in between each other, so that every apple is held tight. This is known as the diagonal pack, 2 1-2, 3 1-2 or 4 1-2, depending on how many rows of apples there are across the box. Those two packs will accommodate nearly every size of apple. Then there is the pack known as the offset pack (which was illustrated). Between these three different packs you can accommodate any size of apple. Now depending on whether the apple is turned edgewise or sidewise or blossom end up or stem end up, and using various combinations of those different packs, and the different ways of turning the apples in the different packs, there are something like sixty-two or sixty-three different packs possible. And if you grade all the apples that come from an

orchard into sixty-two or sixty-three different sizes, you pretty nearly use up the different sizes of apples that you have in the orchard; and you could get them all into the box and have every one fit up against the others tightly in such a manner that they will not bulge.

Just one word more about this standard box. The ends are 7-8 inch stuff or 3-4, it doesn't make much difference which, thick enough to give solidity to the box; the sides 3-8 inch stuff,—3-8 is thick enough so that it will not spring and at the same time it is light enough so that the box is light and easy to handle. If you use thicker stuff you are using more wood than you need and the box is heavier. For the tops and the bottoms you want thin lumber which will bend a little bit, which will give a bulge to the middle of the box so that the cover will fit down tightly and hold the apples in place. So we use 1-4 inch stuff for the top. Of course the tops and bottoms being so thin when they bulge as the box is handled they are likely to split a little bit. To prevent that a narrow cleat is nailed across to hold the nails and to keep the tops and the bottoms from splitting. A box like that costs from eight to ten cents or eleven cents, depending upon how many you get and upon the company you get them from; but they can be made for about that price. That gives you some idea of what this standard Canadian box is. An expert packer can probably pack four to five boxes per hour of medium sized apples and six to seven of large apples.

Now a word about this packing table. It is the kind of packing table which I think ought to be in every orchard in the State of Maine. The cost of the lumber and labor in making it is from two dollars and a half to three or four dollars, depending upon how fast a man can nail them together. It has 2 x 4 legs, 3 ft. high. On the inside, the ends are 3 ft. 1 in. board; the sides are 4 ft.; 3 x 4 x 3. Just an ordinary board along each side and the end board projects 14 inches at the opposite corner in order to make a rest on which to set the box. The top is covered with ordinary burlap that you can get for thirty or forty cents a yard. There are two thicknesses of this burlap. Only one thickness is nailed down and that supports the entire weight of the apples. As you see, there is a barrel on here and another half barrel could be put on without taxing

beyond its limit the capacity of the table. The other thickness is on loose so that after a dozen or more bushels of apples have been packed and the table is cleaned off one can swing this top cover back and throw off all the litter, then drop it back ready for another lot of apples. The advantage of a packing table of this sort is that every apple on the table is within reach of the packer, and the top being of burlap, and the inside edges of the sides being planed off, no apple comes against a sharp corner and there is no opportunity for bruising if the apples are poured rather gently from the picking baskets upon the packing table.

WHY APPLES DECAY.

(From the Viewpoint of the Horticulturist.)

By VICTOR R. GARDNER, Assistant Professor of Horticulture,
University of Maine.

Most of the fruit growers' products are of a very perishable nature. They come at particular seasons and then are not seen again until the next year. Even in case of the apple, which may be had during a longer period than any of the other fruits, the bulk of the supply comes in late summer and early fall. The demand, however, does not come mainly at this season but is more or less constant throughout the entire year. In fact the demand seems to be keenest during the winter and spring months when the supply is smallest. The problem of the fruit grower is not so much how to produce more fruit, for he generally has an abundance or even an over-supply in the fall, but how to make his uneven supply meet the even demand. His aim is to lengthen the season during which he can sell his fruit.

Practically the only way to lengthen the apple selling season is to place the fruit in storage. Yet, the storage of fresh fruit is attended with no little risk. All who have stored fruit know that there is likely to be more or less shrinkage from decay and this prevents many from now storing their fruits who otherwise would. It is to the reasons for this decay and to the ways by which it may be prevented that the writer wishes to call attention. The observations upon which this paper is based were

made during the winter of 1906 and 1907 in Iowa. In the course of the investigation over 30 bushels of fruit were very carefully examined. These 30 bushels, including specimens of 30 leading varieties, were obtained from different parts of the state, some coming from sprayed and some from unsprayed orchards. The fruit was grown on a variety of soils, under different orchard conditions, picked at varying degrees of maturity, handled in different ways, and examined at different times so that the results obtained may be considered as fairly representative. These 30 bushels of apples contained 3918 fruits, 788 (or 20%) of which were either partially or entirely decayed. Approximately 18% of these 788 fruits were decaying with soft rot or blue mold; 9% with pink mold; 5% with brown rot; 5% with an unnamed rot (some species of *Alternaria*, *Macrosporium*, or *Cladosporium*); 4% with black rot; and less than 1% with bitter rot. In most of the remaining 58% decay was just starting and no fruiting forms of the fungi were visible so it was impossible to identify them with certainty. Without doubt at least 90% to 95% of these unidentified forms would have developed into some of the diseases enumerated above had opportunity been offered. In several test cases these forms did develop into the above easily recognized decays. Thus, it will be seen that blue mold, pink mold, brown rot, the unnamed rot, and black rot were causing practically all the decay of apples in Iowa, their percentages becoming 43, 21, 12, 12, and 9 respectively. The percentage of loss from others was so small that it was almost negligible.

Of these 5 diseases or 5 classes of disease blue mold was by far the worst, doing nearly as much damage as all the rest put together. Now let us inquire how this disease gets started in the fruit. In 120 (or 96%) of the 125 cases of soft rot found the point of infection was a bruise in which the skin of the fruit had been broken. In two instances (or a little more than 2%) the fungus had entered through scab wounds. In two other instances entrance had apparently been made through the unbroken epidermis. It should be stated, however, that both of the apples infected through the unbroken epidermis were lying right against other apples decaying from blue mold and it is possible their skins were softened by the juices and lique-

fyng enzymes (ferments) produced in these other fruits and thus rendered subject to this manner of infection. In one instance (less than 1%) infection occurred through calyx lobes. Here the blue mold had apparently become saprophytic upon the calyx lobes of the fruit and then had become parasitic as its mycelium entered the living tissues of its host. In a number of instances blue mold was found growing vigorously and producing abundant spore pustules on the stems of apples. That it sometimes gets into the flesh of the fruit by first growing as a saprophyte upon the stem is altogether possible; but in no instance was this found.

From this discussion it is evident that blue mold is preeminently a wound parasite. Proper spraying so that the skin will not be broken by scab or insect injury and careful handling so that it will not be broken by mechanical injury will almost entirely prevent its parasitism in apple tissues.

Sixty-six of the 788 decaying apples in the lot mentioned were decaying with the pink mold or pink rot. Pink rot does not cause the entire decay of the fruit like blue mold. In fact the decayed tissue usually extends to a depth of only about 1-4 inch; but the decay spreads over the surface and spoils the fruit for market. In 22 instances (or 33%) this rot was an attendant of apple scab. The scab fungus ruptured the epidermis of the apple and prepared the way for the pink mold spore to enter. In 15 instances (or 23%) entrance had been made through ruptures in the epidermis made by bruising. In the remaining 29 cases (or 44%) entrance was made through the calyx lobes. This disease too had probably started growing upon the calyx lobes in its ordinary role as a saprophyte, its mycelium later entering the live tissues of the fruit and becoming parasitic. This peculiarity was noted in only two varieties, however, (Patten and Anisim), and it is possible that there is some peculiarity in the structure or substance of their calyx lobes to encourage this rather peculiar habit, as the fungus was found many times on the calyx lobes of other varieties without entering the fleshy tissues of the fruit. In no case was the disease found entering the fruit through the unbroken skin. * Eustace, however, states that in case of a tender skinned

* Eustace, Bulletin No. 227, New York Agr. Exp. Sta., p. 382.

variety he found it working in this way. In all those cases in which the disease is an attendant of scab, it can be avoided by preventing the scab. Where bruises are the points of infection the simple remedy is to carefully handle the fruit so that it will not become bruised.

Where the disease first develops as a saprophyte upon the calyx lobes and through them makes its way into the living fleshy tissues of the fruit we may find it somewhat more difficult to control. Still it would seem that a thorough spraying with some good fungicide, such as would prevent the development of apple scab, would also coat the calyx lobes of the fruit sufficiently to prevent the growth of either parasitic or saprophytic fungi upon them.

It is well known that brown rot is the most serious decay of the plum, cherry, peach, and other stone fruits. It also causes considerable decay among apples. In examining the 30 bushels of apples mentioned at the beginning of this paper, 39 fruits showing decay from this disease were found. In each instance infection took place through some break in the skin. In many instances observed in early fall of fruit hanging on the trees decay had always started from some wound. This is not stating that brown rot never enters apples through the unbroken epidermis. The fact that it does in the case of plums, cherries, etc., would indicate that such is possible, at least in tender skinned varieties. But it does show that the percent of fruit decaying from brown rot through infection in this way is at least very small—so small as to be negligible. This means that the loss of apples due to brown rot is almost entirely avoidable. Handle the fruit carefully so that it will not be bruised and brown rot will not be a source of trouble.

The extent of injury done to stored apples by the unnamed rot has already been pointed out. It is plainly not a negligible loss. That this decay is one to which little attention has been given in the past is quite apparent for so far as the writer knows there is not even a common name by which it is generally recognized. These fungi cause a dark brown decay of the apple without the softening of tissues characteristic of several of the other rots. They were almost invariably found following bruises which had ruptured the skin and along the edges of the

wound would appear a dark green or brown felt-like growth—their fruiting organs. Here again careful handling would nearly, if not completely, do away with the injury caused by these fungi.

In 18 of the 22 cases of black rot found in the 30 bushels of apples already referred to entrance had been made through bruises. In the other 4 cases the disease germs had apparently made their way through the unbroken epidermis. This shows that while more careful handling would not do away entirely with this decay, it would prevent the larger share of it.

Other fungi besides the ones mentioned were occasionally found in decaying fruits. The damage they caused, however, was so small they may be disregarded.

Among the many things of interest brought out by this little investigation one thing stands out preeminently. In Iowa there is seemingly little excuse for the fruit grower being troubled with apple decay. The diseases were almost entirely wound parasites, unable to penetrate the unbroken epidermis of a sound apple. In 90% of the decaying apples examined the disease spore had entered the tissues of the fruit through scab, insect, or mechanical injuries. This means that careful growing to avoid injuries of the first two kinds and careful handling to prevent injuries of the last kind would indirectly prevent 90% of the loss now occasioned by apple decays. That this same care would also materially reduce the remaining 10% loss is hardly to be questioned.

The apple decays of the state of Iowa are the apple decays of the State of Maine. It is true that some of them may be of relatively greater or of relatively less importance here, but that does not materially alter the one important fact, namely, that they are almost entirely avoidable. Whether the fruit grower of our State will suffer loss from the decay of apples in storage is largely a matter of his own choosing. If he does not prune, cultivate, spray, and otherwise care for his trees, and handles his fruit roughly when matured, he indirectly invites decay. On the other hand if by spraying, pruning, and cultivating he grows fruit without blemish and then handles that fruit carefully he need not worry about the rotting.

REMARKS.

By Prof. CRAIG, in presenting the prize to the successful competitor in the fruit judging contest.

I want to congratulate the Society, I want to congratulate our friends in the Experiment Station on instituting something which is valuable from the standpoint of industrial development and the standpoint of educational advancement. We see two things going on in our horticultural work in whatever state we may be placed. We see old orchards going out; I am sorry to say we do not always see new orchards coming in. We also see the men who have been instrumental in pushing forward the work of pomology going out; I am sorry to say that we do not always see young men coming in to take their places. Now here is an effort on the part of our Professor of Horticulture at Orono to interest the young men, and he has done it very successfully thus far, and I congratulate you as members of the Society in having a man of that point of view, and I congratulate you on having young men who respond to his initiative, and it is therefore with great pleasure that I have acceded to the request to discharge this pleasant duty of awarding the prize in this scoring contest. The score card method of judging fruit is an analytic method. It is a method whereby we take the object, divide it up into integral parts and give a definite value to each. We then recognize the intrinsic qualities of the fruit or the object to be judged. That is the purpose of the score card method. It is not any system of generalization. We take the fruit apart, as it were, and examine it all through. That system has been adopted here, and these young men from the institution have come over and passed upon that beautiful exhibit of fruit in the adjoining hall, and the person who has come nearest the score of the expert judges has won the prize. The score of the judges was 171 points. The score of the winning member of the student judging staff was 162, which speaks well for the ability of that person and also for the training which he has had. It is very interesting to note that of the nine men who judged the lowest score was 138—not so bad, I should

say excellent. The prize which has been given for this exercise in ability and in judgment is a very appropriate one. It is a work on systematic pomology. The score card work as an accurate method of judging fruit is a definite part of systematic pomological work. Therefore this is a stimulus to the person who won the prize to go on, to continue in the good work. We are led into various types of work in various ways. This is one way in which to interest young men—judging fruits. It is the way in which to learn the qualities of fruits. I have to announce that Mr. Wadsworth is the winner of the prize.

STARTING A COMMERCIAL ORCHARD.

By Prof. F. C. SEARS, Massachusetts Agricultural College.

I have not prepared a paper to read to you, and I don't know but that I have made a mistake in not doing so. I heard Mr. Collingwood, the editor of the Rural New Yorker, speak a short time ago at a meeting and he read his paper, and he gave an explanation of reading the paper instead of speaking. But a short time before that he had heard his little girl and little boy discussing whether they would rather have a minister read his sermons or speak from notes, or speak without having manuscript, and the little girl said she would rather he would read his sermon because then he knew when he got through. Now for that reason particularly perhaps I ought to have prepared a paper, but I will try not to prolong this sermon unduly.

Your President in introducing me has said something of what I intended to say in starting this matter, what I presume most of you know, that I expect to talk to you from my own personal and practical experience. As he has said, formerly professors were not supposed to be practical. They were supposed to be strictly theoretical, and if they had any experiences those were theoretical too, and they didn't get down to the practical end of the business at all. Prof. Waugh and I have always had faith in this apple business and have been teaching it for a good many years, and we thought it would be a fine thing to eke out a small salary with the returns from a fine orchard. So this

last season we finally got our courage screwed up to the point of starting an orchard, and it is because I believe that the experience we have had in starting that orchard may be of practical use to you that I want to talk to you a little while this evening in regard to some of the problems we have met and the way we have solved them. I think it is Bernard Shaw who says that "He who *can* does, and he who *can't* teaches," and it was more or less out of resentment to that general feeling that we went into this business; although, as I said, it was still more because we had a firm belief in the ultimate outcome and felt that we could make it profitable.

In selecting a site for our operations, both of us being teachers in the agricultural college at Amherst, we were almost of necessity restricted to locations within a reasonable distance of the college, because while we didn't expect to give very much personal attention to the matter, still we had to have it where we could get at the farm expeditiously when we did want to go, and we have always run down at least once a week. So in selecting our farm, while we looked about and got what we considered as a good orchard locality, we were considerably tied down and perhaps didn't have the range that we might. But we considered, aside from the question of ease of getting at it, two or three points in the selection of the location, and the first and most important point was the matter of soil. We selected what you might call a gravelly loam. Of course it varies somewhat; there are about one hundred and fifty acres and it varies in different parts of the farm, but most of it runs to a gravelly loam. We had Mr. Kinney, President of the Vermont Horticultural Society, and himself a lifelong grower of apples and of the finest quality of apples, come down and look over the proposition. He said he didn't see how we could have improved in the matter of soil. Our idea is not to go into the general trade, the growing of barrel fruit, but to go into the box trade, into the gilt-edged trade, if you may call it that, in New York and Boston and the large towns, so that it is practically imperative that we shall be able to grow highly colored fruit. And for that reason we selected this soil which is rather a dry soil, not clayey but a soil that will give us first-class, highly colored

fruit, and if a man is going into the high class trade that is a necessity.

We bought one hundred and fifty acres. I should like to emphasize that point particularly. I believe the one great difficulty with the apple business in all this region is that the people are not in it on a large enough scale. Of course we were obliged to go into it large enough so that we could afford to hire a first-class foreman and put him in charge, because we could not take charge of it ourselves. I believe nothing would put the fruit-growing interests of Maine and New England upon a better footing than to get people interested in the growing of fruit more largely.

In fact, the curse of our orchard industry is the fact that men are engaged in it on such a small scale that they cannot afford, or at least do not afford to give it the attention that it demands. I believe that if men would set out five or ten acres, to place it at the minimum, of good commercial orchard, in a very few years they would find themselves becoming enthusiastic over it. You cannot get enthusiastic over a few old Baldwin trees up in the back lot that you only visit once a year to see if there is any fruit on them. But you cannot keep from getting enthusiastic over five or ten acres of Baldwins giving you the returns that some men are getting. I do not believe there is anything that would put the industry on a better footing than to get fifty men in each of the New England States to put in twenty or thirty acres of orchard. It is simply the old story of the Irishman who was seen dropping a fifty cent piece down through a crack in a board walk. Somebody asked why he was doing that. He said he accidentally dropped ten cents and it wasn't worth while to take up the walk for ten cents and he was dropping fifty cents to make it worth while to take the walk up. Most of our orchards are ten or five cent orchards. If we could only make them fifty cent or dollar orchards, it would give more of an impetus to fruit growing than anything else we could do.

I will try not to weary you in the matter of details. I simply want to give you a few of the experiences that we have had that may be of practical interest to those of you who are intending to start an orchard. We started out this last spring rather

late. We were not able to get as early a start as we wanted to, as we couldn't get the land we wanted until late, so we were not able to put out exactly the varieties we would have preferred, but had to confine ourselves to a certain few. And I would like to make this one point very strongly in the matter of varieties, and that is, to urge you who are going into orcharding to select as good, as high quality varieties as you possibly can for your locality. Of course if you can't grow anything else but Ben Davis, it is all right I suppose to grow it—I am not sure then but that a man damages the market more than he ought to—but I do think after looking at the magnificent show of apples that you have in the armory here, that there is no excuse for a man not growing a high quality of fruit. My friend, Dr. Twitchell, tells me that men make more money here in Maine out of Ben Davis than out of any other variety, and I don't question that since he announces it, but I do not believe that men are going on year after year buying that quality of fruit when they get something better, and I do think that here in this part of the country where we can grow the high quality fruit, that is the kind to grow. There is nothing that will help out the Apple Consumers' League more than to grow that class of fruit, and there is nothing that will put a damper on it quicker than to grow the other kind. So this was our main point in deciding on our varieties, to select merely the high quality fruits. We planted this year only three varieties, the Wealthy, the McIntosh and the Hubbardston, as we started late and could not get all the varieties we wanted. Our plan being to go into the box trade and to cater to that trade, we naturally wanted to have a reasonably large number of varieties. If a man is going into a different line of trade, going into the general trade, he might want to restrict his planting to two or three varieties, possibly one. We expect to grow perhaps as high as eight, ten or twelve varieties, because we do not want to start a good trade on our Williams Early, for instance, in the autumn, and drop that when the next stage of apples comes up in the market, pick it up again for our Gravensteins a little later and drop it again and pick it up again. We want to have a continuation of varieties that will take us right through the season. So we are going more largely into varieties than we would advise other people to do.

Some one in speaking this afternoon rightly urged the importance of the careful preparation of the land before the orchard is set. And I believe on general principles that if a man is planning to set an orchard he should get his land in first-class shape by one or two years of cultivation before he attempts to set the trees. But we did not do that. We bought run-down farms. One of the neighbors told us that on one of the farms the practice had been to grow alternately potatoes and rye until the rye would no longer reach knee high, then to plow up a piece and put it into orchard. We went right onto that land and plowed it and harrowed it thoroughly, fitted it in first-class shape, then planted our orchards, and I don't believe that any one could ask for any better growth than we got on the majority of the trees. We set out 650 McIntosh and they are as pretty a bunch of trees as you ever saw. They have made all the way from two to four feet of growth, and have ripened up finely this fall. Of course we had an exceptional season there, and the first thing we did after the trees were established was to go over the orchard and put an ounce of nitrate of soda to each tree. We had practically no plant food in the soil and we had to supply it. Then we kept our cultivators going right through the season up to the time the cover crop was sown, and while we have had the driest season on record, pastures gave out, wells gave out, and the ordinary crops failed, there wasn't any time that you could not go into our orchard and kick down through the dust mulch there and find the dirt moist enough to hold the impression of your hand. We wouldn't ask for another drop of water on that land. The trees didn't suffer the slightest from lack of moisture, owing to the thorough cultivation. It was merely a question of cultivation. The land doesn't have much humus in it.

