

STATE OF NEW JERSEY.

Twenty-Sixth Annual Report

OF THE

State Board of Agriculture.

1898.

Printed by Order of the Legislature.

NEW JERSEY STATE LIBRARY

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1899.

To the Hon. David O. Watkins, Acting Governor of New Jersey :

SIR—In accordance with the act creating the State Board of Agriculture, adopted April 22d, 1884, and with the provisions of the law approved June 15th, 1895, I have the honor to present the report of said Board for the year 1898.

FRANKLIN DYE,
Secretary.

Dated TRENTON, November 29th, 1898.

(3)

STATE BOARD OF AGRICULTURE.

—•—
OFFICERS FOR 1899.

PRESIDENT.

HON. D. D. DENISE.....Freehold.

VICE PRESIDENT.

E. B. VOORHEES.....New Brunswick.

TREASURER.

WILLIAM R. LIPPINCOTT.....Fellowship.

SECRETARY.

FRANKLIN DYE.....Trenton.

EXECUTIVE COMMITTEE.

H. F. BODINELocktown.

JOS. B. WARD.....Lyons Farms.

WALTER HERITAGE.....Mickleton.

ALSO,

THE PRESIDENT, VICE PRESIDENT, SECRETARY AND TREASURER.

STATE CHEMIST.

E. B. VOORHEES, A.M..... New Brunswick.

STATE ENTOMOLOGIST.

JOHN B. SMITH, Sc.D.....New Brunswick.

TWENTY-SIXTH ANNUAL MEETING
OF THE
New Jersey State Board of Agriculture,
HELD IN THE
STATE HOUSE, TRENTON, N. J.
Wednesday, Thursday and Friday,
JANUARY 11th, 12th and 13th, 1899.

BOARD OF DIRECTORS.

Board of Directors.

NAME.	ADDRESS.	TERM.	COUNTY.
V. P. HOFMANN	Egg Harbor City...	2 years.....	} Atlantic.
L. H. PARKHURST.....	Hammonton	1 year.....	
SAM'L R. DEMAREST, JR.	Hackensack	2 years.....	} Bergen.
ABRAM C. HOLDRUM.....	Westwood	1 year.....	
JOHN E. DARNELL.....	Mount Laurel.	2 years.....	} Burlington.
THOMAS J. BEANS	Moorestown	1 year.....	
* J. M. GARWOOD.....	Blackwood	2 years.....	} Camden.
* A. J. DRIVER	Kirkwood	1 year.....	
A. B. WALTERS	Cold Spring....	2 years.....	} Cape May.
FRANK HARRIS	Rio Grande.	1 year	
H. W. ONTHANK.....	Vineland	2 years.....	} Cumberland.
H. O. NEWCOMB.....	Cedarville.....	1 year.....	
F. C. GOBLE.....	Verona	2 years.....	} Essex.
J. H. M. COOK	Caldwell.....	1 year.....	
JOSEPH T. CARTER	Mickleton	2 years.....	} Gloucester.
GEORGE H. HORNER.....	Mullica Hill	1 year.....	
H. F. BODINE	Locktown	2 years.....	} Hunterdon.
I. H. HOFFMAN	Baptisttown	1 year	
JOHN M. DALRYMPLE.....	Hopewell	2 years.....	} Mercer.
JOHN D. RUE.....	Trenton	1 year.....	
RUNYON FIELD.....	Bound Brook	2 years.....	} Middlesex.
D. C. LEWIS.....	Cranbury.....	1 year.....	
FRANK DENISE	Freehold.....	2 years.....	} Monmouth.
GEORGE L. DU BOIS.....	Tennent.....	1 year.....	
W. F. ELY	Madison	2 years.....	} Morris.
* OSCAR LINDSLEY.....	Morristown.....	1 year.....	
CHARLES M. RORER.....	Cassville	2 years.....	} Ocean
* H. R. WILLS.....	Toms River.....	1 year.....	
S. JACKSON MORGAN.....	Woodstown.	2 years.....	} Salem.
RICHMAN COLES	Woodstown.....	1 year	
WILLIAM N. ROGERS.....	Plainfield.	2 years.....	} Somerset.
ERNEST C. TAGGART.....	Griggstown.....	1 year.....	
JOHN A. MCBRIDE.....	Unionville, N. Y.	2 years.....	} Sussex.
WILLIAM H. LEPORT.....	Deckertown	1 year.....	
F. E. WOODRUFF	Cranford	2 years.....	} Union.
E. P. BEEBE.....	Elizabeth	1 year	
B. R. CLIFFORD.....	Delaware.....	2 years.....	} Warren.
WM. C. ADDIS	Delaware	1 year.....	
* W. HOAGLAND.....	Princeton. Princeton Agricultural Society.		

The Committee on Credentials reported all the officers present and forty-seven Directors. Those marked with a * not answering to the roll-call.

M. D. DICKINSON,
I. H. HOFFMAN,
Committee.

MINUTES OF THE TWENTY-SIXTH ANNUAL MEETING.

FIRST DAY.

MORNING SESSION.

JANUARY 11th, 1899.

The Twenty-sixth Annual Meeting of the New Jersey State Board of Agriculture was called to order by the President, Hon. D. D. Denise, at 10:30 A. M., with appropriate remarks.

Prayer was offered by Rev. Dr. W. A. Hunsberger, of Trenton.

The roll of delegates was called, showing a very full attendance.

On motion of Mr. Rogers, the programme as printed was adopted as the order of business.

The Chair then announced the following committees :

Credentials—M. D. Dickinson, Salem ; I. H. Hoffman, Hunterdon ; V. P. Hofmann, Atlantic.

Resolutions—J. E. Darnell, Burlington ; J. M. Dalrymple, Mercer ; Harrison Quinby, Morris.

Legislation—Job S. Haines, Gloucester ; Hon. J. A. McBride, Sussex.

The report of the Executive Committee was presented by the Secretary. (See report.) The report was, on motion, adopted, and ordered to be printed in the minutes of the State Board.

The report of the Permanent Committee on Legislation was presented by Mr. Job S. Haines, of Gloucester, as follows :

To the President and Members of the New Jersey State Board of Agriculture:

Your Legislative Committee report as follows :

We devoted attention at various times during the sessions of the Legislature to the special subjects assigned us by this Board in the resolutions and the recorded minutes, and also to other subjects of proposed legislation we regarded as affecting the public welfare. We

have endeavored to prevent unfavorable legislation and aid the passage of approved measures.

A law was passed providing against the spread of injurious insects, and creating the office of State Entomologist. This must afford gratification to all interested in the culture of fruit and plants.

The need of some proper and legal authority to demand and grant certificates of inspection was widely felt. We are informed that the law is being enforced in many sections of the State.

Resolution No. 2, viz.:

Resolved, That the New Jersey State Board of Agriculture is in favor of the present system of taxing bank stock in the municipality where the stock is held.

Reported favorably—Legislative Committee, 1898.

Upon this matter your committee waited on the State Board of Taxation, who had in their last printed report recommended a change in this, and had prepared Senate Bill No. 45 for enactment, and we also attended a public hearing by the Senate committee having it in charge, and we were gratified to learn, especially from the State Board of Taxation, that the measure would not be further pressed at that time if they could be assured that the unfavorable effect upon the rural sections would be as represented. This assurance being so plain, no further action was taken.