Just a word or two in regard to the laying out of an orchard, because I have been in the business of laying them out for a good many years, and I think we had an improvement over anything I have seen tried. We had there a young man, a graduate of our college, who came to take charge of the plant, and he had for several years past been extensively engaged in the planting of trees. His method was this: In the first place we

started laying out the orchard with a transit, as we had one at our disposal. If you haven't a transit available, get some man who can see straight and lay off your rows carefully. Be sure to have the initial row straight. I urge that point because it seems to me an orchard ought to be put down carefully, when it is put there to grow for a lifetime, or a hundred years or a hundred and fifty years.

Now having laid off this straight row across the long way of the orchard we took the transit and turned a right angle about midway and laid off a row of stakes the other way, setting the stakes the distance apart we wanted our trees. That is all the staking that we did. We set our trees sixteen and a half feet apart, and used a planting board in setting them. I know a good many people do not believe in that, as they think it requires too much time. But we put those trees in, having usually about seven men in the planting crew, at the rate of from six to seven hundred a day, and put them in in first-class order. I do not believe a man can lay off his orchard and put the trees in without the use of a planting board any cheaper than we did. We started on the apples, and we found it cost us six cents apiece to dig the holes, put the trees in and prune them. We went from that to a block of peaches—each man was getting his work done a little better, and that cost us five cents; and then we put in about five or six hundred dwarf apple trees and we put them in for four cents, the reduced cost being partly due to the size of the trees and partly to the fact that the men were getting more expert. These are extremely low figures for the setting of trees and they were put in in first-class condition.

Question. Please explain the planting board.

Prof. SEARS. The planting board that our man used was about four feet long and six inches wide. He cut a notch in each end and then cut one from the side of the board. Now the use of it was simply this: After the land had been staked off, this board was put down with the stake where the tree was to stand in the middle notch and then a small stake was driven down in each of the end notches. Then the original stake was taken up, the hole was dug and when we were ready to set the tree, we put down the planting board and put the tree in the

middle notch and we had the tree exactly where the original stake stood. The objection is that it requires too much time, but if you handle it rightly it does not take very much time, and you get your tree back exactly where the stake was, and if the stake has been put in the right place you will come out all right. We set 530 of the dwarfs and we lost 14 trees. We thought that was doing pretty well. We set 300 Hubbardstons and lost 6 trees, that is 2%. We thought that was doing better. We set 500 Wealthy trees and lost just three out of the bunch, and set 650 McIntosh and lost the same number; and the rest of the trees practically all made a heavy growth. I think that is a remarkably good record for any year, and considering what a dry year this was, it seems to me it proved that we used practical methods in the setting and care of those trees.

A word in regard to the way in which the trees were set. Of course when the trees came in the spring we took them out of the boxes and heeled them in. The men started at one corner of the orchard and the first thing was to put in the small stakes to locate the tree. Then a part of them went along and dug the holes, possibly 15 inches across and about that in depth. The land was good, friable land and we did not consider it necessary to dig very large holes. The foreman and one of the men meanwhile went to the place where the trees were heeled in and pruned the roots of the number of trees they could take out, cutting them back pretty well. We had two large kerosene barrels mounted on a stand about half full of water, and the trees were put into these barrels and taken out to the field. Of course there was not the slightest chance of any of them drying. The trees were taken out of that half barrel of water and placed, and the different varieties were interplanted.

Now I am going to say just a word on which I know you Maine growers will not agree with me, in regard to the heading of trees. We bought our stock from Maryland and bought, as far as we could, one-year-old trees. I know there is a prejudice in some quarters against southern grown stock, but I lived ten years in Nova Scotia where they have gone into orcharding extensively and where they have a rigorous climate, and practically all the stock is grown in New York state or perhaps as

far south as Maryland. So we decided it was mere prejudice and bought all of our trees from a Maryland firm, and got very fine trees at a reasonable price, because we were ordering a large quantity. Some were branched, but a good many just straight whips. Prof. W. and I both like low-headed trees, and we headed nearly all our trees eighteen inches from the ground. That took away all the top. For that kind of heading it seemed imperative to get one-year-old trees. We had a few two-year-old Hubbardstons and we found we got down in two-year-old wood on the butt, and the buds were weak and sprang out up and down the tree wherever they were strongest. With the one-year-old trees the buds are all strong enough, the top buds push, and you get the tree headed where you want to. I am not going to advise low-headed trees for you in Maine, because I think very likely your heavy snows would make it impossible to use them. But it seems to me that where it is possible, the whole argument is in favor of the low-headed trees. We have the San Jose scale badly, and to get the tree where it can be sprayed and pruned and the harvesting done largely from the ground appeals to me very strongly. As I said, we headed most of our trees at eighteen inches. We headed a block of peaches at six inches. That means of course that the head comes out practically at the ground, and they have made the finest growth of any of the trees on the place. I was talking with Mr. J. H. Hale not long before we started our work, and he told me that in nearly all his Georgia orchards, and very largely those in Connecticut, they never even take a step-ladder into the orchard. They simply have a short pole with a hook on it to bend the branches down, and the whole crop is gathered from the ground.

Another problem that we attacked was the great question of fertilizers, and naturally with a soil as I have suggested, without any humus in it, and with nothing but its good natural physical condition, the question of fertilizer was an important one. As I said, we applied nitrate of soda and got satisfactory growth for this season. We want to get at the soil and get it in better condition for future seasons. We put on 300 pounds of sulphate of potash per acre, not about the tree but on the land, and about 800 pounds of basic slag. Phosphoric acid

gives a large amount of lime, which our soil needs particularly. That was all except where we were growing some particular crop, where we put on a special fertilizer for that particular purpose. Practically all the land planted out this season was given that sort of treatment. Then we took up the question of lime. While we had 40% of lime in the basic slag, we thought the land needed something more,—a direct application of lime. We have not yet got to the point of applying the lime. What we did was to find in what shape to get the lime and the best way to apply it. We took the matter up with a number of firms who manufacture what is called agricultural lime. A New Jersey lime company sent us samples of three different kinds. One was ground limestone, about like chopped corn for fineness, and not burned at all, simply the limestone ground and sacked up. That they sell, I think, down our way for about \$3.50 a ton, and a number of station investigators have found that very satisfactory indeed. They also sent us a hydrate of lime which had been slaked with water and came to us as white powder. And the third form, which it seems to me is what we want, was a freshly burnt lime in small lumps. When I took this matter up first I discussed it with our foreman who is a practical man. I said "Why shouldn't we get freshly burned lime as it comes in casks?" He said at once that you would not get an even distribution on account of the lumps. I thought perhaps it could be distributed by harrowing. In buying that type of lime you pay for only the regular lime. In the unburnt lime of course you have a lot of other materials, and in the slaked lime you are paying for a lot of water. We can furnish the water. It seemed that the freshly burned lime was what we wanted. This firm gave us a sample that came in lumps as big as the end of one's thumb. You could get an even distribution, pay for nothing but pure lime, and get all the benefits without the slightest difficulty. That is what we are planning to buy next year. We are planning to apply it at the rate of about half a ton to the acre.

Question. Wouldn't that be cheaper than hydrate of lime?

Prof. SEARS. I think so, very much. Of course the manufacturers have to pay for the labor of putting the water on and we can do it cheaper than they can. So much for the matter of fertilizer.

Just a word in regard to cover crops. The next problem that appealed to us, after the question of getting fertility back into the land, was to get some humus, and we took four or five different crops and used them either as cover crops or general crops in the orchard. We grew four or five acres of the white pea bean simply as a crop, with the idea of getting a crop of beans. I have never been at all familiar with it as a source of humus. I was very favorably impressed with it, so much so that we intend to use it largely this year, merely as a means of getting humus back into the soil. We put that on a section of the orchard up in an old sheep pasture and we got a magnificent growth of beans with no special application of fertilizer, which if plowed under would have added an immense amount of humus and a good amount of nitrogen. Then we used buckwheat, which I think is one of the best things to start with. You can get that to grow almost anywhere. We found that satisfactory, as we got a fine growth, and it leaves the land in the finest condition. If land is physically in a poor condition nothing will improve it more than buckwheat. The Soy bean is also a fine cover crop. Planted in drills and cultivated once or twice it gives far better results than sown broadcast. We think most of our cover crops should be put in that way. Then we also used a small vetch, which in Nova Scotia makes a large growth, but with us it did not, I suppose due to the character of the land on which we were growing it. Another year we are planning to put in first a crop of buckwheat, then plow that under and put in a crop of beans, and then follow it with still another crop, in order to get humus back into the land and cause a satisfactory growth.

Just one word before I close, on the matter of crops. We cast about for some crops that we could grow in the orchard that would first be satisfactory to the orchard, and then return us some money. I was disappointed that Prof. Morse did not discuss the potato question, because I wanted to hear something in regard to the potato, as we are interested in that and think of using it as a crop next year. We discarded that as an orchard crop principally from my experience in Nova Scotia, where the potato is almost as extensively grown as it is up here, but scarcely ever grown as an orchard crop because their

winters are trying, and one of the great problems they have, especially in young orchards, is to prevent the winter-killing of the trees. They find that where they grow their potatoes in the orchard, in the first place it means the application of a large amount of fertilizer so that the trees get an unusual growth, and in the second place the cultivation of the potato is continued late in the season, and the digging amounts to another cultivation, and that is almost sure to prolong the growth of their young trees so far that the trees are winter-killed. I should have been interested to have heard a discussion, to see how it stands with men here in Maine. We are planning to take the potato up as a side crop, but not in the orchard. For money crops we grew the beans and also about eighteen acres of squash, which we considered one of the best crops we could grow. It comes along fairly well, gives you plenty of time for cultivation, and then pretty nearly takes charge of the land so that there is very little chance for the weeds to grow. We found that an ideal crop and shall use it notwithstanding the price of squash **has ruled very low this year**. Then we found that an exceedingly good crop was cabbage. With this crop you do not disturb the land in harvesting as you do in the case of potatoes. Those have been the crops we have used this year, and practically all of them we found satisfactory.

Question. With the trees 16 1-2 feet apart, I should like to ask Prof. Sears if he plans to keep his trees headed in, or plans to take them out.

Prof. SEARS. We put our trees sixteen and a half feet or one rod apart. Our plan is this, but I wouldn't recommend it to the general grower, as I believe more orchards are hurt by putting the trees too near together than from most causes: We plan to keep them headed in, low headed and headed back from growing out at the sides as long as we can, and then go through and cut out every other tree. Probably what we will do is to tell the foreman to cut out every other tree, and then we will go off and take a vacation while this is being done, so as not to see it going on; because it hurts a man's feelings after he has been taking a fine crop of fruit off a tree to have it cut down in that way. I think it will be a good many years, with the style of pruning we plan to use, before our trees begin to crowd

dangerously, but when that time comes of course it will be necessary to have them cut out.

Question. What about strawberries as an orchard crop?

Prof. SEARS. I should think they would be good where there is a good market. We cannot handle them very well. We have to grow crops that will not require too much labor, because it is difficult to get floating labor where we are.

Question. Don't you consider cabbage hard on the land? We consider it one of the hardest crops that we can grow.

Prof. SEARS. I did not consider it so. I thought cabbage had the reputation of growing on pretty raw land. I was not aware that it was considered especially hard on the land. I should have said that in all of our crops, while we attempt to pick out crops that are not going to damage the orchards, we reserved six feet this year, and shall extend that six feet, along the rows, for the exclusive use of the trees, sowing it down to a cover crop without reference to the intervening land which may be used for some other crop. So we do not plan to get any crop near enough to interfere with the trees, or damage them. Of course we plan to put in plenty of fertilizer.

Mr. TRUE. I would like to get more information in regard to this low heading. Prof. Sears and Mr. Hale recommend low headed trees, and it is singular, if they can raise apples on low headed trees there, that we cannot do it here. But in my experience a large majority of all the poor apples grow on the lower limbs, with Wealthy, or Hubbardston or Nonsuch. It seems to me that with low-headed trees the lower limbs are going to lie right on the ground or very near it, and that is where you will get your poor colored, poor quality apples. Is there a difference in climate and soil enough to overcome that? It is not all our snows.

Prof. SEARS. I spoke about the snow because I was warned by one of your men that a low-headed tree would not be popular. I will tell you how we prune our trees. We plan to start the branch as nearly upright as is practicable. Orchards with branches started like that will not bend down as low as a high-headed tree in which the branch is allowed to go straight out. We do not plan to have our fruit get down on the ground any

more than the man who has high headed trees does; we simply plan to have it nearer the ground.

Question. Do you head back any?

Prof. SEARS. Yes, very severely.

ABSTRACT OF LECTURE ON GLEANINGS FROM ORCHARD SURVEY WORK IN NEW YORK.

(Stereoptican Lecture.)

Prof. JOHN CRAIG, Cornell University, Ithaca, N. Y.

Mr. Chairman, Ladies and Gentlemen:

I have very pleasant recollections of my last appearance before this society and it is always a grateful surprise to me when by any possible chance I am invited back to the same place again. I find myself here tonight, however, and I shall endeavor to tell you something—not from the book of personal experience, as my colleague Prof. Sears did, but shall take a leaf from the book of experience of the fruit growers themselves in New York state.

I am just thinking what a fine thing it is for those young men who are studying under Prof. Sears in Massachusetts Agricultural College, that they will be able to make occasional surreptitious visits to his orchards and come back and perhaps confound his lecture-room advice by the results which are showing themselves in his practice. Sometimes theory and practice don't jibe, you know, and I can conceive of the time when it may be very unfortunate for our friend having that demonstration of his practical knowledge so near at hand. Now I must say that I was wiser than he. I have been going into something of the same kind, but in my greater wisdom—probably I am an older man—I removed my scene of practical operation so far that it will be quite impossible for my students to visit it and then come back to twit me with failure to live up to the horticultural doctrine which I have been dispensing from the lecture room rostrum. I am just pointing out at the beginning what a fundamental mistake he has made. It is a little late, but that comes from his not having consulted a more experienced man. He

should have suggested this to me before and I would have shown him how he could avoid a very serious pitfall.

I was interested in some of the figures and deductions which he has drawn from his first year's experience. He will have a number more. In my planting operations my cost exceeded his the first year. It cost me about seven cents a tree to plant some thousands of trees; but the second year we reduced it to his minimum price. I see he is progressing in that, in one year, he approximated my minimum. If he keeps on he will forge ahead. But I think in the progress of his practical researches his lecture room doctrines will very likely be modified to some extent.

Seriously it is a privilege, I think, for you ladies and gentlemen to have a man of this type come and talk to you of the things that he is doing in the field of commercial orcharding. We teachers have so constantly to draw from the experience of others—as I shall do tonight—and from the field of theory, that it must grow rather tiresome for the practical man, and when on the top of that we are often so cock sure as to how to answer the questions of the practical man, we spoil confidence and destroy our own usefulness.

THE SURVEY.

I shall show you tonight some slides which illustrate average experiences, more valuable than any particular experience that we could describe.

Human experience in lines of scientific research is of two kinds—first, the discovery of new truth, in the laboratory ordinarily; second, the rediscovering of old facts. We are constantly discovering, or rediscovering, old facts, and we occasionally discover some things which are new. Many of the things which we think are new are not so very recent after all. For instance, Prof. Sears tells us about using beans as a cover crop and we rather plume ourselves on the notion that this is a modern practice, that we have just discovered that the whole great family of legumes are valuable plants in farm practice because they capture a relatively large amount of nitrogen. Now if we were to go back to some of those old books—I was reading an old book the other day, the author of which

lived something like two thousand years ago, one of the early Romans, and was surprised to find that he actually advised the use of the legumes in the farm crop rotation; so this is not one of the new things we have discovered, but rather an old fact rediscovered. The Romans knew that legumes were valuable; we know why.

Tonight we shall run over some of the experiences we have discovered, as drawn from the practices of fruit growers in Western New York over in the region where our friend Allis resides. I am not going to show you any pictures of Allis' farm however, because that would be rather hard on him very likely and then he might get back at me, you know, when he returned to our home state. I am going to travel around principally in Niagara and Wayne counties where he doesn't live.

This is a view of orchards in Wayne county—rather interesting topography—rolling hills and on these gravelly hillsides splendid orchards were planted forty to sixty years ago, and are now in full bearing—mostly well cared for. It is our purpose to find out what those orchards are actually doing in Wayne county. There are some 22,000 acres in orchards. It is a large county. Sometimes that county produces more apples than one of the western states which we hear a good deal about. These apples do not all go to market, however. Some of them are shipped in the form of fresh fruit; many of them go to the evaporator. We conceived the idea in this work of starting in with the orchard and interviewing the trees themselves, and incidentally the owners of the trees, putting certain questions to the soil, certain questions to the trees, certain questions to the men who manage the trees and the soil, and then gathering from this body of facts correct deductions which would be useful to these and other fruit growers.

Question. Do you know how many evaporators there are in the county of Wayne?

Prof. CRAIG. I don't know; I should be afraid to make a guess, but the evaporator is almost a universal part of the farm equipment.

Questioner. There are six hundred evaporators in one township.

Prof. CRAIG. I should think there might be. The trees were one part of the investigation. The soil in which the trees grew

was another. So the investigator, equipped with a bicycle, a soil auger and note-book, sallied forth. You see him here taking a sample of the soil.

This chart shows you the type of information that was sought—a regular form you see, giving the name of the proprietor, whether owner or renter, the man who managed the place, the kind of site, the topography, that is to say the way in which it slopes, the kind of drainage, variety, how cared for, the pruning, fertilizer used, present treatment, whether sprayed or unsprayed, the troubles, the difficulties, the enemies, and then the interesting part—the returns. We were not always able to get these tables filled out as completely as in this case, but inasmuch as individual returns were not published you see it was often not difficult if the farmer kept books, and most good farmers keep books. Then the inspector made his own remarks at the bottom, largely with reference to the orchard itself.

Here we have the agent interviewing the farm owner, the orchard owner as it happens to be, just at the harvest time. That is a good time to do this work because you can see the product, and you are always likely to catch the owner or manager in the orchard. The entire county was not surveyed closely but we were able by getting accurate data on one part to draw our deductions for the whole, although the principal apple orchards in the whole county were carefully examined.

Planting began about 1840 and continued till 1900. Those trees which were planted between 1855 and 1859 gave the largest yield over an average of four years, or a yield of 200 bushels per acre. These figures point to this important fact, and a fact which I think will apply to your conditions here, that under normal conditions the apple is a long-lived tree, and that we should plant sufficiently far apart and care for it in such a suitable way that our tree may be long-lived. In other words we are going into a long investment. It is a principle that is applicable all over the New England States.

DISTANCE APART AS AFFECTING YIELD.

This slide shows the influence of the distance apart on yield. As the distance between the trees increases so does the yield increase. The fewer trees, in other words, on the acre, the

larger the yield. Now we are speaking of mature trees. We are not speaking of interplanting, as Prof. Sears has described, but referring to permanent trees which are to stand for the generations. The large tree of the Baldwin or Greening type needs plenty of space, and this table shows you that as the area around these trees is increased, so does the yield increase. The yield increases in inverse ratio to the number of trees to the acre.

From the last table we find that the yield of that county would have been greatly increased had the trees been all placed at the maximum distance. There would have been 31,320 more bushels of apples in the county in the given year when this census was made if they had all been properly spaced.

Here is a picture which illustrates the crowding of trees, shows what will happen to Prof. Sears' orchard if he doesn't have the courage which he spoke of and thin at the proper time. There isn't any method of pruning down or heading back, which will put a standard apple in good bearing condition at a close distance. We cannot do it.

It is interesting to note what the influence of the owner is compared with the influence of the renter on the yield of the orchard. In the upper chart we see those trees which were set before 1880 in the entire county, and the per cent of trees under the owner and the per cent of trees under the renter; 77% worked by the owner, and 37% by the renter. In the lower chart we see the average yield. Notice here in 1903 the average yield showing 260 bushels per acre under ownership, 216 bushels under renter, or a difference of 44 bushels per acre. This last column gives the four-year average—210 bushels for those orchards managed by the owner, 174 in the orchards managed by the renter. There is another point to this study, namely, the influence on the orchard itself, ultimately and finally. Those rented orchards are infinitely worse off now than they were at the time they were taken hold of, and should the owner take possession again and manage them it will take him some time to get them back into good bearing condition again.

Now I will give another piece of advice to our friend Sears without any charge, and that is, with his low trees, closely headed back, he will have to look out for bad forks. The branches are likely to spring out very close together, resulting

in splitting later in the life of the tree. It is not necessary that this should happen, but it is quite likely to do so unless careful pruning is practiced the years following.

Here is a closely planted orchard which the owner thought he would remedy by trimming up, cutting back, making smaller, in this way making each tree smaller. It is only a sort of palliative, working for a short time. It isn't the fundamental remedy. The fundamental remedy lies in removing the trees entirely.

To go back again to the practical phases of pruning. The right kind of a cut is one made close down to the body of the tree. Don't leave any shoulder at all. The closer you cut the quicker it will heal over. I don't know how long a good apple tree would live that was properly cared for, but thousands of apple trees die each year for lack of reasonable care.

Now we have an orchard in which interplanting has been practiced. In this case the secondary crop is strawberries. Now whether you grow strawberries or cabbage will depend largely on the condition of your soil and on the kind of market you have. If you have a market for strawberries, I don't think there is any difficulty about growing them, or cabbage, or anything else, even though it may be what you call an exhausting crop. The good cultivation will make up to the soil what the secondary crop will take out. It is a question of judgment and generosity.

Question. Are strawberries continued all the time?

Prof. CRAIG. In that particular orchard—and it is now four or five years older than at the time of this picture—strawberries haven't been grown of course continuously, but the strawberries are used, in the rotation, and they have been grown right along in the row except for a space of three or four feet around the tree; that space is cultivated by hand.

And now we come to the important question of tillage, the question of the influence of tillage on the yields. Our figures here comprise a period of four years, and covering that period they may be regarded as fairly reliable. We were obliged to class our orchards into groups, the first group being that lot of orchards which were tilled for five years or more previous to the examination; the second those which were tilled more often than they were not tilled but had not been tilled for five

consecutive years; the third those which were in sod more often than they were tilled; and the fourth which were in sod for five years or more previous to their examination—in direct contra-distinction to the first one. The four year average of those which were tilled for five years or more, was 266 bushels per acre, for those tilled most of the time 229, for those in sod most of the time 202, and for those in sod five years or more 150. Now you may say at once and properly, those orchards which were in sod were probably otherwise neglected. That is so, because the best practices of pruning and spraying and feeding go together. In order to eliminate that factor of error, we threw out all those orchards which were notably neglected, and included those orchards in which the sod was regarded by the owner as a legitimate and proper way of tilling. He cared for them well otherwise. These we put into a group by themselves. We have these figures from this group: 270 for those tilled, 247 for those tilled most of the time, 209 for those in sod most of the time, and 197 for the sod orchards. You see throwing out the very worst of these we raise this 150 to 197 bushels per acre, but the difference between 197 and 270 bushels per acre is about enough to account for a good dividend in an orchard. These figures are deduced from an examination of twelve hundred acres, so it is a conclusive experiment.

This work of making orchard surveys has been going on for four or five years, as you will see by the tables, and we are getting a body of information on other factors. Here I am able to compare two of the leading fruit-growing counties in the Lake Ontario district—Niagara and Orleans. It may happen that the yield may be smaller in one county than in another. That is to be explained by the character of the fruit yield for the particular year or period of years when the census was made. The yield, or lack of yield, for one year you see would disturb the figures very considerably; but the main lesson holds that the tilled orchards give the highest yields in Niagara County, 280 bushels with 254, 239, 209, etc., for other types of cultivation. In Orleans you see the yield was higher in that series of years, 327 for tilled and 274, 225, 222, 204, and 176 bushels for other types of management. The income drops down from \$120 for the best tilled orchards to \$75 for the sod orchards in Niagara County; in Orleans from \$182 to \$87.

It is hardly necessary, I think, to emphasize these figures because the force of the general principle is in all your minds, and you don't need any further reassurance. But there may be some who are considering the question of type of tillage, type of management, and the figures are given for their benefit, to strengthen the doubtful and to stimulate the man who has been in the field and to encourage him in continuing his good practices. In Orleans County a body of good orchards were taken, all otherwise well cared for in the matter of spraying and pruning and they were compared. They all tell the same kind of story, some a little more emphatically than others, namely, the story that good tillage and good feeding give the results we are after.

The kind of cover crop will depend largely on your locality. I don't know one best cover crop.

TABLE I.

COMPARISON OF TILLED AND SOD ORCHARDS.

(Five-year average per acre in bushels.)

	Average condition of all orchards		Only orchards well cared for			
	Niagara Co. Bu. Income.	Orleans Co. Bu. Income.	Niagara Co. Bu. Income.	Orleans Co. Bu. Income.		
Tilled 10 years or more	280	\$120	327	\$182	337	\$189
Tilled 5 years or more	254	100	274	138	296	148
Tilled at least 3 years	239	97	225	113	234	121
Sod at least 3 years	209	67	222	107	242	118
Sod 5 years or more	197	76	204	108	258	134
Sod 10 years or more	194	75	176	87	232	117

The next slide shows a neglected sod orchard. This is the kind of tillage that does not pay, this is the kind of tillage which gives the lowest returns. Unfortunately, I think, in New England, in Central New York, and more or less all over the country, there are too many of these orchards. They simply tell the story of failure.

Next, we have one of the sod orchards. Now there are ways and ways of managing orchards. In connection with this examination we have been attempting to get some light on the influence of different methods. I don't think it follows that we must all till our orchards. In fact, I know it doesn't. There

are many orchards that are successfully handled by sod methods or by some cultural methods. In some parts of the country they are pastured with hogs, in some with sheep, in some with cattle. I have here a table, in which orchards in three counties,—Niagara, Orleans and Wayne Counties—are shown, and the influence of different pasturing methods is brought out. You will notice the hog, the rooter, is at the head as a pasturing animal, measured by the returns you secure from orchards treated by that animal. There isn't very much difference between the hog and the sheep. Cattle are distinctly injurious for the reason that they not only crop the grass but they bruise the trees and perhaps knock off and destroy a good deal of the fruit. In fact, orchards not pastured have commonly given larger returns than those which were pastured with cattle, and I mean by not pastured simply kept in hay. The cattle seem to have been the most injurious of the pasturing animals employed. I remember the last time I visited Maine I had the pleasure of visiting a large orchard not far from Farmington where apples were extensively grown and where hogs were used as a pasturing agent. On that soil I am sure that no other animal and no other cultivating instrument or implement could be used with equal advantage. So we must study our conditions and apply the kind of treatment that suits those conditions.

TABLE II.
METHODS OF SOD TREATMENT.

(Three-year average per acre.)

	Niagara Co. Bushels	Orleans Co. Bushels	Wayne Co. Bushels
Pastured with			
Hogs	138	312	271
Sheep	129	308	216
Cattle	117	153	159
Not pastured	141	217	185

A WORD OR TWO ON SPRAYING.

I suppose there is no part of orchard practice which has undergone such important and fundamental changes as the practice which aims to control orchard enemies. It was not so very long ago that we used to fight potato bugs with a whisk

and bucket. I remember using a dish pan and a shingle paddle. That was superseded by the poison methods. We have now for all kinds of crops, systems and remedies which will check the growth of fungus parasites and insect enemies. Not only must the orchardist protect his trees during the time that they are fruiting, but the nurseryman must protect his stock in the nursery. If he is to grow good stock he must protect the foliage, because without good foliage, healthy trees cannot be secured.

And so in this case we have a type of nursery sprayer in which three or four rows are sprayed at a time. I am not going to take you through the various steps in the evolution of spraying.

The point I wish to make in these remarks on spraying is that we ought to make everything just as easy and convenient as possible. Every one who has gone into spraying knows that it is a disagreeable task, and we cannot make our plans too carefully in order to minimize labor and reduce difficulties.

This shows a rough type of platform, very primitive, the beginning of the so-called platform system. Most of our large orchardists now have well elevated tanks from whence the water runs into the barrels for the mixing of the liquids by gravity and is conducted directly to the spray tank itself by gravity. These preparations are necessary to the proper carrying on of the work. I visited one of our winter course students the year after he was so unfortunate as to have passed under my hands, and I observed that he was one of the enterprising men, that he had gone out and established a "laboratory" where he was preparing his Bordeaux mixture and other insect killers. He had rigged up a tank and harnessed it to the wind-mill, thus lifting his liquids at a minimum cost. These things count in the thoroughness of the work. The more difficult it is, the less thoroughly it is done.

A type of sprayer which is not at all uncommon in our orchards in western New York is a gasolene sprayer and simply represents a little trial in using a San José scale killer, one of the various oil remedies which may be applied during the dormant season and sometimes even in cold weather.

Question: How about spraying where the trees are close?

Prof. CRAIG: That is just the point, you couldn't do it; but in these particular orchards the trees stand nearly sixty feet apart. They are fifty-year-old Baldwins. But that brings us back to our point again, viz. that we have got to have our trees in this age of insect and fungus diseases far enough apart so that we can properly protect them.

Here are some figures which will strengthen the doubtful man in deciding whether he is going to spray or not. Here are the results of spraying in two counties contrasted. In Niagara County we had as a yield from a large block of orchards, 261 bushels per acre; those sprayed once 364 bushels, those sprayed twice 509 bushels. Now this represented not the absolute yield of the tree but the yield of merchantable fruit, that which was picked and graded. The returns derived from those unsprayed apples were \$45 per acre, \$93 from those sprayed once, \$101 from those sprayed twice, \$171 from those sprayed three times. In Orleans County 245 bushels of unsprayed brought \$92; 307 bushels of those sprayed once, an income of \$116 per acre; 343 of those sprayed twice, an income of \$127 per acre. These yields do not represent the same year, however, but nevertheless the figures are comparative in regard to the influence of spraying. Here is a group of orchards in which all the practices, pruning, spraying and feeding are considered to be of the best. Even in those where the trees were well fed, and where they were well pruned you see the returns both in Niagara County and in Orleans County were very much higher for the well sprayed orchards than for the unsprayed, \$95 per acre for the unsprayed in Niagara, \$103 per acre for the unsprayed in Orleans, going up to \$184 in Orleans for those sprayed three times and \$201 per acre in Niagara. These figures, then, I think will give us courage to persist in a practice which, though unpleasant, is profitable.

TABLE III.

YIELD IN BUSHELS AND INCOME PER ACRE OF SPRAYED AND UNSPRAYED ORCHARDS.

	All Orchards		Only well cared for orchards					
	Niagara Co. Bu.	Income	Orleans Co. Bu.	Income	Niagara Co. Bu.	Income	Orleans Co. Bu.	Income
Unsprayed	261	\$45	245	\$92	266	\$95	328	\$103
Sprayed once	364	93	307	116	353	146	346	139
Sprayed twice	509	101	343	127	422	147	374	143
Sprayed three times	577	171	322	139	440	201	414	184
Sprayed four times..	390	183	569	211	285	226	569	211

Question: What is the reason for the four times sprayed falling off?

Prof. CRAIG: I couldn't tell you. That is one of those questions that it is impossible to answer. There may have been a few orchards in which the variance was great and those being so very striking would pull down the average results in that particular group. There are two exceptions to that rule. The income is higher in all cases; it may have been a question of quality.

Here is a picture showing methods of packing and handling the fruits in boxes in Oswego County, New York. Spraying the fruit, feeding the fruit, pruning the fruit, these are the practices which encourage this sort of packing, for we secure the kind of fruit which can be put up in boxes and we are not ashamed to send it to high class markets.

Here we have some Canadian apples, a view in an orchard north of Lake Ontario, where the brand that we were speaking of a while ago goes on the barrel, marked plainly "No. 1," "No. 2" and so on, so that the buyer may know what the packer's idea of No. 1 and No. 2 is.

This is a view in a Monroe county orchard, showing the height of adult trees. Now these trees begin at the ground and they reach to the top of a thirty foot ladder. So that if we live long enough and in the right place we are going to get a high tree no matter whether we start it eight inches from the ground or five feet, but we shall have more satisfaction, I think, out of the low-headed tree during our life time than out of the high-headed one; but the apple tree in this country is bound to grow tall.

Now we have looked upon some figures and upon some suggestive pictures, and it seems to me the lessons from this work are that no single factor is alone responsible for maximum yields, for maximum success; no single factor can be credited with bringing success to an orchardist. It is true he may be a better sprayer than some of his neighbors, but spraying must be backed up by feeding, by pruning. He may be a better feeder than others, but if he does not spray he is going to fail—he is going to fall short of the maximum. I have often heard growers say "I know this thing," and "I know that thing." It is surprising, I think, how little we do know really.

We can gather a body of facts like these and reason from them, but the great danger is in making general rules from exceptions or from the happenings of a single year. If we get a wonderful crop one year, we often couple it with some particular practice, or some particular thing we did in the orchard that year, and make a rule out of it. I know of a group of growers in Western New York who think that spraying during the time the apple tree is in bloom is a very efficacious method of controlling disease and securing large crops. One year during the blooming period an orchardist did spray because he was obliged to spray then,—he couldn't get time to spray other than in the blooming period; and having an immense bloom, and the season being favorable he got a large crop. Since then he has based a rule upon that single year's experience. We know that it will not work out in the majority of cases. So we should be careful not to arrive at conclusions based upon a small or insufficient mass of facts or wild generalizations.

The personal factor is perhaps as important in orcharding as anything else. It is the man behind the orchard practices who is responsible, and that man fails or succeeds largely in proportion as he applies his knowledge, applies his judgment, and applies it consistently and perseveringly to the problem in hand. These figures which I have given you have been deduced from three large fruit-growing counties comprising an aggregate area in orchard of about 75,000 acres, and we regard them as fairly reliable. We have examined over 125,000 acres of orcharding land in Western New York, in addition to one county in Eastern New York. We are working up the details of these later surveyed counties at the present time.

This completes the little story I have to tell you, drawn as you will see from the book of experience of the growers themselves. I want to leave that one thought with you, that it is largely a personal equation, it is the man himself. We have conditions for fruit growing in every county in every state in this eastern country, and whether we succeed or fail depends upon ourselves. We know that there is no better body of husbandmen, farmers, men who deal with the soil, than the fruit growers. We know that they represent the foremost advance in tilling the land. Fruit is the flower of commodities.

Its cultivation demands intensive practices. The fruit grower occupies a responsible position in the agricultural fraternity.

I thank you, ladies and gentlemen, for your very kind attention. It has been a great pleasure to me to have this opportunity of meeting you again.

INDUSTRIAL DEMOCRACY—CO-OPERATION.

By Prof. PETER HENDRICKSON, Yarmouth.

It is very, very long ago that the question: "Am I my brother's keeper?" was contemptuously asked. Nineteen hundred years ago the world received an answer, which it has ever since obstinately struggled not to accept in a frank and cheerful spirit. The stronger and more cunning has yielded to the promptings of selfishness and greed and marched towards his goal with his heel upon the neck of his weaker brother.

But the germ of sympathy in the human breast has been growing in every generation until it has acquired a force and momentum which promise to bring in a new era and to realize the "Brotherhood of Man," no longer in theory only but in actual experience.

I shall never forget the solemn earnestness with which our college president, in his lectures on political economy, declared his conviction that the only settlement of the struggle between capital and labor, between the economically strong and the weak in society would be found in co-operation. That declaration, like a seed in fertile soil, took root in my mind and has grown ever since until it has acquired the strength of certain knowledge.

And this it is of which I shall try to speak to you here today.

It is now only about a dozen years since I witnessed the springing into life of the first co-operative industry in a community in which I lived.

In a very fertile region of Wisconsin, the dairy industry had been making very rapid advance since the advent of the cream separator. The money makers were not slow to see their opportunity, and creameries with machine equipments began to spring up all around.

A single company, or sometimes a single individual, under the guise of a "Creamery Co." would own from one to a dozen creameries, thus getting a monopoly in the region and at once proceed to skim the cream of the farmers' milk and with it the profit from the farmers' labor.

A skillful and wide-awake butter-maker in the employ of one of these concerns in our community, quietly aroused the farmers to a realization of the situation and their opportunity. He declared that they were paying at least three times as much for the service of the creamery as it was worth and as they could do it for themselves. A society was formed, the necessary capital quickly subscribed and the "creamery company" politely offered the chance to dispose of their plant at a fair valuation. This it refused to accept, choosing rather to fight. The result was a farmers' co-operative creamery within 30 rods of the old one and a vigorous fight which soon ended in the triumph of the new and a reduction in the cost of making the butter to less than one-third of the old price.

This was not the first co-operative creamery in Wisconsin, nor was it by any means the last. There are now about 600 of them in that state, and as it is reported, even more in Minnesota and adjoining states. It is no longer a bonanza for money men to own creameries in those western states.

Very similar was the situation of the grain growers in the newly opened territory of the adjoining states. In Minnesota, Kansas, Nebraska and the Dakotas the homesteaders rushed in, broke up the prairies and raised grain. They had, of course, no place to store their wheat, but hauled it at once from the threshing machines to the nearest shipping points. Here was a fine opportunity for the middleman to step in. At every new station along the railroads elevator companies erected their warehouses and received the farmers' grain at prices which sometimes brought the owners a neat fortune in a single season. Little by little the farmers realized that they did not often get the "square deal." They learned to act together and now a very large and growing proportion of the grain elevators in these states are owned and operated by farmers' co-operative societies.

As in all such movements, there were many failures in the beginning. The farmers worked their way as through a fog,

learning often by costly experience the right method of procedure and how to meet and foil the cunning of their resourceful competitors. Now "co-operation" is the watchword of the farmer in nearly all parts of the land, and the movement is spreading with ever-increasing velocity.

Most hopeful and encouraging is the latest phase of this development. Both in merchandise and manufacture the spirit of fellowship and mutual help is taking possession of the masses and spreading with almost startling rapidity. Within a radius of about 150 miles of Minneapolis about 70 co-operative stores have been started in the past three years. A plan of organization has been devised which promises to be very safe and successful.

A systematic propaganda is carried on by a central society, under the name of "The Right Relationship League," whose leading spirits are animated by a zeal and enthusiasm akin to that of a religious revival, to which it may not unfittingly be compared.

The man to whom most of all this movement owes its origin in the West is N. O. Nelson of St. Louis. He is truly a remarkable man, a man whose name cannot fail to find a place in history as one of the greatest and noblest spirits of the age. He calls himself—and justly—one of the "Captains of Industry," but one of that rare type that loves man more than money and righteousness more than power.

In several establishments he now employs about 700 men and has from the beginning been very successful in business. Over 20 years ago he made up his mind that the respect and friendship of his workers would give him more satisfaction and was more worthy of his ambition than heaping up a vast fortune out of their sweat and toil. In 1884 Mr. Nelson commenced to share his profits with his employees. One day in that year he called them together and announced what he was going to do. Not much attention seemed to be paid to it and little was heard about it till the next time he called them together and distributed \$4828 among them in cash. Then they realized that their employer had meant what he said. The next year he distributed \$9700. In 1906 it amounted to \$177,500 and in 1907 about \$200,000. There has been no year without profits and the distribution is made among both employees and customers,

for as is evident, both have helped make the profits. "In 1891, after 5 years of profit sharing, individual accounts stood like this: A \$12 a week man who had worked steadily, had received in addition to his wages, approximately \$448; a \$15 a week man, \$561. In August, 1893, perhaps you will recall the financial condition, wages were cut 25 per cent in the Nelson factories, with the consent of the employees. In January, 1894, with the business revival, wages were increased to what they were before the reduction and employees were voluntarily paid in cash what they had lost by the cut."

I wish time would permit me to tell you about the town of Leclaire which Mr. Nelson started in 1890 in Illinois, just a few miles across the river from St. Louis. The village is 18 years old, numbers 600 inhabitants and has no policemen, no jail, no court and no crime. It would seem to be the best governed, the happiest and most prosperous community in the world. As is evident, Mr. Nelson is possessed of extraordinary business and organizing talent coupled with an equal genius for judging and managing men. His long experience and success has made him uncompromising in his hostility to the usual "capitalistic" method of business and equally enthusiastic in his support of "true co-operation." He has these many years carefully studied the principles and watched the progress of co-operation wherever found, both in this and other countries and has become a firm believer in the fundamental principles and methods of the so-called "Rochdale System," named after the society of the Rochdale weavers, started in England in 1844.

The Welchman, Robert Owen, was really the first great apostle of modern co-operation. He accomplished wonderful things with his own energy, resources and broad human sympathy. But the movement was premature and the methods adopted were not calculated to make its foundation sound and permanent.

It remained for the starving weavers of Rochdale, a few years later, to give the principles as well as the name, to a movement that has taken root and is rapidly spreading in all civilized countries with every promise of lasting success. It is said that at that time there were over 2000 people in Rochdale who had to subsist on 46 cents a week. These weavers, 28 in number, took heart and got together, forming a society and called it the

“Rochdale Society of Equitable ‘Pioneers.” They began by turning into the treasury two pence a week each. Next year they found their “strong box” to contain what to them seemed a big sum, 28 pounds sterling or about \$140. With this they decided to commence business. These poor weavers had high ideals and much sound sense though very little education or business training. They were teetotalers, they were ready to labor and sacrifice for the common good. They worked evenings and there was no clerk hire. They had fixed business principles. They would tolerate no adulteration or trickery. They would sell for cash only and at current market prices; they would not be a competitor of any one and they would set aside a certain per cent of their profits for education. They hired a cheap little room in a street called Toad Lane, purchased a little flour, some butter, sugar and oatmeal and with this they commenced business at first only in the evening twice a week. They were scorned and ridiculed by some and pitied by others, but they did not lose heart. Like every good seed in good soil, it grew; at the end of the year the capital stock had grown to \$900 and the weekly sales to \$150. In 1850 it had 600 members; in 1857, 1850; in 1876 it had 8892 members and its business amounted to \$1,500,000 with an annual profit of about a quarter of a million. Best of all it has a large, well selected library and small reading rooms attached to each of its now numerous stores. These few hungry weavers have become the teachers of the world. In every civilized country the name Rochdale is synonymous with thrift, prosperity, intelligence and hope. Some of you may not have had the opportunity to look into the history of this movement and will be surprised when I tell you that in Europe there are now over 50,000 co-operative societies outside of Great Britain. In France there are over 800,000 members of farmers’ societies of this kind, while in England there are not less than 2000 societies with a membership of over two million and a capital of \$150,000,000. In Ireland the work is progressing very rapidly, promising to regenerate the industrial and social life of its long suffering people. In Germany, Holland, Belgium, the Scandinavian countries and even Finland, this movement has had a wonderful growth.