Resolutions Nos. 3 and 4 were referred by the Board to the Executive Committee.

Resolution No. 5:

Resolved, That it is the sense of the State Board of Agriculture that the "Act to prevent adulteration and to regulate the sale of milk," passed March 14th, 1882, shall be so amended as to prevent dealers, large or small, from using chemicals or coloring matter to adulterate or preserve their milk, as it is not only unhealthy, but presents unjust competition with those who furnish milk fresh from the dairies.

Reported favorably—Legislative Committee.

Two bills, Nos. 160 and 203, were introduced in the Senate. The former authorized local boards of health in cities and boroughs to provide by ordinance for licensing and regulating the dealing in milk: giving a local milk inspector in city or borough the same authority as the State Inspector. Penalty for violation \$100 or sixty days' imprisonment.

The latter, No. 203 Senate, was to guard against contamination of milk by storing or standing in places unclean or infected by decaying or foreign substances, giving power to State Board of Health or any duly-authorized officer to abate and prohibit such conditions. Penalty \$100.

Your committee were informed that the whole subject of milk adulteration was being carefully considered by our State authorities, and that in the near future approved amendments to said act of 1882 could possibly be enacted.

The matter is thus pending, but it is evident that prompt and decisive action will be needed to meet and check this adulteration of milk by chemicals and placing it on sale in competition with the pure article.

Resolution No. 6.

Resolved, That the New Jersey State Board of Agriculture is in favor of the repeal of Chapter 144 of the Laws of 1896 in reference to the carrying of freight by trolley or traction roads.

Recommend its adoption—Legislative Committee.

We find that trolley or traction roads that have secured and own their roadbed by purchase have a right to carry freight, and in some instances are doing it.

Your committee noticed that competitors to trolley extensions were at the very time we were considering Resolution No. 6 yielding and adjusting disputed rights to construct extensive traction lines in the upper and central portions of this State, and, in consulting with well-known agriculturists in our communities desirous of having trolley facilities extended through rural districts also, we preferred not to offer any difficulties or complications to such extensions, unless otherwise instructed by the wise counsel of this Board.

Resolution No. 7.

WHEREAS, The rights of the people to be exempt from the operation of laws creating bonded debts without their consent, is guaranteed to them by our Constitution ; therefore, be it

Resolved, That the Committee on Legislation are hereby authorized to insist that any law creating an issue of public bonds be first submitted to the people for their rejection or adoption, who are to be affected by said bonds, in pursuance to the Constitution of New Jersey.

Reported favorably—Legislative Committee.

We find there is a disposition on the part of the legislators to submit for popular approval those measures which authorize large issues of bonds. We could only guard against legislation failing to embody the provisions mentioned in the resolution.

Resolution No. 8 was acted on by the Board, 1898.

Resolution No. 9 :

WHEREAS, There is a strong probability of a bill being framed at the present meeting of the Legislature to provide for the inspection of dairy cattle from which milk is sold to the cities of this State ; therefore,

Resolved, That our Executive Committee be directed to co-operate with the Dairy Commissioner and State Board of Health in framing such a bill that will be satisfactory to the dairymen.

As this was referred to the Executive Committee, we only kept it in mind with other matters of like general interest.

A resolution was adopted at the last annual meeting commending the Governor for his recommendation of traveling libraries, and urging their early establishment in the State.

A law was enacted authorizing the establishment of such libraries, but none have yet been purchased, owing to a lack of appropriation of the necessary money.

One other resolution appears, viz. :

Resolved, That it is the sense of the New Jersey State Board of Agriculture that the rights of owners of the soil are paramount to the rights of sportsmen on said soil, and that horticulturists, fruit-growers and farmers should at all times and seasons have the right to kill and destroy such animals as are destructive to their plants, trees or crops.

Reported favorably and recommended to the Legislative Committee.

In response to the above resolution, your committee, recognizing the truth and force of the argument advanced, yet realizing the combined opposition that lay in store to combat it, took counsel long and carefully of wiser minds. We knew the years of persistent toil by opponents to erase from our statutes this sovereign right of owners previously held as undisputed.

We, in preparation, consulted farmers, fruit-growers, Senators and members and conferred with committees.

Two bills were prepared, one granting to owners or lessees of culti-

vated lands the privilege to kill or destroy rabbit or hare damaging their fruit, fruit trees and field crops at all times.

The other bill was entitled "An act to provide damages for injuries to fruit trees and garden and field crops by hares and rabbits." (Senate Bill No. 216.)

The former in substance was subsequently incorporated by amendment by a majority of the Fish and Game Committee in Senator Engle's Game Bill No. 61, and passed both Houses with but slight opposition in the vote, but failed of Executive approval.

We believe there was but one short act on the subject of changing the game laws that was enacted and approved last session.

That act defined what shall hereafter constitute legal notice to gunners not to trespass, viz., notices posted in four places on the land premises within three months of a complaint; fine for trespass \$100, or imprisonment ten days.

Our Senate bill aforesaid, No. 216, passed the Senate almost unanimously, and to all appearance was in a likely way to meet fair success in the House, but to our surprise the measure was defeated for the time, and it was too late in the session to restore the bill.

A bill, designated Senate No. 206, was introduced, and passed both branches of the Legislature, amending the act of 1829, protecting muskrats. That act made it unlawful to catch, trap or kill muskrats between April and December of any year, except on banks inclosing low meadow lands, mill or forge dams and the embanked lands; our bill No. 206 above added also on branch meadows.

This seems proper now, as the muskrat can and does damage valuable branch meadows adjoining the cleared lands. But this bill shared a like fate, at last, with most other game bills here in 1898.

In review of previous statutes on game, we find (in Elmer's Digest, page 219) a law passed December 21st, 1771, which reads: "Any person who shall hunt or watch for deer or any other game with gun or dog on any lands, not his own, without license or permission in writing to so hunt, shall, upon conviction, forfeit and pay to the owner of the soil, the sum of forty shillings with costs of suit." No closed season is alluded to in this law, and its provisions do not apply to owners of land.

Game law supplement passed February 21st, 1820, reads: "If any person shall hunt for the purpose of killing, or to destroy or take or kill, any grouse, partridge, quail or rabbit except only between September 1st and February 1st yearly and every year, he, she or they so offending shall forfeit and pay for each grouse \$2 and

for each rabbit or quail \$1 for each and every offense, with costs of suit ; provided no person shall be prohibited from gunning on his own land.”

By game law of February 27th, 1838, the open season was made from November 1st to January 10th, provided no person shall be prohibited from gunning on his or their own land.

Game law, April 16th, 1846—The open season retained as to grouse, quail and rabbit, with the same proviso as to the owners of land.

These former laws were repealed May 27th, 1874, and the penalty raised to \$5 for each rabbit, and the privilege to trap rabbits was forbidden by law enacted March 1st, 1886, and the penalty further raised to \$15 per rabbit, even applying to the boy of twelve or fourteen years who might chance to trap on his parents' own premises.

Thus we find that the rights of owners have been recognized by statute at least from 1771 to 1874, and partly even up to 1886, when the ceded rights of private ownership were taken without compensation.

It would appear that at least one of two plans should be pursued, either to insist upon a restoring of our stolen rights or demanding reparation for the damage sustained, by just legal proceedings.

All of which is respectfully submitted,

JOB S. HAINES,

WM. B. LIPPINCOTT.

Mr. Rogers—I move that the report be accepted and printed in the minutes, and in doing so I wish to call your attention to a fact in connection with the game laws of the State, which is often overlooked. It is this : At common law the owner has a right to shoot any game found on his land. This Board has, from time to time, adopted or recommended laws in regard to the putting up of signs prohibiting gunners from trespassing. When those signs are put up they not only prohibit others from shooting game on that land, but they prohibit the owner likewise, and if such a law is passed it prohibits you, as owner, from shooting on your own land.

Mr. Roberts—This subject of the game laws is exceedingly repugnant to me. It is an iniquitous thing from beginning to end. If we read the deeds our forefathers received for their lands we find that they not only gave title to the lands themselves, but they also ceded with them all title to hunting fishing, fowling—everything pertaining to the lands, to their heirs and assigns forever. This was the title

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our forefathers received some two hundred years ago. My ancestors bought these property rights before they left England, and they located with that kind of title. I think this is our right to-day, as well as then, and all these game laws that have grown up step by step since, are an encroachment on our rights, absolutely. The idea of the law passed last winter seems to me utterly absurd—that the owner must go around every three months and post up signs forbidding gunning, and sign his name to such notices. A business man is not required to do this to prevent trespassing. He puts a sign “No Admittance” on his door, and that is all that is required of him, while the farmer must do this every three months, and have his name signed to each notice to make them legal. If some tom-fool wants to come in your buildings and hunt rats, would he not have the right to do so under these game laws? [Laughter.] It is an imposition and an outrage. Let us make a calculation what this posting of fresh bills every three months would mean. We have a number of small lots of ground around the country, and it would be necessary to walk at least ten miles, besides the driving, in order to post these notices, as required under the present law. You have no right to ask a man to do this. No other form of business requires it, and the farmer should not be called upon to stand such a ridiculous regulation for his protection.

The Chair—This question has given us a great deal of trouble in the past, and it is not done away with yet.

The report of Committee on Legislation was adopted, and ordered printed in the annual report.

The report of the State Grange was presented by Mr. Edmund Braddock, Master. (See report.)

The report was received and ordered to be printed in the annual report of the State Board.

The Secretary then read his report, which was, on motion, adopted and ordered printed in the annual report. (See report.)

Mr. McBride—I have a resolution which I would like to offer at this time, and, with the consent of the Board, although it is perhaps contrary to the rules, I would like to have it acted upon at once, without reference to the Committee on Resolutions. As it is in line with the report of the Secretary, I would like to make some remarks upon it, as I fear I may not be able to be present to-morrow. I will state that it is in reference to an increased appropriation for the use of the Dairy Commissioner.

On motion the rules were suspended, and it was ordered that the resolution be offered and acted upon the first thing at the afternoon session.

Then took recess to 2:30 P. M.

FIRST DAY.

AFTERNOON SESSION.

2:30 P. M.

Mr. Denise in the chair.

Mr. McBride—In accordance with the action of the Board at the morning session, I will now offer the following resolution :

Resolved, That the State Board of Agriculture, in convention assembled, respectfully ask the present Legislature to appropriate the sum of \$15,000 for use of the Dairy Commissioner of the State of New Jersey.

I move its adoption without reference to the Committee on Resolutions, and, Mr. Chairman and gentlemen, in furtherance of this, I wish to make a few remarks, the resolution having been seconded :

When we listened to the very interesting report of the Secretary we noticed that he said that, although there was an increased cost in the production of milk and other dairy products, and an increased demand for milk in the markets—and this demand in the New York markets has increased 1,000 cans of 40 quarts each per day for the past year—notwithstanding all this, there has been no increase in prices. The average in New York is 25,000 cans of milk per day—cans of 40 quarts each. It has grown into a business which is second to none in its importance. It has increased in the State of New York, and equally as much in the State of New Jersey, in accordance with her population. Yet, in view of these facts, the Secretary, in his report, has said that we are not receiving a corresponding advance in the price of our milk. Notwithstanding this, we pick up our papers every day and see in them, regardless of party affiliation, accounts of the prosperity of the various industries of this country. It is true, in some sense, but this prosperity has not struck the agricultural industries. Your lands to-day, in the State of New Jersey, are worth less than a century ago, and what is the reason? They are just as fertile, and the men who till their soil are just as intelligent as were their forefathers. The one great reason for this condition, so

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far as the dairy interest is concerned, is that an enemy as black as Hades, infernal and infamous, is uprooting and destroying in the State of New Jersey, and in the whole United States, the dairy interests of this country. That enemy is oleomargarine. I call it by its right name—infernal and infamous. What is the condition in the New York market to-day? The finest Elgin creamery butter is bringing but 21 cents a pound.

You ask why we get such low prices in our markets. For the simple reason that the milk business of New York, and of other sections, is handled differently from ten years ago. The surplus is handled through the creameries, and when worked up by the creameries, it must be worked on the basis of butter prices, and the oleomargarine is grinding down these prices. To-day, in the State of New Jersey, with all the dairy machinery we have at work, and I do not believe that any State in the Union has more effective dairy machinery than the State of New Jersey—with all this they are plying their infamous business, selling oleomargarine for butter right under our eyes, as they did in my own county the other day. You must hunt them as you would a rabbit or a skunk. They are packing this oleomargarine in ten-pound packages and selling it for creamery butter, and a butter dealer told me he did not sell five packages of fine creamery butter now of any kind, where, a few years ago, he sold fifteen packages. The reason for this is that the men who sell it say there is no use in buying fine creamery butter, when they can buy oleomargarine for less money and sell it at butter prices. This, gentlemen, is the enemy that stares us in the face, and threatens the destruction of the dairy interests of the country. Yet with all this, we sit still and fold our arms, and if we are asked to contribute a dollar to assist the National Dairy Union in fighting this enemy, we say "not one cent." They need this fund for educational purposes, and when the Legislature of this or any other State understands what the intention is with these appropriations—that they are for legitimate and careful inspection—I do not believe there will be an opposition vote. The Dairy Commissioner tells me that, to make a careful and thorough inspection, they have not sufficient money. All they ask is an increase of \$5,000 per year in their present allowance, making their appropriation \$15,000 instead of \$10,000. There is a necessity for more chemical work, but they have not the money to employ the chemists. I would like to see this resolution passed, and as a member of your Committee on

Legislation, I pledge you that I will do all that I can to secure the increase asked for. [Applause.]

Mr. Chairman, I wish to add this: Two years ago I was asked to write an address to be delivered to the New Jersey Dairy Union. I took the pains to prepare such an address. It was circulated broadcast throughout the State, and I suppose the waste-baskets of the dairymen were filled with it. As you know, an effort was made to organize such a union in this State, and there is a remnant of it alive yet, I believe. Governor Hoard says it is a shame that this union is practically extinguished, because the farmers refuse to contribute a dollar each to assist in enforcing national legislation on this important matter.