The Seventh Congress of the International Co-operative Alliance was held at Cremona in Italy in September, 1907. In his address of welcome the Italian Minister of Foreign Affairs spoke in the most enthusiastic terms of the Rochdale societies, their progress and prospects in all parts of Europe. "I look upon Denmark," he said, "in the field of agricultural co-operation as a laboratory in which social experiments are made for the benefit of the whole human family, and where it is shown that co-operation is the salvation of the agricultural proletariat."

The rapidly growing chain of co-operative societies in this country that I have already spoken of, under the guidance of Mr. Nelson and the "Right Relationship League," of Minneapolis are patterned after the Rochdale system with but slight modifications suggested by local conditions. Here "these stores are incorporated by counties, and when there are several stores in one county, they are departments or branches. For example, the Polk County (Wisconsin) Company has ten stores, the Pepin County Company nine stores and each has a general manager and a joint warehouse. Instead of starting a new store with a new manager and no established trade, the newly organized co-operative company buys out the best or next best general store in the town and continues the former owner as manager, retaining his customers and influence and avoiding the creation of a new competitor."

"The essential features of these corporations are that in distributing the profits a fair interest is allowed to the capital invested—usually six per cent. Then a fund is set apart for missionary or propaganda work, general repairs, etc., the rest of the profit being distributed at stated times to the customers in proportion to their purchases. Non-members who may patronize the store receive half dividend." This latter feature Mr. Nelson considers of the utmost importance. In an address at the general conference in Minneapolis a year ago Mr. Nelson said, "Pay the going rate of interest to capital induced to enter the business; pay going wages to employees; buy for cash; sell for cash; declare dividends as the profits will permit; pay regular dividends to stockholders, considering the employees as such to the extent of their earning power or wages. The non-shareholder patron, however, as he assumes no responsibility in the business should receive only one-half as much of

the profits on each dollar's trade as that given to the stockholder, employee or laborer."

Other features of the system are a uniform system of book-keeping, frequent visits and close inspection by the general manager of the county, and regular monthly reports of the business done in each store. Copies of these reports are also sent to the central office of the Right Relationship League at Minneapolis. The best experience and business talent is employed in perfecting the organization in such a manner as to reduce the possibility of failure to a minimum and to cultivate the spirit of mental helpfulness among the members.

We may imagine the spirit and enthusiasm infused into it by a man like Mr. Nelson, who has freely distributed to others for over twenty years the large profits from his business, which last year amounted to the vast sum of \$200,000.

"Three years ago," said Mr. Nelson, "I decided that I had accumulated more of this world's goods than I could spend in the natural course of life. Since then I have not accepted a salary, nor do I receive any dividends on the capital invested in my own business."

Now, let me ask, what does all this mean? It means the coming "Brotherhood of Man." It means the approach of a new era when man shall extend his right hand to his neighbor and say: "Come, brother. Come, let us work together for the good of both, for the welfare of all." It means the dawn of a new day when the sun of righteousness shall rise higher in the heavens, the light shall shine brighter and the shadows be shorter.

The question for us is: Shall we help bring on this day? Every great thing has had a small beginning. Finally after many failures, the right methods, the fundamental principles have been discovered and recognized by thinking men, and then the development has gone with a rush. What a few years ago met ridicule and contempt, today gets our approval and admiration. Look at the history of the railways and the ocean steamships, the "floating cities of the vast deep."

A hundred years is not a very long time, but it seems like an eternity when measured by the distance between Franklin's kite and the ocean cable or the wireless message encircling the earth. Darius Green and his flying machine have furnished amusement

for the schoolboy of the past generation, but today we are seriously talking about traveling in company with the stork and the crane.

The great Russian seer and philosopher has emphasized the fundamental principle which distinguishes good from evil. What is it? "Whatever tends to separate men is evil; what helps to unite and draw them together is good."

The ocean greyhounds, the railways and cables are uniting and drawing together the nations of the world and hastening the day when war shall be no more. Likewise the co-operative societies that dot the western prairies, now only scattered here and there, will in time unite and like a great prairie fire sweep over the land, not to destroy but to bind men together with the bonds of mutual goodwill and fellowship.

The noble Scotchman, Professor Drummond, preached a sermon on "The greatest thing in the world." It was soon translated into many languages, for it appealed to the soundest thought and the deepest feeling in man. "Charity (love) is the greatest thing in the world." Love unites, binds together. Love organized is co-operation.

But one thing must be remembered: This thing will not do itself. There must be a firm union of willing hands and strong. Nice talk about it will not do it. But while all must work together we must not forget the old saying, founded on much sad experience: "What is everybody's business, is nobody's business." There must be a strong, capable, watchful driving head. Nothing now goes without organization and a powerful steersman with a firm hand at the helm. A good general manager is worth more to a railroad than a million of capital. As you will remember, the Wisconsin and Minnesota societies formed county organizations with a central manager and expert accountant to superintend ten or a dozen stores. "United we stand, divided we fall," but the bond of union must be both visible and strong.

What shall be the future of country life? Much is heard nowadays about the return movement from the city to the country. This is well. But I do not take it to mean simply that because of the automobile and the trolley some city millionaires are to build palaces in the country. It means much more than this. The massing of millions into great centers of population

with its multitudes in filth and misery and its few in luxury and splendor; its squalid street peddler and rag-picker and its million dollar skyscraper and then the lonely and isolated "peasant" in the country is not to be the abiding condition of human society. All this must pass away, not with a rush or a revolution, but by a natural, steady and healthy growth. Man's birthright is the pure air, the freshness and beauty of nature, the nearness to mother earth, the purity and cheer of the undefiled snow, the opportunity for work and also the pleasure, the convenience, the culture of mutual association and unselfish co-operation. There will in time be a decentralization. This will be the mature fruit of perfectly developed co-operation.

It would be interesting to let the imagination have free play and attempt to form a picture of the rural community when this goal shall have been reached. But that kind of dreaming is hardly profitable even if we had ample leisure for it.

No one can yet foretell what shape this "Industrial Democracy" towards which we are moving will ultimately take. What we know is that we are now living and struggling in an age which may most fittingly be called the age of Industrial Tyranny or Industrial Aristocracy.

Whenever we want anything, we humbly ask: "What must I give for that? What is the price of this?" But when we have anything to offer, we just as meekly ask, "What will you give?"

What lies before us, and to which fortunately the people of this country now seem to be awakening, is the struggle to free society from the yoke of plutocracy, from the despotism of aggregated wealth.

Here, however, is one thing which I must not forget to emphasize, but which in the heat of the strife we are apt to forget. We owe, I venture to say, as much to the "Money power" as it owes to us. What have not the money getters and the wealth gatherers done for us and for the world? How would the great inventions have been made useful, how would the vast industrial progress, of which we all justly boast, have been brought about, unless somebody had gathered the capital into piles large enough to construct and put in motion the wheels of the vast system of machinery which today is the pride of the world?

The age of Industrial Aristocracy had to come before the birth of Industrial Democracy was possible. It logically belongs before it, just as in government the age of Aristocracy and Monarchy came before and necessitated the age of Democracy, of popular liberty and self-government.

When we were ready for political liberty, we got it. When we shall be wise enough, enterprising enough, brotherly enough to have and enjoy industrial liberty, we shall get that, too; and I trust I may say we are about ready for it. It is the "Kingdom Coming" and, I say it reverently, it is of the essence of the "Kingdom of Heaven," for it is the kingdom built on the brotherhood of man, which also means the "Fatherhood of God."

CO-OPERATION FOR MAINE FRUIT GROWERS.

By G. C. SEVEY, Associate Editor N. E. Homestead.

Mr. President, Ladies and Gentlemen:

First of all I wish to express regret in not being able to be present at your sessions of the society this week. After promising Pres. Craig that I would come, circumstances over which I had no control made it necessary for me to be in Springfield. Today, while you are discussing modern methods of fruit culture, we are dedicating down in Springfield, the new building of The New England Homestead. As surely as two bodies cannot occupy the same place at the same time, so is it impossible for me to be in Waterville and Springfield the same day and hour. It has been my pleasure in recent years to see much of Maine. I am constantly gaining a keener appreciation of the marvelous resources of this great State in an agricultural way, notably along horticultural lines. A few weeks ago I visited the orchards of Pres. Craig, Mr. Leland and Mr. Volney Gray. Those of you who are familiar with the operations of these men will appreciate the fact that something worth while was seen. In justice to the many other farmers I have visited in the Pine Tree State, will say that I never yet have been disappointed in what I saw, but on each occasion have observed methods of enterprise and progress.

Now this subject of co-operation which your president saw fit to assign me is as old as the hills and has been threshed and rethreshed until it would seem there is nothing new to be said. However, I may be able to present the arguments in a little different light and thus contribute in a degree to the general problem before you. It is said that "Constant dropping of water will wear a stone away," and constant repetition of the advantages of co-operation may finally bring the desired results. You will all agree that this is pre-eminently an age of associated effort. Those business enterprises which have gained the greatest success are those where associated effort has been most carefully directed and developed. You will find co-operation in all avenues of trade and no business enterprise gets very far without it, whether it be a matter of running the government of the United States or the successful making of a model home where each member of the family has his part to do and gives up certain things for the good of others, which in turn will reflect to his ultimate advantage.

Granting then that associated effort is essential, how can it best be applied to agriculture? There are various ways, depending upon the practical objects sought. There are any number of co-operative enterprises conducted by farmers throughout the country. There are grain elevators, grange stores, grange banks, creameries, milk producers' associations, vegetable growers' associations, fruit growers' exchanges, cow testing associations, live stock breeders' associations, etc. Without exception decided advantages are secured by all these organizations. It is an inspiring thought that once a group of farmers has tasted the advantages of true co-operation they will not give it up for any price. Instead, they go on improving their societies and making them more and more efficient. Has it not been so in Denmark where co-operation among the peasants has grown in such a remarkable way? Is it not true in the west, the south, and even here in New England? The trouble with us in New England is, we seem to be content with picking up the few crumbs that fall from the table rather than sitting up and enjoying a full meal. This is especially true along horticultural lines and in my opinion it is about time we had a square co-operative meal. Day after day, and year after year, we read of the successful operations of co-operative asso-

ciations on the Pacific coast and in the south, and heaving a sigh, we declare how nice it would be if such things were only possible among us.

Without going into a long discussion of what some active co-operative associations are doing, it may be well to mention in a word a few of the typical societies that are saving farmers thousands of dollars annually through associated effort. You have heard of the Ozark Fruit Growers' Association at Springfield, Mo., that handles 600 carloads of strawberries in a season, and 1000 carloads of peaches, to say nothing of apples. Then there is the Peninsula produce exchange with headquarters at Pocomoke City, Md., which in a single season handles 200,000 packages of melons and potatoes. So successful has this exchange been that shipments have increased 60% within a year. There is the Long Island Cauliflower Growers' Association, doing business at such towns as Southhold, Peconic, and Riverhead. In 1906 they handled 130,000 barrels of cauliflower. In Iowa and Nebraska there are at least 175 farmers' elevators which do a mammoth business. One elevator in Buffalo county, Neb., handled a business in 18 months of 500,000 bushels and returned farmers 2 1-2 cents more per bushel for grain than would have been provided except for their associated efforts. This meant better than \$12,000 saved to farmers of that county alone. Another farmers' elevator at Nevada, Ia., the very first year handled 130,000 bushels oats, 120,000 bushels corn, 1600 tons coal, 11,000 pounds binder twine, and 45 tons of oil meal and feed. In this work better than \$10,000 was saved for those farmers, and you will remember that a dollar saved is a dollar earned.

As good as these stories sound, they are not too good to be true. They have numerous duplicates throughout the country and here in New England we have yet to realize the full significance of the possibilities that follow genuine co-operative effort. Our milk producers appear to be more aggressive in this line than do fruit growers. The farmers' organization now known as the Boston Co-operative Milk Producers' Company, which has the handling of the milk reaching the Boston market from Maine, New Hampshire, Vermont, Massachusetts, and Connecticut, has saved farmers many thousands of dollars at a minimum expenditure. Right here in Maine, I believe your

Farmers' Protective Association has secured certain advantages for farmers who ship milk to the Portland market. You need not be reminded of the work in Aroostook county that is being done by the Houlton grange. What about your co-operative associations for testing cows and learning whether a cow eats more than she produces or whether she produces more than she eats. Is not that work likely to result in something worth while?

All of these instances both in and out of New England indicate what some of the possibilities really are in the line of associated effort along farming lines. Dozens of equally successful enterprises could be cited did time permit. But as members of a Pomological Society you are especially interested in what can be done along horticultural lines. So far as I am informed, with one or two exceptions it is impossible to find in New England any co-operative fruit growers' exchange that is really doing anything worth while. Fruit growers in Grand Isle county, Vt., are co-operating in a small degree and enterprising growers here in Maine in the vicinity of Turner are endeavoring to get things started. This is good as far as it goes but we want more of it. These dairy farmers who are succeeding so well in co-operative enterprises are no brighter than are fruit growers though it does look as though they were more enterprising. Go into the files of the agricultural journals in your State and I dare say you will find that 20 years ago fruit growers were talking co-operation and telling how nice it would be if they only had some good exchange in operation. Year after year the same authorities will show that this subject of co-operation has been talked up one side and down the other, and yet how much farther on the road are we to actual results than 20 years ago?

This is not said in a criticizing way, but rather in a business way, for it is only by recognizing the facts, however cold they may be, that we are likely to reach a satisfactory conclusion. All of the discussion has been very proper and I am glad it was provided for. But unless a start is made, will it not be another 20 years before we actually accomplish results? We as New Englanders are conservative folks, and I do not urge fruit growers to launch unreservedly into something they know nothing about. But there is no magic in this matter of co-operation.

It is simply a case of our utilizing the possibilities before us to our mutual advantage. We have everything that is required. As Casca said in his tirade against Cæsar,

“The fault, dear Brutus, is not in our stars
But in ourselves, that we are underlings.”

Our stars are all right, co-operation is all right, but it is in ourselves that we are content to strive along individually, each hewing out a separate road to success. If it is true that a man's success is limited only by the limitations he sets on himself, then what of the success that might follow the combined efforts of a group of men?

I ask if the Maine Pomological Society could engage in a better work than the encouragement of associated effort among the fruit growers of the State? This society has the reputation of being an active and enterprising one, and in general it is making good that reputation. However, here is an opportunity for it to accomplish more than would possibly follow a dozen or more summer field meetings in restricted sections of the State. If it can conceive and put on a working basis, one, two or a half dozen real live co-operative fruit growers' societies, then it will have done something that has not been done in New England.

I like to think of an organization like this as having personality. For instance, you meet a man who impresses you as a man of action. You will see he has character, and perhaps a few rough spots. But you will also find he has a corner that does not crumble off, or even wear to mere roundness when it comes in contact with the world's problems. He is a man of action. He gets results and you know where to find him on certain questions, 365 days in the year. If you want anything done you would like to have him connected with it for you know that if it is possible he will accomplish the desired result. That is the brand of personality I would like to see stamped on the Maine Pomological Society. The final test of an individual, association or corporation is bound to be, *Are results accomplished?* What matter the training, the education, the eloquence, the financial backing, and even existence of a thing, either individual or corporate, if none of these attributes can be turned to account and nothing *accomplished?* A result presupposes action and it is action for which I plead on the part

of the individual and the Maine Pomological Society in connection with this subject of co-operation. If associate effort were some new fangled notion there would be a good excuse for going slow and waiting a few more years to see how it works. But we have the records for decade after decade where farmers have combined their interests to advantage. Their experiences are an open book to us and we can stand on their shoulders from the start, thus having a wider range of vision and avoiding the pitfalls and dangers incident to the line of march.

A fundamental factor of business is that the large producer is the one who usually enjoys greater profits. Our manufacturers may not make a large amount of money on a single yard of cloth but in many thousands of yards they reap their profit. Buying in quantities you get a reduction. The same is true with shipping. This is as true in horticulture as in making calico cloth. Our friend Hale of Connecticut who handles thousands of baskets of peaches and does everything on a big scale has distinct advantages over the small grower. Presumably, we cannot all be peach kings, or apple kings, but we can combine among ourselves and pool our interests so that the aggregate will approximate an interesting total. This is what a co-operative association would do. I know no reason why such a society could not buy trees in large quantities at 25 to 50% discount, obtain fertilizers, packing barrels or boxes, spraying mixtures, provide for co-operative spraying, etc.

Furthermore, with a manager who is interested in making a success of the association, the trend of the market in various cities would be closely watched and the society members would know by wire the very latest conditions that effect their interests. For the individual with comparatively small output all this might not be practicable, but for an association it would become one of the first requisites. Then again, suppose an oily tongued individual with patent leather shoes and boiled shirt puts in his appearance at the time of harvest and presents his card as Mr. Catchem, representing the firm of Catchem and Skinem, wanting to buy fruit. Is there any harm if through the researches of this association you know this man and are able to tell him, "Yes, I have heard of you. You were out in western New York and bought apples of farmers and never paid for them." If you were consigning apples to New York would

it not be to your advantage to know that the market there was glutted on a particular day but that the Boson market was short. All of these things would be mere incidentals to an active co-operative association.

In case you are interested in this subject of a co-operative fruit growers' exchange and ask me for a plan of organization, I immediately refer you to the start made by the little society down at Turner. A few weeks ago I investigated the foundation upon which the Turner fruit growers are building and am inclined to believe they have made a good start. The plan would necessarily vary with the location and the exact objects sought. The Turner growers as you probably know plan on a central plant where apples will be taken and uniformly graded and packed. Every member must pick his fruit in prime condition and deliver it to the packing house or shipping point on call of the manager. No fruit shall be accepted except that which has been sprayed. Every member must also sell his apples to the association rather than another individual. Provision is made for packing the fruit at the home of the producer under the direction of the manager or competent assistant. The company is incorporated for \$10,000 and the avowed object is the better production and sale of fruit and farm produce. A share of stock costs \$10 and the affairs of the company are managed by a board of five directors who in turn employ a manager. I am informed that the past season the Turner growers bought a large power sprayer and co-operatively sprayed their fruit. This was something specific but if I am correctly informed, no co-operative marketing of the crop was practiced this fall, presumably on account of short supply.

The Turner association represents something like 30,000 or more barrels of apples for a normal season. At \$1.50 a barrel this would mean a business of \$45,000 and a 5% commission deducted from the sales for each individual would mean better than \$2200 which would make a good start towards paying expenses. It might be possible to arrange with the manager so that he should receive 2% or 3% on the dollar for his work. This would give him an interest and afford an inducement to bring in more fruit and return larger sums to the growers.

Then again, it might be advisable to erect a storage plant and handle the fruit in that way, receiving the gratifying profits

that ordinarily accrue to the man who has good fruit and stores it well. Less than two weeks ago I visited the 40 acre orchard of T. K. Windsor in Rhode Island. He is probably the best apple grower in the state and while this year the crop was short, he had 1600 barrels. Asked about the matter of storing, he told me that he always makes a good thing by storing his apples. Fruit that would ordinarily return \$1.50 to \$2.50 a barrel in the orchard brings him \$3 to \$6 in the spring, with average around \$4. He now has 1250 barrels in the Providence cold storage. They charge him 50 cents a barrel for the privilege of storing. He has had six years' experience in storing his way and says he always comes out several hundred dollars to the good by the storing method. If this is good for Rhode Island growers I am not so sure but it would be worth while for Maine growers, especially if they have the proper storage and a good product, uniformly graded and packed. The care and sale of this fruit in the winter would make interesting knitting work for the manager.

In my opinion the Turner society has already made one serious mistake and that is, in not securing the services of a competent manager. Even if they had but 20,000 barrels of apples this year, 5 cents a barrel would mean \$1000 for some competent manager to have graded that fruit, packed it uniformly and given it a distinguishing brand which another year would mean an increased price over miscellaneous fruit. Then again, matters of barrels, prospective new stock, fertilizer, etc., would have been more carefully investigated. Presumably, spraying would have been better done and more of it. I cannot imagine a satisfactory co-operative exchange without the services of a good manager who is ready to give more or less, usually more, of his time to the problems that interest members of the association. While one grower could not stand the additional expense of a manager, the cost is nominal when it is shared co-operatively among many. With a good manager the Turner association can accomplish marvelous results another year.