Some time ago I received a letter addressed to me as Vice President, wanting to know about the union in this State. I wrote back and stated we have no State Dairy Union in New Jersey, but I said I would bring the matter up before the State Board of Agriculture, and I am fulfilling that pledge to-day. They want to go before the National Congress as soon as possible, to further the enactment of some stringent law to wipe out this monster, if possible, and New Jersey, as one of the thirteen original States, wants to have some part in that enterprise. Will you do this, gentlemen? We are feeling the blighting and infernal effects of the manufacture and sale of this oleomargarine—it is like an octopus on the necks of the dairy farmers of this State. Will we do our part towards securing relief, or will we fold our hands and let this infamous business go on? It is aggressive and positive action that counts, and that only will help to relieve the dairy interests of New Jersey of this curse, and help to make her prosperous. It is as the Secretary has said, "When the agricultural interests of the country are suffering, every other line of industry must suffer." This is a fact that cannot be gainsaid, but frauds have crept in, and these frauds cannot be hunted down without money.

I would like to see this State Board of Agriculture organize a branch of the National Dairy Union. In the West they are striding ahead of us with lightning speed in the efforts they are putting forth in this direction, and without a united effort you cannot curtail the sale of this infamous stuff. It is not sold for what it is, but it is sold for butter—pure butter. It might almost be called the devil's own invention.

I thank you for the favor you have shown me, and if I can see the State of New Jersey take the proud position which belongs to her,

and join hands with those in the West, to present a solid front when the fight comes on before Congress, we will have done one of the best day's work in the history of New Jersey.

The Secretary—I believe this Board cannot take too strong action against this food adulteration. Reference was made in the report of the Executive Committee to a Pure Food Congress held last March in the interests of this matter. I was a delegate to that convention, and was forced upon its official board. There were present over three hundred delegates, representing twenty-two States of the Union and over seventy organizations. The convention lasted three days, during which the Brosius bill was considered and harmoniously acted upon. On account of the time consumed by the war measures, however, the bill was not reached in Congress. A similar convention will be held again next week, and it is hoped there will be a still larger attendance than at the former. This bill gives the Secretary of Agriculture the power to formulate rules for the regulation of the manufacture and sale of the products Mr. McBride has referred to, and if they are adulterated goods they will be branded as such and sold for just what they are. The consumer will then not be deceived and cheated. The bill covers not only dairy products, but also regulates the sale of any adulterated food product.

The Dairy Union is working entirely along the single line of protection to dairy interests, and it is important that we should do something to strengthen the hands of this Union. Everything that robs the producer in the production of the dairy by putting on the market an adulterated substitute lowers the price of the genuine article just so much.

The Senator has also referred to the work of the Dairy Commissioner in this State, and I wish to add that it is an arduous work, and requires a great deal of surveillance—far more, in fact, than the Commissioner is able to give it with the limited sum at his command.

Mr. Crane—The price of milk is controlled by the price of butter, and, as you have seen, the price of butter is practically fixed by the great trusts which control this oleomargarine output. I hope this resolution will prevail unanimously.

The Chair—I heartily indorse what has been said. I think our laws are sufficient if they are enforced, but we have not sufficient money to properly enforce them. With but \$10,000 a year, the Commissioner cannot employ help enough to look after violators of the law as closely as he should.

Mr. Cook—With reference to the National Dairy Union, Mr McBride was not quite clear on that. Some two years ago, our good friend Mr. Nicholson, who has since died, was President, and Mr. McBride was Vice President of the organization, but now he is the President. I think he has more responsibility than that of making a good speech, for it is his duty to make every effort to secure the organization of a branch of the National Dairy Union. This Union has accomplished great good. Only this week I saw a report from the city of St. Louis—the greatest distributing point of this oleomargarine outside of Jersey City, for Jersey City is the greatest in the world. This business has destroyed our export butter trade—the foreign market for American butter. This is proven by the best records in the world. It is not only manufactured there, but exported from there, and sold as dairy butter, with the marks or brands of dairy butter on the packages—brands so closely copied after the brands used for fine dairy butter that only an expert can distinguish the difference. They just keep clear of the law. The National Dairy Union had a law passed which helped very materially last year—I mean the Anti-Color law—and without artificial coloring the oleomargarine cannot be sold for anything but what it is. You want laws prohibiting the coloring of oleomargarine the color of butter, and this will stop its sale as butter. It is along this line the National Dairy Union is working, and they ask you to become members. This costs you \$1 each per year, or you can contribute any amount you wish towards the work, from ten cents upwards. I think Mr. McBride will accept the amount from you right now if you care to hand it to him, and I hope you will not be backward in doing so, as we should certainly take interest enough in this matter to organize a branch of this National Dairy Union.

The resolution was unanimously adopted.

Mr. McBride—Mr. Cook has rather surprised me. I was ashamed when I thought I was the Vice President, and now he says I am President. If this is the case, gentlemen, I ask what is your pleasure? Do you wish the organization continued, or do you not? Mr. Chairman, may I ask will those who are in favor of continuing the organization rise to their feet?

The request was responded to by over half the members.

Then as many of this audience as are in favor of becoming members, not simply in name, and who will give their dollar, will they please rise.

About forty members responded to the request.

MINUTES OF ANNUAL MEETING.

The Chair—The hour for our regular business is passing rapidly, and I will call for nominations of members to serve on the Committee on Nominations of Officers for the ensuing year :

Atlantic.....L. H. PARKHURST.	Middlesex .....D. C. LEWIS.
Bergen .....S. R. DEMAREST.	Monmouth .....GEORGE DU BOIS.
Burlington.....J. E. DARNELL.	Morris.....No nomination.
Camden.....No nomination.	Ocean .....C. M. ROHRER.
Cape May.....FRANK HARRIS	Salem .....S. JACKSON MORGAN.
Cumberland .....H. O. NEWCOMB.	Somerset.....E. C. TAGGART.
Essex .....J. H. M. COOK.	Sussex.....W. H. LEPORT
Gloucester .....G. H. HORNER.	Union.....F. E. WOODRUFF.
Hunterdon.....I. H. HOFFMAN.	Warren .....W. C. ADDIS.
Mercer .....S. B. KETCHAM.	

Prof. John B. Smith, State Entomologist, then presented his report of the work of the past year under the law to prevent the spread of injurious insects. (See report.)

The Chair then introduced Dr. Charles C. Abbott, of Trenton, who addressed the Board on "What Birds Mean to Farmers." (See address.)

On motion, the address was received and ordered published in the annual report.

Prof. Voorhees was then called to the chair, and President Denise delivered his annual address. (See address.)

The address was received and ordered printed in the annual report.

The Chair—I take pleasure in introducing Mr. W. W. Case, of Baptisttown, N. J., who is not unknown to many of you. He will talk to you about "Foul Brood and Honey Production."

Mr. Case—My subject is receiving considerable attention throughout Hunterdon county, although it may not be as important to you in other portions of the State.

We ask that legislation be had that will enable us to wipe out this disease of foul brood. We do not ask that we be paid for such broods as it may be necessary to destroy, as we are willing to stand this loss for the sake of getting rid of the disease. We do not think the cost of inspecting would be heavy, probably not over \$50 per county. I therefore ask the privilege of offering a resolution bearing on this subject at the close of my paper.

FOUL BROOD AND HONEY PRODUCTION.

BY WILLIAM W. CASE.

Owing to the intimate relations existing between the domestic honey-bee and the pollination of plant-bloom, the bee question is a much more important one than appears on its surface.

Given a country producing the finest and most perfect orchard fruits, and you will always find it a country producing great crops of honey.

California, that land of beautiful and perfect fruits, produces and markets honey by the hundreds of tons annually. New York produces our best apples and honey in immense quantities. Hunterdon county, in our own State, long held the banner as a peach county, and at that time owned more bees than all the rest of the State combined; but it seems at least strange that the bee and the perfect peach have waned together in some parts of the county, the fruit becoming yearly of poorer quality, until peach-growing is being abandoned in many parts.

Spraying of fruit trees is, and deservedly, growing in importance and favor, but I can say without fear of contradiction that unless the orchard bloom is perfectly pollinized, spraying will never bring a crop of fruit to perfection.

Peaches, through imperfect pollination, generally throw a great part, and sometimes all of their fruit, in what is known as the "June drop." Cherries frequently utterly fail, not from so-called "blasting," but for want of insect aid in cross-fertilizing of the bloom, such aid being prevented in blossom time by cold, wet weather housing up the bees, and other insects.

Hot-house gardeners, where strawberries and cucumbers are largely grown under glass, frequently keep a colony of bees in the building as pollen carriers, both of these plants requiring artificial aid in pollination. The well-known effect of bees on clover bloom is too common to be more than referred to here.

Again, the bee business in this country is one of considerable income to the inhabitants. Apart from its use in fruit culture, our average honey crops amounting, in round numbers, to from 50,000,000 to 75,000,000 pounds annually, worth more than \$5,000,000, is yet in its infancy, but which when, in the future, properly and scientifically developed, should increase at least tenfold.

There have been more superstitions concerning the bee in the past than would fill volumes. Until very recently, and in many minds yet to-day, bee culture was considered a mere matter of luck. To-day people are beginning to wake up to the fact that it is a science.

Our older men still often speak of their remarkable "luck" in bee-keeping, in years long past, and usually of a very few years' duration, when they would increase from a colony, found perhaps in the woods, to over a hundred colonies in a few years, and were considered, and considered themselves "lucky" bee men; then, just as suddenly, their "luck" would change, and in a couple of years through "bad luck" all their bees were dead, together with all the other bees in a considerable extent of country.

Science now proves the "bad luck" to be nothing more nor less than a fungous disease, the "bacillus alvei," commonly known as "foul brood," which attacks the immature brood and spreads so rapidly as frequently to destroy a strong colony in a few weeks, and, if unchecked, whole apiaries in from one to three seasons.

This insidious, deadly and infectious disease attacks the brood and causes the death of the larvæ about the time when ready to seal—sometimes after sealing—the brood turning to a rotten, ropy, putrid mass, of a brown color and a mattery consistency. The disease is virulently contagious. A single robber bee can carry enough germs from an infected colony in one load of stolen honey to infect and eventually destroy a strong, healthy colony, sometimes in a few weeks, occasionally in a couple of seasons.

The disease outwardly manifests itself in the dwindling of the infected colony, which, if left to itself, will eventually weaken to a quart or less of bees, which (if not robbed by its healthier neighbors) will abandon the hive and unite or attempt to unite with some other colony, either near by or even two or three miles distant, thus carrying the disease from apiary to apiary.

After such a colony swarms out the neighboring bees remove all honey from the abandoned hive, and thus spread the disease to all colonies receiving the stolen sweets. Sometimes the stronger colonies rob the weak, infected colonies, when the same results happen. Under such conditions an apiary is generally ruined before the close of the second season.

This disease has again broken out in many parts of our country, and with great malignity, and bids fair, if not checked, from its deadly infectious character, to exterminate the bee from the land.

In California, it has practically exterminated the bees in some sec-

tions. In Canada it has destroyed thousands of colonies, and the greater part of that country is already under legal inspection. In New York it is epidemic in several counties, and repressive laws have already been enacted to prevent its further spread. In our neighboring State of Pennsylvania the disease also exists; while in our own State, at least in my own county (Hunterdon), the disease has ruined hundreds of colonies—in many cases whole apiaries.

In 1895, this honorable Board, at the earnest solicitation of our Hunterdon County Board of Agriculture, issued a bulletin on the disease and its cure, by Mr. Wm. McEvoy, of Woodburn, Province of Ontario, Canada, Inspector of Apiaries of that Province, and who has successfully treated thousands of colonies in that country.

Now, the treatment given in that bulletin is a most excellent one, and effects a perfect cure every time, and the bulletin has already become a text-book on the subject. But many of the mossbacks still believe in "luck," and refuse to believe in foul brood, with the result that they eventually lose all their own bees and cause the extinction of all bees within reach, and make it impossible to eradicate the disease when once fairly seated, as these neglected apiaries act as hotbeds for the propagation of the disease.

And now, in the interest of the bee-keepers and horticulturists of the State, I am here to ask the influence of your honorable body in securing the passage of a law in this State providing for a system of inspection of apiaries and compelling the owners of infected colonies to either cure or destroy the same, under a penalty sufficient to make it effective.

We do not ask pay for destroyed colonies, but the compelling of either the cure or destruction of the same, as a great many owners, even when they understand the case, say, "Well, if that is the case, the bees may go, before I will bother with them." They do not seem to think that neighboring bee-keepers have any rights to be respected in the premises.

And now I wish the privilege of offering the following preamble and resolution:

WHEREAS, That insidious, deadly and destructive disease of the honey bee, familiarly known as foul brood, is rapidly spreading throughout this State and the East, and bids fair, if not stamped out, to totally destroy the apiaries throughout the country, entailing a great loss to both apiarists and fruit-growers; and whereas, many apiarists use no measures to prevent the spread of the disease; and whereas, New York and other neighboring States are passing inspection laws looking to the eradication of said disease; therefore,

Resolved, That we, the State Board of Agriculture, use our most earnest efforts through our Legislative Committee, to secure a law for the inspection and cure or destruction of infected colonies throughout the State.

I move the resolution be adopted, and referred to the Committee on Legislation.

Mr. Cook—In rising to second that I wish to say that I thoroughly concur with what has been said on the subject, and I think the statements there made with regard to the necessity of the honey bee to fruit-growers are not over-estimated. The importance of the bee industry to the State is beyond our calculation in the production of fruit. There would be but little fruit without the aid of the honey bee, and but few products would be a success without its aid, the instrument of nature in fertilizing our blossoms. We all know how important they are in the production of clover, and we know the honey bee is important to both horticulturists and agriculturists. There is great danger of the honey bee being annihilated through this disease. Some years since, while in Cuba, my observations of this disease there proved to me conclusively its danger to the apiary. It is practically impossible to eradicate it by easy means, from the fact that many keepers of bees have it in their broods, and are ignorant of the necessary measures to eradicate it. They don't know how to handle or keep the bee, and never even look into their hives. They do nothing because they do not see the importance of it. They do not understand the danger of its spreading, and many of them do not seem to care if it does spread. I think bee-keepers are entitled to some protection in this line, especially as they do not ask for pay for the broods destroyed.

I heartily second the resolution, and think Mr. Case should be associated with the Legislative Committee in drafting the proposed bill; not because I doubt the ability of the members of that committee, but because he knows what other States have done along this line, and what laws are most effective in other States.