You will agree with me that Turner is not the only section of the State where apples grow and there is room for a half dozen or more other co-operative societies. If a few of these local associations once get started and get on to a working basis

it will be a simple thing to form a combination of them all and have an organization that will eclipse in efficiency the famed organizations of Hood River Valley, Ozark Mountains, etc. It can be done and it is simply a question whether any individual or the Pomological Society will take the pains to become interested and do a little missionary work looking to action rather than mere discussion.

Perhaps some have already wondered if the speaker really knows what he is talking about. I am glad to say that I do, in a degree at least. I believe it proper to say that editors as a class have unusual facilities for picking up information. Necessarily, they are in touch with conditions throughout the country and if a group of farmers is making a success in any particular line of co-operative effort or other agricultural venture it is the editor's business to investigate and pass on to his readers such facts as will prove helpful. Moreover, editors visit among the most progressive representatives of agriculture, study their conditions, their methods, and even a blind man could not fail to be impressed when thus coming in direct contact with the everyday problems of these men. As some men are born great, while others have greatness thrust upon them, so were some editors born great, while others had it thrust upon them.

Though being in the last named group, I am fortunate enough to have had a little personal experience in this matter of co-operation. I have gone out of the way to look into co-operative enterprises, seeking their factors of success as well as failure. Last year along with others, I served the Massachusetts State Grange in evolving a co-operative plan suitable to put in operation among patrons throughout the state. While we have not yet reached the desired goal there is one Pomona grange in Middlesex county that is starting out in a most commendable way and promises to be of great service to its members and perhaps form an object lesson for others in the state. With us, it is the same old story of being unable to agree how to make the start.

My experience and observation lead me to say that never will any body of farmers like a state grange, be able to *unanimously* agree upon the *exact* plan of operation. Some one will see difficulty ahead if the start is made in a certain way, and if you change your course accordingly, then someone else has

visions of shipwrecks and deserted farmers on a wind swept coast, a la Robinson Crusoe. Wait until all agree on the course that your co-operative bark will sail and you will wait 20 years more, yea, 20 times 20, unless the farmer loses some of his independence and the very nature of things changes.

I cannot resist adding that like your president, I love the country and the beautiful. Like him I own a farm and live on it, and by way of explanation may say that the bills are not paid from the editorial envelope. The farm is self-supporting. Still again, like your president I believe in fruit. I set out an orchard of apples last year, making standard Baldwin trees stand 36 feet apart and in the center of squares I planted McIntosh, Gravenstein and Wealthy apples on dwarf Doucin stock. Here, however, the comparison ceases, for as much as I love to emulate the example of your genial president I cannot agree with his living example of single blessedness. You would expect a man of so well tempered judgment and love of the beautiful and all that is æsthetic, to co-operate with some good woman and honor her with his name. This is again a matter of action for some one. I am constrained to say that like some of us who are considering this subject of co-operation, he is presumably thinking hard but cannot bring himself to the point of making the plunge. He lacks the necessary courage to result in action.

Seriously, and in conclusion, I trust something will be done in the matter of associated effort among Maine fruit growers, not five, ten or 20 years hence, but right now at this annual session of the society. Once you are started, you will blame yourselves for not starting before, and wonder why growers were so long contented with minimum profits. I believe you will find the agricultural press of the State back of you in your efforts, ready to support you in the way of publicity, and this is surely worth while. So far as the New England Homestead is concerned, I can pledge you our every assistance in this connection. The editors will gladly contribute their time, observation and experience to the cause in which you labor. Your interests are our interests and in a degree vice versa. The broader conception of life as we are understanding it nowadays is usefulness, and not mere selfishness. In helping others we are helping ourselves and that is the spirit we need more of in our co-oper-

ative enterprises. As was so well brought out in the preceding discussion, "United we stand, divided we fall." May this session of the Pomological Society see action which will early result in the united forces of fruit growers throughout the State

PLEASURE AND PROFIT IN WESTERN NEW YORK APPLES.

By CLARK ALLIS, Medina, N. Y.

Ladies and Gentlemen; Fruitgrowers of the good old State of Maine: It is a pleasure to be here with you and I have thoroughly enjoyed my visit here.

In looking at the State of Maine on a map of the United States it does not look very large, but every year we hear from the buyers that Maine has such a large apple crop that all the rest of the country cannot sell their apples, and from the number of barrels they talk about, every tree in the State, Christmas trees and all, must produce large crops of apples; and this year when the apple crop is short above ground, all the trees must be producing apples on their roots and when dug buyers think them potatoes, for buyers say Maine has so many potatoes the railroad company cannot furnish cars to move the potato crop.

In orcharding as well as in other enterprises, the more pleasure we take in our work, the more profit we usually receive, and the more profit we receive the more our pleasure increases; and while the love of money may be and often is the root of all evil, we all try to help it get a deep root. The last seven years have been fairly successful with apples with us and that success comes from spraying, fertilizing and tilling.

In one orchard of 30 acres which I bought, about one-half had been in sod over thirty years. The trees were set 30 x 30 feet. I mulched them well with rich sheep manure and pastured the orchard with sheep but it produced such a crop of blue grass and June grass, the leaves of which evaporated so much moisture, I decided to plow it up, which I did last winter. I left a part of the orchard in sod to experiment farther with along the mulch or sod method, and that orchard has more cigar and pistol case bearers than any other I have and an extra fine lot

of blister mites. This orchard has fruited fairly well every other year and one year it bore so heavily it hurt itself, many of the trees being broken badly. It did not bear very much this year so I sowed clover in July and have a fine stand.

The other part of the orchard, the former owner said, did not produce enough to pay, so he cut every other row out lengthways to get land to raise crops on, leaving the trees 30 feet apart in the rows and the rows 60 feet apart north and south. If he had cut the trees cornerwise every other row the orchard would have been much more valuable.

That orchard I sowed to mammoth clover under the trees and alfalfa between the rows and raised heavy crops of clover and alfalfa which were all put under the trees with a side delivery rake. The clover and alfalfa died out and a rank growth of blue grass and June grass came in. It was all plowed and reseeded to clover under the trees and alfalfa between the rows but I will plow under the trees again next summer. Some of the years when hay has been very high in price it has taken a good deal of nerve to keep on mulching with the hay which was very heavy and made a heavy covering under all the trees, but I knew if it was once drawn away it might get lost and never find its way back again.

It has paid me to leave the hay under the trees for the orchard is in fine condition and bears every year; not all the trees bear every year but many of them do, not the entire tree but one side of the tree or limbs in different places on the tree.

Another orchard I have owned but a few years was in sod when I bought it. This was manured with sheep manure and tilled. The trees were too close together so every other row corner ways was pruned very severely, cutting off every limb that touched the row left on either side. The orchard did not blossom heavily last spring but every blossom must have set for the trees were overloaded and broken, but we kept it tilled until very late in the summer to keep the apples growing and it was well we did for we had a very dry summer. We found two baldwins in that orchard over 14 inches in circumference, one 14 1-2 inches.

I feared a dry summer and fall so worked the orchards later than I liked to and this year I helped the apple crop but in the orchards I worked the latest the clover crop is about minus.

This orchard has never produced many apples until I bought it and this year neighbors say it grew more than it had produced all its life up to that time. This orchard, as well as the one described before, is about 38 to 40 years of age. I am convinced that more apples can be raised by tillage than by sod and will continue to cultivate most of the time, although in a wet season it is a disagreeable task to harvest a crop of apples from a tilled orchard.

All the apple orchards I had up to last spring I had bought and from what I had seen of orchards in other states I thought I would raise an orchard to suit my own ideas, so I took a piece of new land that two years ago was covered with stumps. These had been removed with dynamite, and one crop of beans raised on the land.

I bought No. 1 trees that had been fumigated and inspected by two New York state inspectors and declared free from scale. Right here is where theory and practice fell out, for according to Dr. Twitchell at the New Hampshire meeting fumigation and inspection are sure. The trees were set just the opposite from the Stringfellow method. I did not trim the roots unless broken nor the tops except to get the right number of limbs, and did not cut back at all. As the field was next two main traveled roads, I had lots of advice about the way to trim the tops, but they did not get trimmed and grew finely all summer. In the *new* wood's dirt, and being well set, they did not know it was a dry year and but three or four trees died on the 20 acres.

I set the entire orchard 42 feet apart with Baldwins and put in three fillers to each Baldwin, 21 feet apart, of early bearing kinds like Alexander, Wolf River, M. Blush, Twenty Ounce, McIntosh Red, etc.

In this orchard I intend to sow clover or some cover crop to be left on the ground, and while the ground is new and fertile and might be cropped for several years safely, I believe if I let the cover crops go back the ground will store up fertility and when the trees produce fruit I will have enough better quality to repay me for all the crops that would have been raised there. I do not intend to trim the trees much except to remove water sprouts and limbs that cross. My theory is that trimming young trees throws them to producing wood instead of fruit.

I am in hopes to have the orchard producing good crops of apples in two or three years.

I was proud of that orchard and the more folks praised the orchard the prouder I got until one day in September, the New York state inspector came along and served notice that I had 23 trees infected with San José scale and wanted to know what I would do with them. I told him all that had the scale I would cremate and all the rest I would spray with lime sulphur.

My pride got a set-back for sure, but I will fall back on grit and fight the scale.

It was the first scale I ever found on our farms. I wrote the nurseryman who raised the trees and he told me to pull all that were infected and he would replace with trees free from scale. I will set more orchards in the spring and will buy of the same nurseryman.

Some of the orchards I have are very badly infected with case bearers and on these I will use arsenate of lead very strong, about 5 pounds to 50 gallons and 1-2 pound of Paris green. I have used arsenate of lead for the codling worm and will use it again this next year.

I have a fine lot of blister mites and will use factory made lime-sulphur mixture for them. Orchards near us in which lime sulphur has been used for blister mites have fine foliage and are practically free from scab and fungus.

The best results seem to be derived when spraying is done as late as possible before the trees leave out.

I would like to say just a few words about packing apples. Adam was the first farmer we have any account of who had trouble in packing apples and he laid it to his wife and fruit-growers ever since have old Adam for an example and when the buyers find poor apples in the barrel, "The hired man or the boys, or my wife does all the packing," is the ready response. But, seriously we surely must stop it some way, no matter who puts up the poor apples. At the present time, and especially last year, buyers are by far the worst sinners for they have bought orchard runs and run in everything grown and the blossom buds for next year.

I have in mind now a dealer who has done more to hurt the Western New York apple in the markets of the middle west than can ever be estimated, and last week I was in his ware-

house where he was packing apples for Wisconsin and the farther the help dropped or threw the apples into the barrels the better packer he was considered and as the hot weather has ripened all fruit up very rapidly, one can imagine what some Wisconsin man will say when he buys fancy No. 1 Western New York apples.

I wish to invite you all to our New York State Fruit Growers' meeting at Medina the first week in January and to the Western New York Horticultural meeting the 3rd week in January at Rochester.

DISCUSSION.

Question. I want to ask Mr. Allis where he bought his trees.

Mr. ALLIS. Until last year I bought all my trees in New York state. Last fall I was down on the eastern shore of the Maryland peninsula and visited a nursery from which the year previous had been shipped twenty car-loads of trees to a firm in Rochester, N. Y., that were sold at Rochester as Rochester grown trees. So I thought I would buy eastern shore Maryland trees and get them direct. That is where I got this orchard.

Question. Did that scale come from the nursery?

Mr. ALLIS. I never had any on the farm before.

Question. Are there any nurseries in Maryland free from scale?

Mr. ALLIS. I think there are. The reason I don't buy of the New York firm is that they don't have what I want. The inspector tells me that there has never been any scale in the nursery from which I have formerly purchased, in Batavia, N. Y.

Question. What variety are you going to set?

Mr. ALLIS. I think I will set some kind and graft it to Kings. The King apple is a very good selling apple, and in fifteen years from now there will be scarcely a King tree left, and I think by that time these trees will pay a good price. Kings on their own stock are apt to die.

Question. Why wouldn't you keep sheep in your new orchard? I would like to have you tell your experience with sheep.

Mr. ALLIS. When I first began to work on these orchards I had a lot of sheep—I had as high some years as 700 sheep, and

they had to have nearly the whole farm for a pasture. In an orchard of high-headed trees it is all right to pasture sheep. But you can't pasture sheep in an orchard of low-headed trees; they like to pasture on the trees. We raise a lot of beans. Our sheep get almost entirely bean fodder, that is, the bean pods, through the winter. That gives us very good manure and the manure goes on to our orchards and helps our trees.

Question. Do you have the railroad worm?

Mr. ALLIS. I never have found any except on one tree of Jonathans.

Question. I want to inquire what stock you are going to set to graft your trees into?

Mr. ALLIS. I don't know yet. I have thought of the Spy.

Question. What is the reason Spies are not good enough to set?

Mr. ALLIS. You mean to raise for a crop? Why, I think the Spy is a good apple to set for a crop.

Question. Do the Kings make better bearers? Are they more sure bearers, to graft on to other stock?

Mr. ALLIS. We have quite a number of King trees and they have what is known as collar rot and our King trees are dying and they are not old trees either. I don't think the collar rot will attack the other trees, as it has not done so yet. By setting some other kind and top-grafting to Kings we hope to get trees that will not die with this disease. We are going to graft some Twenty Ounce too.

Question. What is collar rot?

Prof. CRAIG. It is a disease which attacks the bark of the trees at the base, the surface of the ground. It corrodes and eats away the bark gradually till the tree is engirdled and then it dies. As soon as this girdle of diseased bark is complete it comes to an end. The Twenty Ounce and the Duchess are both subject to that particular disease. The remedy is to graft onto a stock which isn't subject to it.

Mr. ALLIS. This disease will go along the outside bark and you will not know your tree is dying sometimes till it gets around the tree and then the outside bark is all loose.

Question. Are you troubled any in New York with the King apples growing watery?

A great many Kings in this state are affected in that way and the apples have been ruined entirely so that a great many who formerly raised Kings largely have discontinued the cultivation of them on that account.

Mr. ALLIS. We are very seldom troubled in that way. I don't think we would find one in a barrel that would be affected.

Mr. COOK. In studying the results of the cold winter here, there are a good many reasons to think that the stock you graft into will partake of the nature of the top, of the scions; that you will not prevent disease any more by taking some other stock than if you had bought the tree; that the top determines the whole tree to the roots.

Prof. CRAIG. I am glad to say that I don't think this is true. Of course there are influences that go from the top to the stock, but the constitution of the stock, specially when it is top-grafted, will remain throughout. The character of the tissue, which largely determines its susceptibility to a disease of that type, will remain unchanged. That is the experience of most fruit growers. The same thing runs through the entire experience of horticulture. For instance, in Italy and France at the present time vine culture has been saved by the importation by those countries of American vines, because the native vines were subject to the attacks of an insect; our American vines are not subject to the attacks of that insect. They import our American vines and graft their native vines on them. The same rule holds true in other lines.

Mr. HARDY. I like to hear this because we had a professor here two years ago who said that the stock had no influence on the scion, or the scion on the stock. Now any farmer who ever grafted a tree knows better than that. In regard to the influence of the top on the stock, I had a little experience with crab stocks, and I have as handsome baldwin tops as you ever saw in an orchard, but the stock is crab stock and always will be.

I have one tree that no one on earth could tell where the union was were it not for the difference in the bark. It is crab bark just the same as when the Baldwin scion was put in there. The union is just as smooth as can be.

Mr. CUMMINGS. I have noticed in the past few years on the underside of the newly formed leaves a little green louse. This last spring the trees were grafted—I grafted them quite low—

and these lice were so plenty that they stopped the growth of the scion; and round among these little green lice there were a great many small ants which seemed to be visiting them. I would like to know, if any of you can tell me, just how to get rid of them.

Prof. SANDERSON. It is the common green aphid. I think Miss Patch, the Station entomologist, has published something on that. The ants attend the plant lice to get the honey dew which is secreted by the lice. The best method of control would be to spray your trees with kerosene emulsion, about 10 or 15 per cent kerosene, or with whale oil soap, a pound of whale oil soap to about five gallons of water,—just as the leaf buds are opening in the spring, and if you are spraying with Bordeaux mixture just as the foliage is opening, you can put your whale oil soap in with the Bordeaux mixture and save the extra spraying. The time to catch them is before the leaves get out, because they curl the foliage and then you can't hit them with the spray.

Mr. MORSE. I want to say a word on that subject. I have had a lot of experience with them in the last few years. They have really caused more trouble than anything else we have had to fight. This kerosene emulsion must be a little stronger than most of the Experiment Stations recommend, that is, in our experience. Perhaps if we used it just as the buds were starting it might work with one part to fifteen. I did not discover that the lice were present until the leaves were out, and the lice were quite well grown. I made the emulsion the same as the Experiment Station tells about, 1 in 15, and as our trees were two miles from home I went out there five or six times and applied this emulsion, and it did no good. They seemed to enjoy it. I kept making it stronger until I got it about 1 to 10 and that did the work. Some people recommend dipping the little twigs right in the emulsion so as to be sure to get it all over the lice. It will not do to use it as strong as that in that way. I tried it this year. We had some trees set out, as Prof. Gulley told us two years ago, in rows like corn, and I sprayed it on all but one tree. I dipped the twigs on that tree and it killed all the fresh grown leaves and the tree hasn't recovered yet from the effects of that one dipping. But on the others it killed the lice and didn't hurt the trees.

LEGISLATION FOR PURE INSECTICIDES.

By Professor E. D. SANDERSON, Durham, N. H.

I want to speak a few minutes about the need for insecticide and fungicide control, and try to bring before you a measure which is now before Congress, which I think will have the support of this Association as well as that of all the fruit growers and agricultural associations of the country. I presume that every once in a while you have met one of your neighbors who has said that he put on a couple of pounds of Paris green for the potato bugs and that it didn't kill a bug. I run across that once in a while. I think a good deal of this is due more to the man than to the Paris green; but we do every once in a while find poor Paris green on the market, although from the fact that many states have legislation on Paris green and the manufacturers have to sell in these states, it has protected the other states which have no laws.

Now we have also a great many insecticides which we call proprietary insecticides, all sorts and kinds, which are claimed to kill everything, and fertilize the land and do everything else. We have had a host of these compounds, and we experiment station men get dozens of them every year to test, to show that they are good things, so that we can advise the farmers accordingly. Once in a while we get a good thing but about nine-tenths of them are bugbears and nuisances and we get very tired of testing out these quack remedies which prove to be of very little value, or else are sold at exorbitant prices. Of course we do find some good things now and then. To make this work easier our association of economic entomologists appointed a committee to see if we could not in some way supervise the testing of these things and avoid a lot of that work, and as we got to work on the proposition we found the first thing needed was a chemical analysis of these insecticides. We needed someway whereby they could be analyzed and we could tell in that way whether there was anything of value in them or not. And we concluded after considering the matter for some time that if all of these insecticides were analyzed, the analysis on the package would speak for itself and that many of our fruit growers and farmers

could tell for themselves whether this insecticide or fungicide would do what was claimed for it, or was worth what was asked for it. We attempted therefore to get a clause, or an interpretation of the pure food and drugs act which would cover insecticides and fungicides. We found that was not possible, that insecticides are neither a food nor a drug. So after conferring with some of the officials in Washington, we decided to try and secure the introduction of a measure in Congress which would secure federal supervision of the purity of insecticides and fungicides, the same as is now exercised with foods and drugs, and to do that it was necessary to introduce a separate measure, which was done last spring both in the Senate and in the House, the bill having been drawn up after consultation with officials in Washington and other people, on much the same line as the pure food and drugs act.

This measure which is now before Congress provides that all Paris greens and lead arsenates must be up to a certain standard—or specifies only those two insecticides which must be up to a certain standard; all other insecticides and fungicides must have stated on the label the effective ingredients of the insecticide or fungicide,—that is, the arsenic in the insecticide, or the copper sulphate, or whatever is the effective ingredient in the fungicide, must be stated on the label, and what percentage of the material is effective; or the manufacturer can state on the label all the inert ingredients. If he is making a secret compound and he has a whole lot of ordinary loam or road dust or something of that kind in it which acts as a carrier for his insecticide or fungicide he can simply state what the inert ingredients are, and how large a per cent they are, and leave out the name of the effective element. This measure has been drawn up as carefully as possible so as to meet the demands both of the consumer and the manufacturer.

After we had gotten this measure drawn up and put before Congress, we found that the manufacturers had various ideas somewhat different from some of the ideas of the entomologists and the chemists, and so we called together all the leading manufacturers to a conference at New York City, and went over this measure. And we talked a whole day about it and adopted certain amendments, and in this amended form this measure will be presented to Congress at its coming session. As a result of

this conference we secured the support of practically all the leading manufacturers. There are two or three still kicking a little about it, but practically all the leading manufacturers are thoroughly in favor of this measure as a result of that conference, and there was a committee appointed to push this matter, through the country and before Congress. On this committee we put the representatives of two of the largest manufacturers of insecticides and fungicides, two entomologists and one agricultural chemist. To show that the manufacturers who are selling legitimate insecticides and fungicides believe this is a good thing, I may say that they are putting up the money for pushing this work throughout the country, and they are working hard. One representative of one firm has been out West pushing this matter before the western fruit organizations, and another representative is caring for the southeastern part of the United States.

We have appointed an advisory board of one man from each state to work up interest in this measure and to see that the interest through his state is focussed on Congress. I have asked Dr. Twitchell to do that work in Maine and he has kindly consented to do so.

Now it seems to me very evident that we need some legislation of this kind. I am not familiar with the situation in Maine. I believe you have a law of some kind in this State. We have none in New Hampshire. They passed one in Massachusetts last session. There is nothing in Vermont, and in most of the states in the Union there is no legislation on this matter. Now it is just as important that, if we are going to spray and spend lots of money, we have good chemicals, as it is that we have our fertilizers analyzed that we put on the soil for furnishing nutrition to the plant. I have had quite a little experience with some of these insecticides. Recently lead arsenate has come into great favor as an orchard spray and shade tree spray. It is much superior to Paris green in many respects for some purposes. Owing to the large demand for this product a good many manufacturers have gone into making it and some of them, I am sorry to say, have been making a very inferior article. This last year almost all of the manufacturers have been putting up fairly uniform goods because they were forced to

do so by competition. But two years ago we found arsenate of lead running all the way from 8% to 20% arsenic. Now it is difficult for me to advise a fruit grower how much arsenate of lead to use when it varies in that sort of way. The same thing is true of fungicides. Your own Maine Station has gotten out a bulletin in which they show the value of various prepared Bordeaux mixtures, and we find the copper sulphate in those Bordeaux mixtures runs all the way, as I remember it, from 26% to 51% in the dry mixtures and in the wet mixtures from 8% to 76%. It is very difficult to advise a man how to use such a prepared compound. Of course the directions on the package tell how to use it; but your Station has also shown that these prepared mixtures are exceedingly expensive for a man to use on a large scale.

Now there is a market and a place for these prepared fungicides and for a great many of the insecticides which we might call sort of proprietary compounds—they are not standard compounds like Paris green and arsenate of lead—but if we are going to use them, we want to know what is in them; we want to know what we are buying, and get what we are paying for. That is a thing upon which we are all agreed. By having national legislation in this matter we can do away with the necessity for legislation in almost all states, because these insecticides and fungicides are manufactured in three or four states. New York, New Jersey, Pennsylvania and Ohio manufacture, I presume, nine-tenths of all the insecticides and fungicides used in this country. The great bulk is made right around New York state. It seems entirely unnecessary for every state to have a law and provide a chemist, when by having it put in one bill in Washington, it will provide for the whole country, coming into interstate commerce. This will be a great benefit to the manufacturers. They see that it is to their advantage in that way.

Now there are various state laws. New York enacted a law very drastic, much more severe than the proposed national law. Texas has a very peculiar law as regards insecticides. The manufacturers have to put a label on every package, which they have to buy from the state chemist and it costs them half a cent a label, no matter if the package is only worth five cents. It is a manifest injustice to the manufacturer. It is an undue bur-

den. By national legislation there will tend to be a uniformity in the state legislation as there has been in the case of the pure food and drugs act. Even the manufacturers see this, that by insuring standardization of insecticides and fungicides they will build up the trade and business for these goods. If we are going to have all sorts and kinds of arsenate of lead put on the market it is going to be much more difficult to build up a good business than if we have fixed standards for it so that people may come to know that arsenate of lead is arsenate of lead—a uniform article. And the more that these proprietary insecticides or quack remedies that are of no real value are driven off the market by legislation, which is not designed to injure them but simply to show what their true value is, the better it will be for the manufacturers of standard goods. And this will also be to the advantage of the farmer.

I do not know that I need go into any lengthy discussion of this matter. It seems to me evident that every man who is using insecticides and fungicides wants to know what they are and what their quality is. I think there will be but very little determined opposition to this measure in Congress. It will come from a few manufacturers and a few retail dealers who are probably making money out of selling these proprietary insecticides, from which they get a better profit than they do from the standard goods. But in general the manufacturers will stand solidly back of this measure, and the consumers—the fruit growers and agriculturists—of the whole country are known to be thoroughly in favor of it. Whether we can get this through Congress or not will depend entirely upon whether we can convince Congress that the people—their constituents—demand it. With thousands and thousands of bills coming in, Congress is not going to give attention to a measure unless they see there is a public demand for it, and if we get this measure it will be simply by the pressure that this organization, and similar organizations, and individuals throughout the country can bring to bear on their congressmen to convince them that we need such a law.

Now you have, it may be, an efficient law in this State concerning this matter, but you can make the work very much more effective, I think, by having also the supervision of the bureau at Washington covering all of the insecticides in the United

States, and it will help build up the fruit industry throughout the whole country to have such a measure. I hope then, that we may have the indorsement of this Society for this measure, and that when you hear from Dr. Twitchell sometime in December or January that this matter is up before Congress, you will sit down and write your congressman a letter and say that we need that legislation. I don't know any other way of getting a measure of that kind through, and that will help immensely. I hope not only this organization, but the granges throughout the State—the Pomona granges, State granges and local granges—will pass resolutions in favor of this measure and see that they are forwarded to Washington. The matter will come up before the National Grange at Washington this week, and I have no doubt it will be indorsed by the National Grange as I have assurances from them.

HORTICULTURE IN EUROPE.

(Stenographer's transcript.)

By Prof. JOHN CRAIG.

Mr. President, Ladies and Gentlemen:

I want to take you on an extended trip through Europe. In the institution with which I am connected when a man works a certain length of time and he becomes more or less ineffective in his department, they do one of two things—either give him a rest or “fire” him. I don't know just how ineffective I became, but they gave me a rest. Perhaps that was a warning that the next time my rest will be indefinite. And so with my family I took a steamer to Southern Italy, and travelled afterwards through Italy, Germany, Holland, France and England, and the pictures which I will show you are those which I secured on this trip. If they have any merit at all, they have the merit that they are personal productions, and out of several hundred which I secured these are some which bear more or less upon the horticultural topic and out-door life generally.

THE ITALIAN RIVIERA.

The picture before you is a contour of the Riviera section along the Mediterranean, the Italian Mediterranean, one of the most picturesque regions in Southern Italy, high bluffs running up to a thousand or more feet in some places. The point I wish to draw attention to here is this winding line which follows the coast line. That is a highway, one of the noted highways of Europe. If there is one thing, it seems to me, that this country needs—I mean those broad fundamental factors which make for the progress of the nation—it is better highways, better water-ways, in short, better means of inter-communication.

ROMAN ROADS.

Here is another road of the Italian Riviera, one of the most beautiful, picturesque, best mountain roads it has been my pleasure to travel upon. We shall see this somewhat in detail. Road making in Italy is as old as the civilization of the Romans. The Roman roads were noted for their durability. They were not noted for their beauty, that is, from the constructive standpoint, but they were noted for their lasting qualities. This mountain highway was not built for carriages but constructed for horse and foot passengers, pedestrian traffic. It is probably two thousand years old—the center of it a smooth space constructed of bricks with rough stones packed in on the sides. The picture here is one of a peasant living in the mountains coming down to market with her only means of transportation—the mule or donkey—carrying these panniers on either side laden with whatever she was bringing to market. These are quite common scenes in the olive growing regions of Italy.

Another view of one of these mountain footpaths passing a villa situated on one of the mountain sides. Here you notice a little shrine which reminds the passerby of his duties to things spiritual.

Another view of one of these Roman roads:—This road, probably dating back to the second century, winds through the olive groves along the face of that extremely picturesque cliff, at one time connecting Italy with France. And on the general question of roads I would not have you think for a moment that the good roads are confined to any one part of Europe.

Here is a Swiss mountain road some 3000 feet above Geneva. Incidentally we see the way in which many of the peasants transport their supplies to and from their mountain homes. This view is of a road which is not used for vehicles, but by pedestrians who acquire the habit of carrying loads on the back very easily. Again, in their constructive work there was an element of the artistic in the old remains, particularly in the Renaissance period, the period after the dark ages.

We have this quality in the view of a Roman bridge built across a little stream. Notice the attractive features in that arch, not as beautiful as many you see, but after all, curves you know are always more beautiful than straight lines. We are apt to deal in rectangles in this present work-a-day world; we are prone to overlook the æsthetic in out-door life too much altogether.

SWISS ROADS.

Another view—the last view was in Italy—this is in Switzerland, showing how well kept or well maintained these mountain roads are. We are making progress in road making in this country, but one of the defects of our system is that no adequate provision is made for maintenance, and many of the good roads which were constructed only a few years ago are now showing serious signs of wear and tear. They are not being properly maintained.

Another view of a road cut along side of a cliff in Southern Italy; note the strong stone retaining wall. The only point about this which I wish to bring forward is the attempt at introducing the æsthetic into an otherwise bare and rather harsh landscape. Small openings are made into the embankment through this stone work, and into these holes grape vines are planted. The grape vines are supported by a little trellis which is more or less invisible in this hastily taken picture, but which supports the vine, keeps it away from the stones, and actually enables a crop of grapes to be harvested—a combination of the economic and æsthetic. One of the most attractive roads that I have seen anywhere, about one of the best from the engineering standpoint, carved right out of the bare rock, is on the Island of Capri, off the Bay of Naples. The roads wind around these points which are often occupied by monasteries and other

ancient buildings, built in the Roman or after the Roman period, shortly afterwards, but always exemplifying this permanent construction and at the same time combining the æsthetic and the beautiful.

ROMAN BUILDINGS.

This is a view of the Roman forum as seen at the present day in the disinterred city of Pompeii,—a little picture made with a kodak, taken particularly for the purpose of bringing out these characteristic Italian combinations that one sees in the landscape all through Southern Italy. Perhaps some of you remember that when Pliny described the great convulsion here, the great volcano which destroyed this city—there is an outline of Vesuvius in the background—he said that the column of smoke rose up like a great pine tree, a central column and an umbrella-like top, (the pine trees in this picture show how accurate was his description), then the column spread and submerged the city.

Gardening is as old as farming. Mr. Allis quoting Emerson said the first man was the first farmer. I think we can, with even stronger claim, say that the first man was the first gardener, inasmuch as he lived in a garden. Here is a view of a rich man's garden connected with a house in Pompeii, that has been restored. The building has not been restored. The building is exactly as it was disinterred, but the garden has been cleared up and the plants set there with a view to giving a replica or an imitation of what existed in the olden times. The garden was an important feature of Roman home life.

These old Roman relics of arches and towers are quite common to the Riviera region. Notice how that brick arch stands up without any support whatever. There is no reinforcement of iron work there; it is mortar and brick and it stands as it has stood through the centuries. And so with the wall on this side. One of the striking features, too, that you see in the Southern or Central Italian country are these buildings on the almost inaccessible heights. Here is a monastery and there a tower and one wonders how they were ever gotten up there. One wonders how it was possible to get the limestone, the water and sand for the construction of these buildings—and yet you find them on the highest points.

An Italian shepherdess in that same region, with that same old bridge which I showed you a little while ago. These sheep are driven around wherever there is pasturage.

ITALIAN SCHOOLS OF AGRICULTURE.

I had some opportunity of examining educational institutions, those institutions which give instruction in agriculture and horticulture, and I was interested in visiting one of the oldest universities in Italy, viz., the University of Bologna, and I took a photograph of a class-room three hundred and fifty years old. It has not been strictly brought up to date. I imagine it differs in certain marked degrees from the university class-rooms you find in the institutions in this or other states. It is not remarkable for æsthetic adornment. It remains as it was two or three centuries ago.

One of the institutions which should be credited with preserving and handing down a knowledge of the arts and sciences, a knowledge of horticulture and those crafts connected with agriculture, is the monastery, and here we have a picture of one of the old monasteries of Italy. The priests and the monks of these monasteries were the agents who voiced and recorded a knowledge of these arts and who preserved to us many of the records which would otherwise have perished. You notice that they manufactured some articles. Here is a brand of liqueur manufactured by this particular one which no doubt is appreciated wherever it is known.

IMPLEMENTS AND OLIVE ORCHARDS.

You will be surprised to see what primitive and rude implements are used, even at the present time, in parts of Italy. I am speaking still of Italy. There is a plow. I don't believe it would be looked upon with favor by a Maine farmer. It is simply a rough nose tipped with iron on a wooden base and hauled by a sort of tongue. Here is one in use in an olive orchard, and there is a typical Etruscan peasant as one sees him on the Italian Riviera, in that olive growing region. We see it here in operation. I don't think I would enjoy following that kind of plow any more than I did enjoy following the plow some years ago in Canada when it danced among the stones

and occasionally gave me a rough jolt in the ribs. But the olive orchards are very attractive.

Italy has five colleges of agriculture. It is remarkable to think that a state having five colleges of agriculture would have such primitive methods as I have told you of. Those pictures are not fanciful; they are taken from real life. Practically all field work is done by hand. There is no Planet, Jr. There is no mule, no horse for hauling your cultivator. Work is entirely done by hand. In the Pomological Gardens at Florence we have quite a progressive institution, and here is a view of their strawberry beds, in which fifty or sixty American varieties were growing when I was there. The European strawberry, however, is more in favor than the American. In France and Switzerland one sees more intensive methods. An interesting thing here is these little ditches, almost inconspicuous, which are meant to prevent the washing of the soil on steep hillsides. These ditches run diagonally down the hillside, so that they intercept the downward flow of the water. It is a scheme only practical where labor is plentiful and cheap.

IRRIGATION AND GRAPE GROWING.

Irrigation has long been practiced in Italy. It dates from a time previous to the Roman period, and I am sorry to say that comparatively little change has taken place in irrigation methods since its initiation. Here is a well with a wheel on which buckets are arranged, and by revolving that wheel the water is raised and lifted to other levels and conducted along these ditches and thence distributed through the grounds. The donkey travelling around a circle after the fashion of our own sweep system is often the means of raising the water.

The methods of training vines in Italy are interesting and peculiar. We use trellises made by driving posts in the ground and stringing wires on them. The posts they use are live posts. This is a tree,—a maple or an elm, probably; the vine is planted, carried up the tree and spreads over the tree top. That is the system in vogue in the greater part of Italy. The branches of the trees are cut and used for fuel, so that it serves a double purpose.

Here is another view of the Experiment Station grounds of the College of Agriculture in Central Italy, with the director

of the Experiment Station, a delightful man and very well informed. I spoke a little while ago of the place of the American vine in culture in Italy. American vines are used for stocks, and they have saved the wine and grape industry of that country. They are absolutely essential to grape culture.

Speaking of vines, we now come to the great vine-growing region of the German Rhine region and this is a characteristic picture that one might secure from one of the steamers going down the Rhine towards Cologne. Here we have the terraced banks. If it were not for terraces, vine growing would be impossible, but having them terraced it makes it feasible. The wines made from grapes grown in this section have a national reputation.

I was surprised at the extent to which spraying was employed in the vineyard region and the way in which it was viewed by those more or less illiterate peasants. They look upon it in vine growing as an absolute necessity. They spray their vines just as regularly and consistently as they cultivate the ground or as they prune the vines.

THE VINE IN GERMANY.

Here we have one of these Rhine River peasants spraying his vines. It is not pleasant work under any circumstances, but it is very unpleasant work when you have to "tote" a knapsack pump on your back. The goodwife generally works alongside the goodman in the vineyard. She does the pruning.

We are now in Germany where the vines are grown on posts, a post to each vine. They need a great deal of pruning and training so that the manual labor side of the question is an exceedingly important one.

In Switzerland the terrace system and the hillside method of growing vines are very much in vogue. These baskets, fastened to the backs of the workmen, are the general means not only of transporting the grapes out of the vineyard, because inaccessible to horses and to vehicles, but also the method of transporting the fertilizer into the vineyard, and in this particular case the sidehill is so steep that the soil washes down to the lower part of each individual terrace. It is then carried by the workman in this basket on his own back and placed at the top again, where nature will gradually take it down.

LITTLE OR NO COMMERCIAL ORCHARDING IN EUROPE.

There is practically no commercial orcharding anywhere on the continent. There is some commercial orcharding in England, but one does not see extensive stretches of orcharding anywhere on the continent. You often see great fruit trees along the roadside cared for, their crops being carefully harvested and handled. The trees are scattered around along fences, in broken places, but rarely are the smooth fields worked up and planted to orchards. When they are, it is on quite a different system. Either they are dwarf trees with fifteen or eighteen-inch stem or sometimes even lower, or high standards. When standards are used they are supported by planting a post alongside and tying them to the post. Dwarfs and standards are interplanted. From the standpoint of commercial orcharding, you will not find it in any measure comparable to ours, on the continent of Europe.

Peaches are grown in various places in the south of France and in Italy. Here is a row of peaches which you see sadly need heading back, grown in Central Italy, but they are subject to the same troubles there as they are in our more favored portions. On this side of the picture you see the characteristic type of tree which is grown. Those are trees trained on trellises just as our grape vines are trained, but rather more conservatively and rigidly.

OLIVE INDUSTRY.

Now to come back again for a moment to the olive industry. If you look carefully at this picture you see one, two, three, four terraces within the range of the lens of the camera when the picture was taken. That shows how these little hillside lands are terraced up. It is very stony. There are only a few feet of level soil and in this the olive tree is planted. The olive tree is pruned very severely. They otherwise take little care of it. One of the things they are exceedingly particular about is to see that no dead or decaying wood remains in the tree in the stem or on the branches. And these workmen here, with a sort of adze-like instrument are digging out a diseased portion of the stem. Now they do not know anything about vegetable pathology at all, but they do know that a decayed wood tends

to extend its area, and that if not removed it will soon involve the entire tree, so that the Italian peasants have for centuries been practicing the system of cutting right out of the trunk of trees all the diseased wood. They do not disinfect it or treat it with anything, but they remove the agent which encourages the disease. Here we have an old olive tree in which all the central portion has been dug out. The continuance of that practice results in a very curious looking tree. Here the interior of the tree has gradually been removed and we have these remnants, with a top which after all gives a considerable amount of olives. The principle is the removal of the diseased portion. We could improve on that by applying the principles of dentistry to our tree stem—take out the diseased portion, disinfect it and fill it up with something which would prevent the spread of decay. They haven't got to that point.

NURSERY WORK.

In some parts of Europe the business of the nurseryman is carried on most extensively. Thousands of bell jars are employed in the growing of tender plants. With cheap labor, women and boys, they are able to successfully compete with nurserymen here in this country. Here is a mass of rhododendrons, which is truly American but which has been brought over here and is being propagated successfully in great quantities. In other words, the habits of the plant are studied.

PLANT BREEDING.

This picture was to me very interesting. It illustrates a type of scientific work by a purely commercial firm. I wish we might see in this country examples of firms engaged in horticultural work continuing their work through direct lineage, that is to say from father to son. This firm is in the sixth generation. It is a firm in Paris that is an experiment station just as much as any government station is. They carry on a distinct line of scientific breeding, of hybridizing in their own gardens. The various methods by which the plants are isolated so that intercrossing cannot take place are shown.

In England one of the joys of country scenery is the well kept hedge—the native live hedge. Nurserymen's grounds in Eng-

land are often divided up into little compartments as it were, little areas, by these magnificent hedges of beech. We don't use the beech in this country as a hedge plant; it will not stand our trimming here.

These live walls six or eight feet high are great protections from wind, of course not adapted to our method of cultivation, but there you see five series of these hedges dividing different types of plants from each other. And what we see there is typical of many parts of the English landscape.

TRAINED TREES.

Another characteristic of the nurseryman's work and the fruit growers' work in both England and Europe is the trained tree. Nurserymen make these trained trees to order in the nursery. You can have one in any form you like, fan-shaped, two-arm system, any shape you desire. All that is necessary is a suitable frame to give you the style of tree you want. It is an illustration of the old story, "As the twig is bent so the tree will grow." The work is done by an ordinary type of workman. The side branches are cut off, the others spread out and tied down. Here is one of the old trees, an old pear tree. You see it has been trained in that formal shape. Thousands and thousands of those trees are grown on walls and trellises in England and in France. They make very attractive side wall ornaments. Here is one rather more ambitious in its form, a complete circle, and then out of the circle a sort of fan-shaped top appearing. In this particular instance it formed the end piece down a long walk in a Frenchman's garden. Another form in which they are often used is in the making of pergolas and arbors. The trees are trained up over an iron arch, meeting at the top and growing solidly together.

Here we see how completely the ground is occupied, cropped and intercropped. This is an original planting of fruit trees for permanent trees, with bush plants, such as currants, gooseberries and raspberries interplanted to an extent that the entire surface of the ground is occupied from the start.