The Secretary—In reference to this general question allow me to say we will make a mistake if we only look at it from the standpoint of the honey crop. The money product of this industry is small in New Jersey, and the question may be asked why we should trouble the Legislature with so small a matter. We must look at the more important side—the fertilization of fruits, flowers and grasses. It has been said that it was due to the extermination of the white-faced

bumble bee that our meadows no longer grow the red clover, because it is not fertilized. There are times in the production of fruit when the pollen is not carried by the wind as it should be, owing to the condition of the weather. At such times the aid of the honey bee is of the utmost importance. A bulletin has already been published on this subject by this Board, as many of you are aware, but some bee-owners are indifferent as to the disease, its causes and as to methods of eradication. The disease invades their hives without being noticed, and in this way the whole neighborhood is inoculated.

While there are increasing numbers of pests working to injure the farmer's crops, yet we view with hesitancy the increasing number of laws looking to State control of agricultural interests. But if it is possible to secure a small appropriation for this purpose it might be well, and have it turned over to the State Entomologist. He works without extra pay, as you know.

Prof. Smith—I already have a sufficiency of that kind of work and do not hunger after more.

The Secretary—I would suggest he is the man to take charge of the matter. If he will not do it, then some other man of equal benevolence may be found, I hope.

As to the suggestion of Mr. Cook, that the resolution be amended to include Mr. Case on the committee in connection with the drafting of the proposed bill, the Legislative Committee will have this in mind, and if a bill is drafted they will undoubtedly call on Mr. Case, as well as any other persons well informed on this subject.

Mr. Cook—This is a disease that is contagious, and only spreads by contagion, and effective measures should be taken at once to prevent its spread. There is none in our section of the State as yet, and we don't want it there.

The resolution was then adopted and referred to the Committee on Legislation.

Mr. McBride—I recall the story of the colored lady who was at a protracted meeting, and when she was asked to tell her experience, all she could say was : " Brudders and sisters, I is so glad I is here," and, gentlemen, I am glad I am here. I am wonderfully pleased at the action of the gentlemen here to-day, especially with regard to the formation of this dairy union. I am glad to state that thirty-seven members have handed in their \$1 and enrolled themselves as members of the dairy union, and if I could get three more and make it forty, I would be as happy as the colored lady. [Laughter.]

Mr. President, with your permission, I now take the liberty of presenting the following names as officers of this union for the ensuing year: For Vice President, Joseph H. Matlack, Burlington county; for Secretary, George L. Gillingham, Burlington county; for Treasurer, Charles H. Cook, Mercer county.

I move that these gentlemen be unanimously elected to fill these positions.

Unanimously agreed to.

The above-named gentlemen were elected with Hon. John A. McBride as President, and the New Jersey State Dairy Union was re-organized.

Mr. McBride—I would suggest that every dairyman, when he returns home, agitate this question thoroughly among his neighbors who are in the dairy business. If it is thoroughly agitated all over the State as it has been here to-day, we can form a State Dairy Union with a fund of \$10,000 on hand, and although it may not be necessary to use one dollar of it, it will show that New Jersey is foremost in the battle against this infamous business. When I write to the Secretary of the National Dairy Union I shall have the pleasure of informing him that the New Jersey Dairy Union is alive, but I would like to be able to state that it is appreciated by the dairymen of our entire State.

Mr. Gillingham—I would like to make a brief statement in regard to this Dairy Union. Through our old friend, Isaac Nicholson, two years ago, this auxiliary was organized. The President and Secretary worked to the best of their ability, together with Mr. Nicholson. Mr. McBride gave his consent to the issue of the circular he spoke of, and it was one of the best essays on the subject I have ever had the pleasure of reading. It was printed and distributed all over the State before the call of the annual meeting, and only four people came. But I think the response here to-day will enable us to say to the National Dairy Union that we are alive and in earnest, and I hope at the next annual meeting we may be able to show a large increase in members and interest.

Mr. McBride—In the preparation of the programme for the next annual meeting I offer this motion, that half a day be set aside for the Dairy Union on the second day of the session of this Board.

Mr. Matlack—I second that motion, for when we are here we can attend to the matter.

The Secretary—I would like to make a statement and motion in this connection. The law constituting this State Board of Agricul-

ture allows it to admit to its membership any State organization of this character, should it see fit to do so. I now make this motion, that the New Jersey State Dairy Union be admitted to membership in this State Board of Agriculture from this date. That will entitle them to two delegates and give them a specific standing, and consultation can be had with reference to matters of importance to it.

The motion was unanimously agreed to.

The Secretary—I wish to state further, that we hold one day apart in our sessions for the consideration of dairy matters. We hope to see this arrangement continued, and feel that this will meet the want expressed by Mr. McBride's motion.

Mr. Case—I move to amend Mr. McBride's motion by asking that an entire day be devoted to the dairy interests. We have almost an entire day this year and we do not want less next year for the same thing.

The amendment was agreed to, and the motion, as amended, was then concurred in.

Mr. Bodine—I notice a number of our friends have been generous enough to bring a lot of fruits and other samples of the products of the farm here for exhibition. I move that a committee be appointed now to take charge of the exhibits and report on them.

Carried.

The Chair announced the following Committee on Exhibits: E. M. Heath, E. P. Beebe and J. M. Lippincott.

On motion, took recess until 7:15 P. M.

EVENING SESSION.

The meeting was called to order at 7:15 P. M. by President Denise, and Dr. Halsted, of the State Agricultural College, was introduced and delivered an address on "Root Tubercles and Nitrogen Appropriation." (See address.)

Prof. John B. Smith, State Entomologist, was next introduced and delivered an address on "The Entomological Work of the Year." (See address.)

Adjourned until 9:30 A. M. Thursday.

MINUTES OF ANNUAL MEETING.

SECOND DAY.

MORNING SESSION.

THURSDAY, January 12th, 1899.

The session was called to order by the President at 9:30 A. M., and was opened with prayer by Rev. A. W. Wishart, of Trenton.

Dr. Ward—Your committee appointed to examine the accounts of the Treasurer, William R. Lippincott, hereby certify that we have examined the accounts of said Treasurer, and find them correct in every particular.

Signed,

JOS. B. WARD,
WALTER HERITAGE.

The report was, on motion, received and ordered printed in the annual report.

Mr. Lippincott—I have prepared a report of the business of the Treasurer for the last two years. The statement for 1897 was sent to the Secretary for publication, but the Governor decided it was not worth while to publish a detailed statement in our annual report, as the whole matter was set forth in the State Treasurer's report.

I will read this report in full to you, that you may be informed of what has been done with the funds received. I would add that the Treasurer does not draw the salaries of the Secretary or that of the Stenographer.

After the reading of the report, Mr. Collins moved that the report be accepted, with the thanks of the Board to the Treasurer for the information given.

The motion was agreed to.

So much of the Treasurer's statements as cover the expenditures of the fiscal year ending October 31st, 1898, is herewith printed.

William R. Lippincott in Account with the New Jersey State Board of Agriculture for Year Ending October 31st, 1898.

Dr.

Total appropriation.....	\$6,000 00
Total amount received from State Treasurer.....	4,445 51

STATE BOARD OF AGRICULTURE.

Cr.