One of the great industries of a part of Belgium is the growing of palm trees. This shows part of a packing room in one of the great Ghent nurseries where several acres of ground are

under glass and entirely devoted to the growing of palm trees, about three-fifths of which are shipped to this country.

AMERICAN PLANTS IN ENGLAND.

The great American plant, the rhododendron, has been thoroughly acclimated and made at home in most parts of middle Europe and in Britain. I suppose the finest plants I ever saw were in the county of Surrey where this picture was taken. The cottages occupied by the common people, while unimpressive architecturally, are nearly always attractive from the standpoint of plant decoration. They have been dressed up.

HOLLAND.

In the canal region of Holland ornamental trees are grown more extensively and are more intensely cultivated than any place I know of. These little areas, small patches of land, are divided by canals. The soil here is only a foot or so above water level and is all made soil that has been thrown up from the ditches in the construction of the canals. These canals are cleaned out twice a year, and the amount of water plants, etc., secured from them have an important influence on fertilizing the ground. They throw the water plants into piles. It is splendid for the soil but hard for the people around because the odor they evolve is not altogether pleasant. It reminds one of what the epitaph said about Mary Ann who had rather a short temper:

“Here lies Mary Ann
Who has gone to the bosom of Abraham.
It is first rate for Mary Ann
But a trifle hard on Abraham.”

The windmill, of course, is a characteristic feature of the Holland and Belgium landscape; the water way is their line of communication.

Colorado blue spruce are grown extensively in that region. Now we grow them by the thousands and by the acres, but you find very few of our nurserymen setting a stake to each plant and carefully tying the leader to that stake so that the plant will be perfectly upright. This illustrates the different methods practised by the careful European nurserymen.

THE PEASANT PEOPLE.

This shows a picture of four women in the north of Holland, a very characteristic picture of that interesting type of inhabitant—one of the most interesting peoples of the world, I think—independent, energetic, thrifty, and perfectly satisfied with their surroundings. I don't know whether you can see the ornaments which are pendent from these interesting bonnets that the ladies wear. They use a special kind of gold pendant there and also use these heavy necklaces. These peasants represent the most thrifty and well-to-do country people in Europe. A considerable amount of their surplus money goes into the purchase of these decorations which are used on even the small children, viz.: gold and silver ornaments and corals worn as necklaces and pendants from the bonnets.

A group of the Boer men—these are the men who put up the great fight in the Boer War against the British—in South Africa. You will find them on market day in almost any of the towns in North Holland. The island part of Holland is the part where they are most numerous.

SWITZERLAND.

Switzerland is a great sight-seeing country, not only because it is beautiful but because the sights are accessible. We shall come to the time when our magnificent scenery can be viewed without great difficulty, when we shall have roads and railways and means of communication. One of the things that will strike the visitor as curious is the way in which many of the park trees of France, Switzerland and parts of Germany are pruned. No wonder that they present a distorted, gnarled, dwarfed aspect. When the trees are planted they are headed back very severely. The heading back is continued annually. They leaf out in the summer and give shade, and under this shade tables may be set and beer dispensed and other pleasures enjoyed. The English walnut is one of the majestic trees that you will find in Northern Italy, Southern France, and parts of Switzerland. This particular tree was something over five feet in diameter.

Another great tree which does not belong to Western Europe but which was imported there in early times was the cedar of Lebanon and it found a congenial home. It is thoroughly at

home on this English estate, this cedar of Lebanon which came from the land of scriptural history. That tree had a spread of about 130 feet in lateral diameter. It was about 60 feet high.

Another tree of the cedar type is Lawson's cypress. Around the villas in Italy it is one of the striking and characteristic trees, just as the Lombardy poplar is one of the striking and characteristic trees around many New England homesteads.

BOTANIC GARDENS ON THE CONTINENT.

In connection with the educational institutions there was early established in Europe, particularly in Italy, the botanic garden—a garden where plants were grown to illustrate their economic use largely from the standpoint of medicine. In this work the priests and the monks had a large part.

This illustrates the rock features of a botanic garden. Here we have a view of the orangery of Versailles, that most magnificent of European gardens founded in the time of Louis XIV. These oranges are moved into this building in cold weather. It is only a view of a small part of that wonderful garden. The love of gardens and plants is implanted in the heart of the Italian. You have found, no doubt, by actual experience that there is no better gardener, although perhaps with little practical training, than the average Italian, and I look upon them as a very important factor in the civilization and development of our country as it goes on, because they will bring to this country their innate love of gardening.

Here is a group of students which I had the pleasure of addressing in a language which they didn't understand, nevertheless they were most courteous and tried to applaud at the right time. In Italy a good many of them did understand French so that we got along fairly well. This represents a secondary school, not one of the colleges but one of the agricultural high schools, and it simply happened to be a class of students who were studying seeds at that time.

This is a spray cart which hauls the spraying material to the field, knapsack sprayers, operated by the workmen themselves. American machinery is being introduced, however. Here we have a view in the implement room in one of these colleges. I was interested to see that they had a good many examples of American machinery.

A characteristic vegetable very much prized by the Italians—we don't grow it to any extent because of climate—is the globe artichoke. I know of no vegetable more delicious when cooked after the Italian style than this.

SECONDARY SCHOOLS IN GERMANY.

In the matter of opportunities for horticultural education, for secondary schools, Germany is considerably ahead of us. There are private as well as public schools. This is a view of the garden of a private school for women near Berlin. It is a private institution and it is thoroughly self-supporting—an institution run by a woman for the giving of instruction to young women in the practice and theory of horticulture.

I have here a view of one of the class rooms in this same institution representing real, live, practical progress in the teaching of horticulture, also another class room and specimens of fruit used to illustrate work in pomology. It struck me as very remarkable that we should find an institution not subsidized by government, in which good round tuition fees were charged, being successfully conducted in Germany and only for women.

Other views show the manufacturing side where jellies, evaporated fruit, canned fruit and all those manufactured products of the fruit were studied; also the vegetable garden showing the frames and the work in this particular garden done by the students themselves.

Finally I am glad to show you the teacher, who is just as efficient as she is good looking. There were some fifty pupils taking work in that institution.

MARKETS AND MARKETING.

Now we approach the question of marketing. We are all interested in marketing, you know, because it touches the dollars and cents side. First let me show you a view of the commonest and poorest type of delivery cart in the city of Naples, Italy, drawn by a poor donkey that you would expect to fall to pieces before he had gone a block's length and the cart built on the same plan.

The following views show the simple type of marketing of local products in many of the Italian cities, groups of women

carrying their produce and settling down on a corner and staying there until their day's work is done; rather more extended markets in the city of Savona, on the Riviera, in Italy. Heavy types of baskets are used, most of them carried on the back of either the donkey or the seller, sometimes both. Frequently push-carts, hand push-carts are employed. Good natured, stolid, rather indifferent type of people, these Hollanders. If you don't want things at their price you needn't buy them. If you don't pay their price you are not likely to get them. It is different in Italy. There you buy things as low as you can. They sell things as high as they can. The asking price is not necessarily the selling price.

Views in a fish market in Holland. Women of the Boer type in North Holland again; a market wagon; women with dairy products. The dairy and milk markets are separated from the other type of markets.

In Belgium the dog is one of the animals constantly used in transportation, distributing milk, distributing vegetables and the like. A great part of it is done by a strong type of mastiff. They are efficient animals. In Hamburg, too, one finds the dog hitched beneath the wagon. I remember walking round a wagon, not noticing this, and then being hastily brought to my senses when I got a little too near one of these baskets by the guardian right on duty beneath the wagon. Sometimes three dogs, sometimes teams of dogs are employed.

Women in the Black Forest region of Germany sell cherries in the open markets. Cherries and raspberries are grown extensively in the forest sections and the cherries are very fine.

I will now draw attention to a fine layout of hand carriages. These are not baby carriages. These carriages are characteristic of the Black Forest region of Germany. Everything from the small baby carriage type to the large push-cart type is in use in bringing vegetables to and fro. Then the more well-to-do have the regular market wagon with the prairie schooner type of cover which drops down or can be raised up and made to accommodate a considerable amount of produce.

These markets, in Germany particularly, are very much frequented, and market day, which comes once a week, is a gala day. Everybody is on deck.

HANDLING AMERICAN APPLES.

Now we come to the handling of the product from this country. Let us begin with an auction room in the city of Hamburg. I found it open, as I found other auction rooms open and the visitor was not questioned when he went in. I went in and made a photograph of the room. The auction of American fruit with other imported fruit, whatever it may be, takes place in this room daily at ten o'clock. The purchasers are the distributors and they send the fruit to all parts of Germany, or sell it locally as the case may be. But before the fruit is sold it is exhibited at the dock so that people have an opportunity of knowing just the quality and grade of fruit which they are buying.

This is a view in London, at that great market, Convent Garden. There are two parts to this market,—the strictly retail part and the wholesale part. The retail part is supplied by the local grower and here we see a load of squashes brought in by a somewhat nearby grower, although twenty miles' haul by wagon is not considered a long distance in the Convent Garden market.

Women may be seen shelling peas that have been brought from some local gardener. The heavy type of bushel baskets are found generally in all this section. These baskets which nest into each other are quite the universal type of package used by vegetable growers in the Convent Garden market.

Now we come to an auction desk within the auction room. This desk represents a place where an auctioneer stands to auction off a consignment of fruit from a foreign country. I found exceedingly agreeable men, willing to do anything for the good of the cause, as they said. Just a little later I noticed a sign announcing a sale at 2.30. So I came round and was able to secure this scene as a lot of American Keiffer pears were being auctioned off. I was surprised to find them in August but I couldn't get trace of the place they came from, but they must have come from some point in the South where they ripen early and were sent directly to the market. Now the Keiffer pear was appreciated. It was uniform in size and good looking in color and they were not troubling themselves about the quality.

Now we come to the end of our story, ladies and gentlemen.

The end of the fruit story is the marketing of the product, a part in which many of us are keenly interested. It forms the climax of our tree-growing story. The money is the bait which holds many to the industry. Perhaps you have heard the story of the small colored boy down South. A man was walking along the banks of a Texas river and he saw a young lad struggling to rescue a boy who was in the water, struggling vigorously. Finally he brought him to shore and landed him high and dry. The spectator came along and said, "Well, that was a very brave deed, my boy. Was this your brother that you saved?" And the boy said, "No, he wasn't my brother." "Well, it must have been some one related." "No, he ain't no relation of mine." "Well," he said, "that was a very brave act of yours. Why did you do it?" "Why," said the boy, "we was fishing, he fell asleep and rolled into the water wid de bait in his pocket." The rescuer was after *the bait*. And after all, no matter how much pleasure we get out of fruit growing we must keep an eye on the "bait," and it seems to me that we can cultivate the European market more diligently than we have been doing. I found that there was very little American fruit consumed by the common people. By the time it got to the common people it was so high priced that it was out of their reach. The important thing, it seems to me, after talking with the handlers of fruit there, is to furnish a uniform grade. I believe that grade is much more important at the present time than quality. Ben Davis will go, or Keiffer pears will go, provided the fruit is properly graded. So that from our standpoint we ought to look to the grade. Let us keep up the quality of our fruit by all means for our home market; but let us grade carefully. We do not grade as we ought to. This is the weakest point in the marketing of our fruit. I was surprised, as I say, to find Keiffer pears selling at good prices in Europe. I believe that in regions where Keiffer pears are grown we need not be anxious about the future of them. My own opinion is that there will be a good market for this variety for some years to come. There is no commercial fruit-growing in a large part of Europe. There will be none for a long time to come. So it seems to me that the American apple grower has a wonderful opportunity for developing the European market if he works along legitimate business-like lines.

A FEW PHASES OF THE BUSY BEE.

Miss L. M. SCALES, Temple.

"Education is the chief industry of the United States," said a witty American lawyer on one occasion before the professors of a British University. And as a practical as well as scientific knowledge is necessary to insure success in any art, often much may be learned in nature studies from those, who, though ignorant of books, yet have the gift to "Call the birds from the trees, charm the black snake out of the ledges, and bring back the swarming bees." For to the student and true lover of nature any phase of birds, bees and flowers it always interesting, from the first soft notes of the song sparrows at early morn with their low accompaniment of the hum, hum of the bee gathering pollen, till the last flower has faded, the birds have taken their winter flight and only now and then a solitary bee cheerily greets you as you pass.

The family which bees constitute is called from the Latin, "honey-bearing" and from the Greek, "flower-loving." My first impressions of the honey-bee were of the latter type.

"A garden full of bees, large drooping poppies and queen hollyhocks with butterflies for crowns, tree peonies and pinks, and goldilocks."

The great mission of the bee is fertilization of the flower, that a fruit and seed may be developed. Few except horticulturists understand that the importance and value of this is beyond computation. Although the winds also carry pollen they cannot be relied upon and the fruit is often small and imperfect.

Many orchardists keep bees almost solely for the purpose of fertilizing the apple blossoms, the fruit as a result being much larger and finer. It is the same with the cherry, pear and strawberry. Cucumbers cannot be grown to any extent under glass without their aid; bees will live happily in a greenhouse and even swarm there. Honey-bees are often wrongly accused of biting fruit in order to obtain the juices but they cannot do this until the fruit has been punctured by some other insect as they are not provided with sharp jaws like the wasp and hornet.

The social bees are the bumble-bee and the honey-bee. They live in communities, which like those of the human race are composed of drones, workers and queens.

The big, bustling bumble-bee with its shining coat of black and gold, which one always feels like stroking, is most useful to the farmer, its principal work being the pollenization of red clover.

The queen bee spends the greater portion of the spring and summer laying eggs. The cells in which the eggs of the workers and drones are laid are also used for the storing of honey. These cells are hexagonal in form and nearly horizontal, while those of the paper making bees are always vertical.

They are constructed in such a manner as to secure the greatest storing capacity as well as the greatest strength. The drone cells are much larger and more firmly braced than those of the worker brood but differ in no other respect. All of them incline upward to facilitate the storing of honey and to prevent its running out before capping. If you carefully examine a box of honey you will find that the lower rows of cells are much more inclined than those of the upper part.

The queen cell is always much larger, is cylindrical in form, and of a dark brown color and in shape resembles a peanut, its sides being pitted. This insures much greater strength than if they were smooth on the principle that, "a certain amount of material is stronger in a large hollow cylinder than in a smaller one that is solid."

After the eggs hatch the larvæ are fed on pollen and honey. In a few days they fill the cells, and refuse to eat. Then they are covered over with wax by their caretakers and we speak of this stage of their existence as "sealed brood;" though a novice in the business, whose strong point is poultry raising, informed us one day to our great amazement, that his bees were "brooding."

The larva after being sealed spins a fine silk cocoon and after two weeks' sleep during which it undergoes a most mysterious transformation, bursts its prison walls and emerges a perfect bee.

It is very interesting to watch the young bees out on the lighting board for an airing, and being caressed and fed. If taken carefully up on the finger, they will move quietly around with-

out giving the slightest sting. After the brood is hatched the cells are carefully cleaned out ready to be used for the deposition of more eggs or the storing of honey. The wax of the brood frames is at first pale yellow in color but soon grows dark and the cells gradually become reduced in size; then the foundation should be melted as small cells produce small bees.

The length of a bee's life depends on the amount of work which it does; in the busiest season from two to three weeks is the extent.

The industrious little insects gather nectar so rapidly that their delicate wings are soon worn out.

If you keep bees it is of great importance that the hives are filled with bees and the frames with brood early in the season if possible.

We use a seven frame "simplicity" hive as the large double-walled ones are rather too heavy for a woman to handle, and as soon as the weather is warm enough the side packings are removed and three more frames added. This gives for the summer practically a ten frame hive. We always keep light wool blankets over the section cases until the middle or last of June.

When the weather becomes excessively warm, we spray the hives with cold water; then wet sheets are placed over the tops and sides to assist the bees in keeping cool, and also to prevent the comb from melting.

When there is a heavy flow of nectar even the most casual observer will notice that the bees suddenly seem much larger, that there is not enough room for them and an extra super is needed. The following reason is assigned for this swelling of the bee: "Before the honey flows there is no nectar in the honey sacs of any of the bees of the hive, hence the segments of the abdomen telescope over each other, thus contracting the abdomen to the smallest possible space and allowing thousands of bees to mass themselves in the least possible space. When the honey flow comes on, the field bees give their loads of nectar to the hive bees, which causes their abdomens to be drawn out the same as a telescope is drawn out, in order that the now filled honey sacs may find room for necessary expansion, and thus it comes about that two bees now occupy the same place of that occupied by three or four before the flow of nectar was

on and only as room is given can they be kept from crowding out on the outside of the hive, providing the hive was filled with bees before the nectar yield was on. The hive-bees hold the nectar until properly evaporated when it is deposited in the cells, more taken from the field bees again and so on until the close of the honey season when the colony assumes the same massed appearance as at first."

I have carefully watched a bee at work in a bluebell and found that the honey sacs were filled with purple nectar from this flower.

From the white clover, linden and locust a most beautiful white-capped honey is produced. That from the apple blossom is usually very heavy in weight and of a pale amber color; from the goldenrod a bright yellow, and that most disagreeable substance produced from honey-dew a dull, purplish black.

Bees rarely swarm when there is enough work to do, but if the flow of nectar ceases suddenly they watch closely. One of the first indications frequently is that the front of the hive will be nearly or quite covered with bees, but they wait until a queen is almost ready to hatch when you will notice everything is suspiciously quiet about the hive. Inside, however, there is great commotion; the workers carefully guard the young queen in her cell. Soon the old queen and the greater part of the bees leave the hive with such a peculiarly pleasant, buzzing and humming that once heard it can never be mistaken. As soon as the queen has settled on some bush or tree her followers at once begin to cluster around her, hanging up in great bunches. It sometimes happens that the queen does not go out, in that case they soon return and wait until she is ready.

Before swarming, bees always fill themselves with honey for wax making, and also to guard against starvation should the weather be unfavorable to the gathering of food. Never are bees so gentle as at swarming time. You can stand right in the midst of the outgoing colony in safety. While out driving one day with a very nervous, spirited horse, I met a runaway swarm flying low. The bees paid no attention either to myself or the horse. She merely kept her ears moving as if to brush them away but exhibited no signs of fright whatever.

A friend of ours set gayly forth one bright Sabbath morning in June to accompany his sweetheart to church. On his head

was a fine, new silk hat. He paused a moment in the yard where the air was full of swarming bees. Suddenly they began to alight on his hat and there he had to stand perfectly motionless, but inwardly fuming, until they had quietly settled. He did not receive a sting to aid him in his apologies for his non-appearance that morning.

A day or two before a swarm issues from the hive it always sends out scouts to select a site for their new home. We had a swarm come to us; a colony had just gone out and half an hour later the parent hive began to fill with bees. Thinking the swarm was returning we watched carefully, but no, the bees came thicker and faster through the air and our nearly empty hive was filled with shining black bees. A few days later we had been working over the other colonies and we thought it would be pleasant to make the acquaintance of our new friends. It was late in the afternoon, the wind was southerly, a gray sky, every indication portended rain. The smoker was nearly exhausted, and we were unprotected. No one except a novice would ever think of handling strange bees under such conditions. One carefully lifted the cover, while the other gently sent a few light puffs of smoke into the hive. It seemed as if the whole colony rose instantly into the air with that intense buzzing which only infuriated bees can make.

Suffice it to say, that we utterly disregarded one of the fundamental principles of bee-keeping,—“Never allow yourself to be routed by any colony.”

The next day was bright and clear. Provided with two smokers in prime condition and suitably protected we laid siege to that colony and soon had it under perfect control.

Swarming bees when they have decided to accept the hive in which they are placed make a happy, low, purring sound, like a contented kitten. On handling bees it is always well to be protected by a bee veil, unless you do not mind an occasional bee sizzling in your hair, while both hands are employed in carefully prying out a box of honey, firmly fastened down with propolis. If not too nervous and you do not mind bees crawling all over your fingers, it is much easier to work without gloves. Late in the season, however, they are indispensable. If you get a sting while at work it always incites the other bees to go and do likewise.

The most effective antidote which I have found for bee stings, is to place several folds of linen over the puncture, and keep it constantly saturated with vinegar until the swelling and pain subside. Although the bee has such a powerful weapon of defense, it falls an easy prey to its enemies; chief among these are the toad, bee moth and the ant. The toad so beneficial to the garden will calmly station itself on the lighting board, close to the entrance, and deliberately catch the bees as they come in. Previous to bee-keeping we had been pleased to have toads about the premises, but soon they became such voracious bee eaters that we captured all we could find and carried them to the extreme part of the farm, but they soon found their way back; then they were put in paper bags and dropped miles away, near gardens where there were no bees. Even the sunshine loving dragon fly, that flits so gracefully over the marshy pools, where the beautiful purple iris, and dainty arrowhead grow, must be added to the list of bee enemies.

It not infrequently happens that a colony becomes queenless, and though other colonies are hard at work, the queenless family is not only idle but despondent. Several years ago we had one in this condition. A neighbor who was cutting out extra queen cells to prevent swarming, put six of them in a glass jar and sent them to us. Four hatched on the way, two of which were immediately killed by the others; evidently a survival of the fittest. We went to the hive and placed one of the queens near the entrance. The workers seized and carried her away in an instant. Then the other queen was carefully placed at the entrance. She was at once surrounded and borne triumphantly into the hive.

From the first to the middle of April, bees begin to gather pollen, although six years ago we noted that they brought the first the 17th of March, and they continue to gather it all through the season. That from clover is known as "bee bread." In our garden we have a large clump of the beautiful fall aster which remained in bloom until the last of October. Every day as soon as the flowers were open it was covered with bees gathering pollen, always on the sunny side. It was delightful to stand and watch them; not only the honey bee was there, but the bumble-bee, the little wild bee and innumerable butterflies.

Honey has always been highly esteemed as a food. It was used by the ancient Greeks in medicine and also as a sirup in which to preserve fruit. Sicily was noted for its honey produced from fragrant herbs.

There are many Biblical allusions to honey and the honey comb, and we are all familiar with the riddle which proved the undoing of the doughty Hebrew champion, Samson.

Wax is a secretion of the worker bee and is produced when required for use in the hive. The bees fill themselves with honey and as a high temperature is required to produce it, they hang themselves up in clusters or festoons in the hive and most tenaciously cling together. It is secreted between the plates in the lower side of the abdomen. It is at first white and very brittle but is rendered pliable in the mouth of the bee by thorough mastication.

It has been an important article of commerce for many centuries and its production very great. In the days of the Pharaohs, the sacrificial funds were often paid in honey and wax. It was largely used for medicinal purposes and also to embalm the dead.

Bees-wax candles have been used exclusively for ages in the altars of both Pagans and Christians.

The muscles of the bee are very strong and perfect. Its brain is large in proportion to its size; only the higher vertebrates have convolutions to the brain, while that of the bee has well-defined convolutions; and its habits and instincts prove it to be on the same plane of intelligence as our highest animals.

As the season advances the bees remain quiet about the hive. When it is too cold for flight even at mid day, they contract their extremities as much as possible and cluster closely together for warmth. If left in their summer stands they must be provided with sufficient stores for winter and carefully packed with warm, wool blankets.

Then you need have no fear that your cherished bees are suffering from hunger or cold.

It always seems, after ours are thus cared for, when the snow drifts softly over the hives almost concealing them from view, as if the wind murmuring in the pines nearby must be lulling them to sleep.

MAINE STATE POMOLOGICAL SOCIETY AND
STATION ENTOMOLOGY; MUTUAL INTERESTS.

Miss EDITH M. PATCH, Orono.

The season just passed has been one of phenomenal insect outbreaks. Orchards and forests alike have suffered devastation. Startling and alarming as such a season is, however, it is not indicative of such lasting danger to orchard welfare as certain constant though less conspicuous conditions. For an unwonted outbreak is soon over—parasites, contagious diseases and other natural remedies getting the better of the offender—but the almost unbroken lines of neglected and therefore dangerous apple trees that stretch for miles along the roadsides, scattering ungathered windfalls as food for “railroad worms,” curculio grubs, and codling moths, present an annual menace. Wild cherries and hawthorne together with native and neglected apples growing within insect flight of orchards are a cordial standing invitation to every apple pest that can endure the climate. Yet many an orchard owner in the State is grumbling because the invitation is annually accepted. And the earnest pomologist, who is interested in doing everything practical to insure sound fruit, who sprays and prunes and cultivates, suffers from the neglect of his careless neighbor who says “I haven’t gathered a high top sweeting for 5 years,—the railroad worm saves me the trouble,” and cheerfully blames the railroad worm for breeding in ungathered fruit permitted to lie and rot upon untilled sod which are conditions rendered ideal for that very purpose.

A tree may be subject to attack by an excessive number of insects and still hold its own. It has been estimated that there are probably 800 or 1000 different species of insects that attack the oak in the United States. Yet the oak is in no danger of extermination.

And numerous as apple pests are there is probably no reason so far as insects are concerned why apple raising should not be as profitably carried on in Maine as in other parts of the country.

In view of the fact that orcharding is one of the chief interests of the State, the Experiment Station has the orchard constantly in mind with reference to insects of economic importance. The principal orchard insects of Maine are practically well known so far as their life histories and remedial measures are concerned. In order that this knowledge may be shared by anyone in the State who is interested, the Station has always on file the following circulars upon insects which are concerned with the apple tree,—root, trunk, branch, leaf, blossom or fruit:

LIST OF AVAILABLE PUBLICATIONS ON COMMON ORCHARD
INSECTS.

Antique Tussock Moth, Aphides affecting the Apple, Apple Maggot or Railroad Worm, Brown-tail Moth, Bud Moth, Buffalo Tree Hopper, Canker Worm, Cecropia Moth, Cherry Tree Tortrix, Codling Moth, Fall Web Worm, Flat-headed Borer, Forest Tent Caterpillar, Fruit Tree Bark Beetle, Gypsy Moth, Hickery Tiger Moth, Io Moth, Spraying of Plants, Oyster-shell Bark Scale, Pear Slug, Plum Curculio, Red-humped Caterpillar, Rose Chafer, Round-headed Borer, San Jose Scalé, Sphinx Moths, Spotted Tiger Moth Tent Caterpillar (apple tree tent), Tiger Swallow-tail Butterfly, White-marked Tussock Moth, Woolly Aphis of the Apple, Yellow Edge Butterfly, Yellow-necked Caterpillar, How to Fight Apple Enemies.

These circulars are sent as replies in full to persons submitting any of these insects for identification.

While the available circulars include only a small number of the multitude of apple insects, yet if the orchards are so treated as to combat the serious pests, the multitude of lesser evils need not be feared, for they will for the most part succumb incidentally to the treatment given to the really dangerous insects and thus many species may be killed with one treatment. Moreover the remedial measures against the standard pests overlap. For instance, the destruction of windfalls by pasturing orchards with hogs is a measure directed at once against 3 of the worst apple insects in the State—the apple maggot, the curculio and the codling moth; or removing colonies while young and still gregarious includes the red-humped caterpillar, the yellow-necked caterpillar, the tiger caterpillar and others,

all of which occur upon the trees during the same time. In a similar way, because arsenical sprays are recommended for a multitude of orchard pests, it does not mean that the sprays need be applied a multitude of times each season.

Much study has been put upon these orchard pests by economic entomologists all over the country, but that avails the orchards nothing unless the orchardists make practical use of the resulting suggestions. Experiment stations have repeatedly demonstrated the value of spraying for the codling moth, yet it is optional with the owner of the trees whether he shall profit by those demonstrations or not. It has been known for 18 years that a consistent and persistent destruction of infested fruit would practically exterminate the apple maggot, and the apple maggot is working in many parts of Maine as much havoc now as it did 20 years ago.

It is due orchardists of the State that the insect pests upon so important a crop should be studied for the purpose of finding what can be done by way of combating them. This the Experiment Station is willing and interested to continue to do. And to this end it welcomes and invites co-operation from the Pomological Society along the following lines:

1. The submitting of apple tree insects for determination,—material carefully packed and abundant enough for thorough examination or for breeding in case of an undetermined caterpillar.
2. Observations by orchard owners concerning the insects submitted, as in regard to their abundance, time of appearance and character of injury.
3. Report of Pomologists in case a remedy suggested does not upon thorough application work successfully, with a statement of what conditions interfere with the efficiency of such treatment.
4. The maintenance of so strong a sentiment for clean culture in all that term implies that it will be practical to investigate insect difficulties. For instance, there are small chances of getting much information about leaf miners in orchards where the web worm, tent caterpillar, and red-humped caterpillar are at work,—for there do not remain any leaves for the leaf miner to ruin and in such an orchard the yellow-necked caterpillar may destroy not only the leaf miner, but, alas, alas,

the hopes the entomologist has of investigating the interesting life cycle and economic status of the leaf miner. Of course, there is in such a situation a word to be said in favor of the yellow-necked caterpillar,—it may prove an effectual remedy for the leaf miner. But———.

The orchards are at present threatened by the plum curculio which is apparently on the increase in the State. I have visited orchards all the way from York to Washington counties the past few years where it has been difficult to find an apple not deformed by this curculio. You are all familiar enough with the crooked, one sided, dented in apples deformed by this insect, but comparatively few orchard owners are yet familiar with the cause. As for the remedy,—if the much needed hog which is willing to do such good service in the case of the apple maggot were pastured in the orchard, this useful animal would devour all fallen fruit with equal relish, whether flavored with apple maggots or curculio grubs. And as it is in the fallen fruit the curculio devlops, such a remedy if consistently applied over an extended area would prove sufficient.

I cordially commend to the orchard owners the hog as a friend of pomology.

THE HUSK AND THE KERNEL OF RURAL LIFE.

Mrs. V. P. DECOSTER, Buckfield.

Every one who has read the papers lately knows that Pres. Roosevelt has appointed a commission to investigate the conditions of country life in the United States with the object of making rural sections more desirable for homes. This commission has already sent out circulars all over the country asking questions relative to our schools, farm help, mail, express and telephone conveniences, social and business conditions. They will also hold meetings all over the country.

Looking at this step from the average New England farmer's point of view, some are a little inclined to resent it, as an effort to patronize us when we feel that we are as independent as any one in the world and perfectly capable of looking after our own affairs. On the other hand, we should take a broader

view when we remember that this investigation includes the whole country, in many sections of which the farmers are very ignorant and with but few of the helps which we receive.

This investigation also, is based upon the idea that the tillers of the soil are the foundation of the country's prosperity, therefore they should have every possible advantage and encouragement. Comparing present conditions with those of fifteen or twenty years ago it looks as though the farmers of Maine are slowly but surely working out their own salvation. Since we are still struggling for better roads, parcels post, and industrial education, perhaps this commission may help to hasten those blessings. It will awaken an agricultural spirit all over the country at least.

The better *education* a person has, the better he can appreciate country life. An uneducated farmer can enjoy Nature in a sort of unemotional "got used to it" sort of way. He lives mostly on the husks of country life. He has never been taught to dig into it for the sweet kernel which study and research will give him.

The person who has studied harmony will find in the songs of the birds, the rippling brooks, the winds in the pines, an exquisite pleasure wholly unknown to one who knows nothing of music.

The artist sees beauty in the tender shades of green in the spring as well as in the brilliant autumnal coloring. Every where he goes in the country something appeals to his artistic sense.

We unconsciously see and hear the things along the lines in which we are most interested. The bird lover while walking or riding will see a bird or a nest or catch a note wholly unobserved by the ignorant man at his side. The first time Prof. Hitchings came to our home, we were amazed because he would see a caterpillar or cocoon while the horse was jogging along at an ordinary gait.

The botanist sees a flower no other man would notice. He will walk miles to find some rare specimen which the ordinary person would step on unobserved.

Prof. L. H. Bailey of Cornell University, has been working for years trying to introduce agricultural studies and manual

training into our schools. He is probably better fitted for the position as chairman for this commission than any other man in the country. His heart is in the work.

A friend once told me that she heard Prof. Bailey say that we have two classes of men in the country, farmers and agriculturists.

The farmers earn their money in the country, and spend it in the city, while the agriculturists earn their money in the city and spend it in the country. More and more city people are seeking homes in the country.

A friend of mine told me that once while she was in a western state, she saw a beautiful red flower growing very thickly in a farmer's hayfield. As the flower was unknown to her she picked a handful of them and asked the farmer if he would tell her what he called them, thinking if she got the common name she would hunt it up in her Botany.

The man took the flowers and turned them over and slowly inspected them as though he had never seen them before, then he rubbed them together in his hands and smelled of them, then with a satisfied tone of conviction said,—“Smells like a *weed*.”

Last year I took a walk of a mile with a botanist who was especially interested in sedges. We walked over a strip of meadow where I should only notice a variety of meadow grasses, but he would stop delightedly and pluck a bit of grass or rush and exclaim “Ah, here is *carex* so and so,” and give a Latin name as long as my arm.

On the other hand, I had my net and cyanide jar and when I caught a butterfly or other insect I was as happy as he. We both found what we were interested in and it was like meeting old friends.

It is not enough to live in the country and simply know enough to get *dollars* out of it's soil and forests and animals. We must love it, and study it and get into the heart of it.

The reason so many business men have purchased farms is because they have learned that there is a chance to use their brains and make them pay. The person who *has brains* loves to use them and as he uses them life grows broader. It has often

been said that education turns young men from the farm. That is no longer true.

More of our young men are taking a course in college agriculture than ever before. Where four were enrolled at Orono five years ago, today there are 100, including Agriculture and Forestry. The students who graduate from this course now can find as remunerative positions open to them as in the trades and professions. I have in mind a young man who graduated from Bowdoin two years ago and then took a poultry course at Cornell and has gone home onto the farm and is raising poultry by the thousands. I know another young man who took the dairy course at Orono and then worked in a butter factory a few years and is now looking around to buy a farm, who told me only a few days ago,—“Why the farmers have no idea of the possibilities there are in dairying.”

When we used to keep old fashioned scrub poultry, and fuss along with contrary hens, who wouldn't lay in winter nor hatch chickens until June, I took no interest in poultry, but after we purchased incubators and thoroughbred stock and I saw there was a chance to use brains and make them pay, then I became interested. Every year I see new possibilities, and have a continual interest and desire to improve on the year before.

Even a naturally bright boy or girl *can* grow up on a farm wholly ignorant if no one leads them on to study and observe. Even our schools do not teach them much practical knowledge beyond the three Rs. We are waking to the fact that in this competitive age our children must be taught to use their eyes and hands as well as their brains. I have three girls now studying Latin, Geometry, Ancient History and such studies when I think they would be better off to be studying sewing, domestic science and hygiene. In olden times they had to be trained in many things at home but now these arts and crafts are left to the mills and factories, and the city children, especially, are playing in the streets. Every summer I have a boy sent me from Boston for a few weeks and his father always writes,—“Set the boy at work, treat him just as you would your own. There is nothing at home for him to do.”

Suppose you walk down the street and meet a beautiful girl. Her sweet face and pretty clothes awaken an interest, but if you never learn her name, occupation or residence, you forget

all about her. But if you are introduced and call on her at home and know of her work and family, you gain a delightful friend. Just the same with the birds, flowers, animals and insects. If a child brings into the house a bug or flower and asks you about it, if you cannot even tell him its name (that is always the first question a child asks) he soon loses his interest and is not as likely to bring in another. But if you can tell him its name and life habits, then he feels acquainted and will go on studying it. Or if no one in the family can tell him about it, if he has an illustrated book, in which he can hunt it up by himself, he is even more interested. There are books so finely illustrated on all Nature subjects, that a child can study at home.

Realizing the value of these things, for the last eight years at various times, I have held Nature classes at my home, for all the children who care to come. I have a collection of birds' eggs and some nests and stuffed birds, minerals, plants and insects from which we have our lessons mostly. Sometimes we have a teacher in our local school who will work with me, but that is seldom. One summer I gave prizes to the two scholars who found the greatest number of wild flowers. Eight years ago this fall I gave them some chestnuts to plant and a few weeks ago I saw that one boy had a tree twelve or fifteen feet high. Last spring I gave them all some cabbage seeds and told them I would give a prize to the one who would raise the heaviest cabbage. About three weeks ago we had a cabbage party. About twenty-eight children came to my home. One boy had a cabbage which weighed eight and a half pounds and a girl had an eight pound one. So I gave them each a book. Then I had them each tell how they raised them. One poor boy had his eaten by a stray cow. Then they played games in which cabbages figured and then had refreshments served on cabbage leaves.

By having these classes I not only enjoy Nature with my own children but get acquainted with all the children within a radius of two miles. Although they cannot learn a great deal from *me*, they get awakened to the possibilities about them and thus are an influence in the community. The great thing is to get them interested.

It seems very small and egotistical for me to stand here and tell of the little things I have done with these few children, but

that *little* has so opened my eyes to the possibilities of what might be done, if we could have the right kinds of teachers and schools, that I want to interest every one I can in helping along the day when children shall know that God's country is the most desirable place in which to live, and that they may be taught the dignity of labor, and the pleasure of study of Nature's laws.

Such schools are already doing practical work in some western states and I am pleased to see by the recent teachers' convention in Portland that steps have already been taken in our own state to introduce agricultural studies into our own rural schools.

I find that some of the children who are the dullest in books are the most observant in out-door life. All children are interested in birds and flowers. It is not as easy to interest them in insects as so many have an antipathy to caterpillars. Every spring we enjoy helping the birds build their nests, by putting out building material. A great many birds will utilize soft rags and yarn and strings. I have an oriole's nest which was built in an elm across the street this year, which is almost a solid mass of white rags.

Sometimes I am asked how I find time to do such things and still attend to household duties. Did you ever notice that one can generally find time for what one wants to do very much. Some women find time to do fancy work, others belong to literary clubs or whist parties. Some women keep their houses immaculate. I can't. The children track in lots of dirt, but we have hard wood floors which are easily swept. We dress plainly, live plainly, wash with a machine and iron only the necessary things. By study one can learn to save much in housework. I have sometimes said that I had rather my children would remember what good times they had with mother, than what a perfect housekeeper she was. We have such grand opportunities for plain living and high thinking if we will only seek for them instead of being satisfied with the husks. I believe more in homekeeping than housekeeping.

E. P. Powell recently wrote in the Independent that we spend too much time and money building our houses and then filling them with so many unnecessary things, that it makes slaves of us to take care of them.

Farmers' wives as a rule work too hard and stay in-doors too closely. Last spring I decided that I must stay out-of-doors

more than in summers past, and I told my friends that I was going camping out for the season. And so I did, but I stayed right at home all of the time and had the happiest season for years. We simply camped at home. We were fortunate in having men who were willing to go without pie, most of the time, and who were even satisfied with an occasional meal of bread and milk. I believe most men would be willing to live plainer than they do. We women are to blame ourselves for thinking we must have so many varieties of food.

Last year I learned that there was a sale for some kinds of cocoons found in this state. I enlisted the scholars of my Nature Class and taught them what to look for, and where and how to handle them and then paid them a commission. We had a new teacher come from out-of-town, and she told me that she was much surprised at the first week of school to see the children scatter at noon and recess for the neighboring woods and roadsides. And when they returned to the schoolhouse they had boxes and pails, and she would hear them talking like this:—"See my Polys," "Well, I've got two Ios" or "I've got three Lunas," or "See what a big Cecropia I have." She told me that ours was one of the nicest schools she ever had, and do you think me conceited if I take a little credit of that to myself for giving these scholars something to take up their minds out of school? This summer one of the little boys earned three dollars towards a bicycle, and one of my girls earned her college tuition for a year. Outside of the gain in health, education and pleasure of Nature Studies there are many ways they can be turned to pecuniary profits. First class herbariums can be sold to colleges. Many kinds of our wild flowering plants and bulbs are sold to florists. The man who studies forestry can better understand how to utilize and conserve the values in his timber-lot.

What would our Maine orchards be today, if some one did not study insect pests?

We work hard for what we get on the farm and sometimes we are tempted to call it drudgery. But nothing is drudgery which we really love to do, and I think most of us like our work better than we realize. It needs a long sickness to teach some people that they really like to work. After a person has been obliged to sit around during a long convalescence and see

his work either improperly done by others or else not done at all, he begins to realize what a joy it is to be able to get up in the morning and to work all day.

We take more pleasure than we think in saving and working for some desired end. For instance, the farmer wants a new piece of machinery or to paint his buildings, or his wife wants running water in the house, or her kitchen remodeled. If they have to plan and save and work for some time to get such things, they enjoy the working and they better appreciate them when they do get them.

I think it is a blessing to want a thing a long time and want it badly and work for it until we do get it; then how we enjoy it. That is a pleasure the rich must miss who can purchase a thing as soon as they feel a desire for it.

I recently heard our honored past president, Mr. Gilbert, say "There is no limit to the things a farmer's family do want, every year, therefore there is no limit to our pleasure in working for those things." And that is the kind of work which builds character. It engenders patience and thrift and perseverance. Why, I can't imagine heaven as a place where we can have everything we want. I hope we shall keep right on working and studying.

We need to work to appreciate the object attained.

We need labor to appreciate rest.

We need the husk to appreciate the kernel.

Mr. RICKER. There seems to be one thought some of us apple-growers might take home from this meeting. We don't give to the apple trees all that the apple trees really demand. Lots of us have our dairy, some of us keep hens and some of us have something else; but it seems to me after we go home from this meeting, some evening we might sit down and figure out what proportion of the income of the farm comes from the apple trees, and then take the proportion of time that we have to work and set apart one day, or two days, or three days, whatever the proportion is, in the week to work on the orchard and not let anything else come in. That is the per cent that the orchard really deserves. Let us try that for a year and give to the orchard the per cent of our time that is warranted by the per cent of our income that we can naturally expect to come from the orchard, and see if conditions are not somewhat improved.

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