Annual meeting, January 12th-14th, 1898—		
Delegates' expenses.....	\$314 66	
Speakers and traveling expenses.....	353 83	
Stenographer.....	125 00	
Lantern service, chairs, janitor, Board speakers and Executive Committee.....	88 50	
	<hr/>	\$881 99
Appropriations to County Boards—		
Atlantic.....	\$30 00	
Bergen.....	25 00	
Burlington.....	50 00	
Camden.....	20 00	
Cape May.....	20 00	
Cumberland.....	20 00	
Essex.....	20 00	
Gloucester.....	50 00	
Hunterdon.....	50 00	
Mercer.....	50 00	
Middlesex.....	20 00	
Monmouth.....	50 00	
Ocean.....	20 00	
Salem.....	50 00	
Somerset.....	50 00	
Sussex.....	25 00	
Union.....	25 00	
Warren.....	20 00	
	<hr/>	595 00
Appropriation to State Horticultural Society.....		300 00
For lectures and traveling expenses, twenty-six Farmers' Institutes.....		1,216 35
Two delegates to National Association Farmers' Institute Workers, Omaha; two delegates to Pure Food Congress, Washington, D. C., two meetings; one delegate to Commission Merchants' Convention, Buffalo.....		346 50
Preparation fertilizer formulas.....		75 00
Clerk hire and incidentals..		127 99
Treasurer's salary.....		100 00
Legislative Committee expenses.....		81 50
Postage stamps.....		354 65
Executive Committee expenses.....		158 73
Packing and expressage on annual reports.....		165 30
Hog cholera inspection.....		42 50
	<hr/>	4,445 51
Paid by State Treasurer—		
Secretary's salary..	\$1,200 00	
Clerk hire from April 1st, 1898.....	121 31	
Stationery and blanks.....	233 18	
	<hr/>	1,554 49
		<hr/>
		\$6,000 00

MINUTES OF ANNUAL MEETING.

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Appropriation for San José scale investigation.....		\$500 00
Stationery and blanks.....	\$123 21	
Expenses of investigation.....	376 79	
	<hr/>	500 00

The report of the Committee to Nominate Officers was then presented by Mr. Parkhurst, renominating all the present officers, as follows : For President, Hon. D. D. Denise, Monmouth ; Vice President, Prof. E. B. Voorhees, Middlesex ; Secretary, Franklin Dye, Mercer ; Treasurer, Wm. R. Lippincott, Burlington. Executive Committee, Joseph B. Ward, Essex ; Walter Heritage, Gloucester ; H. F. Bodine, Hunterdon ; also the President, Vice President, Secretary and Treasurer.

Respectfully submitted,

L. H. PARKHURST,
Chairman.

On motion, the report was accepted and unanimously concurred in.

Mr. Denise—I wish to say to this Board that I appreciate the honor you have conferred upon me by selecting me again as your presiding officer. I have devoted a great deal of time and attention to the work of this Board, and shall continue to do so in future. I thank you for the compliment you have paid me this morning.

The report of the Tuberculosis Commission was presented by the Secretary, Mr. Dye. (See report.)

On motion, the report was received and ordered published in the annual report.

The report of the Treasurer of the Tuberculosis Commission was then presented by the Treasurer, Mr. Charles Howell Cook. (See report.)

On motion, the report of the Treasurer was adopted.

The Chair then introduced Dr. George M. Mitchell, editor of the "Maine Farmer," who addressed the Board on "Profitable and Unprofitable Animals as Measured by Structure and Individuality." (See address.)

Then took recess to 2:30 P. M.

AFTERNOON SESSION.

The session was called to order by the President.

Committee on Exhibits presented their report, as follows :

Your Committee on Exhibits beg leave to report :

Six potatoes—Silver King, grown by Elmer Noble, large size ; reported yield of 248 bushels per acre.

Two specimens of potatoes grown by George L. Gillingham—New Queen and Early Fortune ; second crop planted July 27th and dug October 29th ; large for second crop ; free from scab.

Apples—New grown by W. E. H. Rouse, Lawrenceville ; exceedingly fine specimens ; good size ; free from codling moth and other imperfections. Twelve specimens of apples grown and exhibited by B. R. Clifford, Warren county ; very good, considering they were not exhibited as primes.

Two boxes of honey, exhibited by W. W. Case, Baptisttown, Hunterdon county, N. J., one each of buckwheat and field aster ; also four boxes exhibited by J. H. M. Cook, Caldwell, N. J., from field aster. These specimens are very fine and plainly show that honey derives its color from the different sources from which it is obtained.

A stand exhibited from Upper Pittsgrove, Salem county, N. J., embellished with box and surmounted with the American flag and specimens of cotton grown by Miss Maggie Davis, with an exhibit of Golden Mammoth corn, grown by A. M. Smith, reporting a yield of one hundred bushels of shelled corn per acre for a field of eighteen acres.

An exceedingly fine exhibit of Vineland Sweets made by H. W. Onthank, of Vineland, the quality of these sweet potatoes enabling them to command the best quotations in New York markets.

E. M. HEATH,

E. P. BEEBE,

JOHN M. LIPPINCOTT,

Committee.

Mr. Crane—If there is any one thing I feel thankful for in the making of laws for the welfare of the farmers, it is the Stone Road law. It has done an immense amount of good, but the appropriation is not sufficient, and I would like to offer a resolution bearing on the subject :

WHEREAS Hard roads are an absolute necessity for the success of the farming interests of the State; *and whereas*, there is an almost universal desire for the rapid improvement of the same; *and whereas*, the present State appropriation is insufficient to macadamize as rapidly as is desired the five hundred miles applied for; *and whereas*, petitions for new roads are being continually presented to the different Boards of Freeholders; therefore, be it

Resolved, That the Legislative Committee of this Board be requested to urge the passage of a law by our present Legislature, largely increasing the present appropriation for public roads.

On motion, the resolution was received and referred to the Committee on Resolutions.

Mr. Crane—I have another resolution I wish to offer, in relation to the adulteration of milk :

Resolved, That it is the sense of this State Board of Agriculture that the act to prevent the adulteration and to regulate the sale of milk, passed March 14th, 1882, shall be so amended as to prevent dealers and other persons from using chemicals or coloring matter to adulterate or preserve their milk, as it is not only unhealthy but permits unjust competition with those who furnish milk fresh from the dairies of this State, and that the Committee on Legislation of this State Board of Agriculture be instructed to prepare an amendment to the present law that will not only prohibit the use of chemicals in milk but punish the violators of the law.

I move its adoption without reference to the Committee on Resolutions.

This resolution is nearly a copy of one I offered last year, and my reason for offering it again is this : Our Legislative Committee did not see fit to formulate a law and urge its passage. They sent me word that the State Board of Health claimed there was all the law necessary already, and no law was passed. No conviction can be had under the present law. Some legislation is therefore necessary, for it is for our own protection. We know there are large trusts forming to control the adulteration, and one with a capital of ten millions is already in operation. If we allow the adulteration of milk in this way we neglect our own interests. We can send milk to market that will fill the requirement of being honest milk, and we want such a law passed that will prevent the sale of these adulterations and thus reduce the prices we receive for an honest product. We must not let them drive us out of the market, and then put up the price of their commodities when they get us out of the way. Let us put our foot on this abominable business.

Mr. Rogers—I am informed we have all the law we want, and I think the gentleman is on the wrong track. We want summary convictions instead of trial by jury. The trouble is not with the law.

Mr. Tine—What is needed is some simple, plain law to get convictions without so much litigation. Some of the suits have been brought under the Pure Food act. I think the law is so obscure it had better be amended. I think Mr. Crane's resolution is in the right direction.

Mr. Fithian—It appears from the general experience that it is the consumer who demands that the coloring matter should be used in milk and butter.

The resolution was then adopted without reference and referred to the Legislative Committee.

The Chair—We have with us to-day a friend of Governor Hoard, who will tell you how to care for and feed dairy stock for the greatest profit. I take pleasure in introducing Mr. C. P. Goodrich, of Fort Atkinson, Wisconsin. (See address.)

The Chair—We have had one gentleman tell us what to feed our cows, and now we will have another one to tell us about human food. I have the pleasure of introducing to this Board Dr. H. W. Wiley, Chemist of the United States Department of Agriculture, who will now address you. (See address.)

Then took recess to 7:45 P. M.

EVENING SESSION.

The meeting was called to order by the President, Hon. D. D. Denise, at 7:45 P. M., who said: I am glad to see so many young people present to-night. It shows you appreciated the meeting we held in this room last year, and we trust all will be equally interested to-night.

We are indebted to Dr. Green for his kind invitation to meet here to-night and are glad to meet with you.

I take pleasure in introducing Dr. William Frear, State Chemist of Pennsylvania, who will talk to you about the formation of the soil.

Dr. Frear gave a very interesting and instructive illustrated address before a large audience composed of several hundred of the members of the State Schools, with their teachers, in addition to the members of the State Board of Agriculture.

Then took recess until 9:30 A. M., Friday.

THIRD DAY.

FRIDAY, January 13th.

The session was called to order by the President at 9:30 A. M., and was opened with prayer by Rev. Dr. Walter A. Brooks, of Trenton.

The Committee on Resolutions reported but one resolution referred to them, that in relation to increased appropriations for roads. This was reported favorably, and on motion the report was concurred in, and the resolution adopted.

Mr. Cox—I have a resolution I desire to offer :

WHEREAS, Certain circulars purporting to be extracts from newspapers published in this State, have been distributed all over the State, in which circulars the integrity, honesty and fidelity of the officers and members of the Executive Committee of the State Board of Agriculture, and the State Tuberculosis Commission, have been called in question ; therefore, be it

Resolved, That we hereby express our condemnation of these circulars, and emphatically declare them to be untrue and slanderous in their character.

Resolved, That we hereby express our confidence in these officials, and heartily commend their action.

I move its adoption.

Mr. Beans—In seconding that motion I would ask that the vote be taken by rising.

The resolution was unanimously agreed to.

Mr. Cox—I have another resolution I wish to offer :

Resolved, That a committee of two be appointed to represent this State Board of Agriculture in the Pure Food Congress to be held in the city of Washington January 18th to 21st instant.

I move its adoption without reference.

The Chair—I wish to state that Prof. Voorhees and myself were appointed by the Governor to go as delegates to this Congress, but we are unable to attend.

The motion was agreed to.

Mr. Cox—I have here another resolution I wish to offer :

WHEREAS, Ninety per cent. of the imports and exports of the United States are carried in foreign ships, which annually receive from the people of the United States a sum estimated at \$200,000,000, which is taken out of the country in gold, or its equivalent, and contributes to the employment of aliens abroad, while at the same time depriving our own people of the employ-

ment that sum would constantly give if it were retained in the United States; and *whereas*, a bill has been introduced in the Senate of the United States (No. S. 5,024) by Hon. M. A. Hanna, and in the House of Representatives (No. H. R. 11,312) by Hon. S. E. Payne, the purpose of which is to restore to American ships a fair share of our foreign carrying to the end that the money so expended may be retained in the United States, giving employment upon our farms, our mines, our forests, our factories, in our shipyards and on board our ships, to our own people; therefore, be it

Resolved, That the New Jersey State Board of Agriculture favors the adoption of Senate Bill No. 5,024, and House Bill No. 11,312, which are identical, at the present session of Congress, and respectfully requests that each of the Senators and the Representatives from this District in Congress do their utmost to secure the passage of these bills in the interest of the people of the entire United States, and for the more adequate defense of the nation.

I move its adoption without reference.

Mr. Collins—I doubt the propriety of this resolution in this body, as it is largely political in its nature.

The Chair—The support of this Board has been asked for on the ground that they want our influence in getting the bill passed.

The resolution was then adopted.

The Chair—I would like to call on Prof. Voorhees to make a statement in regard to the experiments made in this State in sugar-beet raising.

Prof. Voorhees—I regret very much that I have not with me the data in relation to these experiments. I would state, however, that 100 pounds of seeds were distributed among forty-six farmers in about five counties, I think. Instructions were given with regard to their growing and handling for analysis. The analyses were made and reported back to our Station, and the amount of sugar content, as I remember, was exceedingly small. The best was from Union county, I think, $13\frac{1}{2}$ per cent., and this was the only sample which showed sugar of commercial value. The lowest was 9 per cent., grown in Burlington county. This experiment is hardly to be considered as representing all the different sections of the State, or even the best areas, perhaps. It would indicate that a great deal more experimenting will be necessary before it would be safe to encourage the growth of the beet for sugar in this State. The season was regarded by about one-half the growers as favorable, although not favorable for sugar, as it was much drier than usual.

MINUTES OF ANNUAL MEETING.

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Mr. Rogers—What percentage of sugar should they have to make them profitable?

Prof. Voorhees—Twelve per cent. sugar and 80 per cent. purity.

Mr. Ege—I have observed with a great deal of satisfaction and interest the beet production in Nebraska. I have visited the manufactories there and seen them working, as well as the business of growing them. I think we should go slowly in discouraging this business in New Jersey, when our soils may be made deep enough without much trouble. The profits are large, although in Nebraska the beets were not so large. There is not so much wood and water in the small beets, and they may have a larger percentage of sugar. The depth of soil can be secured by proper ridging of the ground.

The soil in Nebraska in many places is not deeper than in our own State, and they overcome it in this way. It is one of the most interesting processes I have seen. The beets are put in silos, as we may call them, and the manufacturers work until February and March. They may also be buried in heaps, as we sometimes bury potatoes. The beets are carried into one end of the factory by water, and come out at the other end as sugar.

Let us be a little careful about discouraging this industry until a more thorough trial is made.

Mr. Evans—How deep should the soil be?

Mr. Ege—That depends upon the fertility of the soil. In the West they don't care so much. I have seen hundreds of tons not larger on top than a silver dollar, and I have seen them worth \$60 an acre. It is the best industry they have undertaken there.

The Chair then introduced Mr. S. D. Willard, of Geneva, N. Y., who spoke on "The Future of Fruit-Growing." (See address.)

Mr. Willard was followed by Mr. J. H. Hale, of Connecticut, who spoke on "The Evolution of Fruit-Growing and Marketing." (See address.)

The Chair—I will appoint Messrs. S. B. Ketcham and John T. Cox to serve as delegates to the Pure Food Congress.

Then, on motion, the Twenty-Sixth Annual Meeting of the New Jersey State Board of Agriculture adjourned *sine die*.

FRANKLIN DYE,

Secretary.

THE REPORT OF THE EXECUTIVE COMMITTEE.

During the past year your Executive Committee have given their attention, as far as was possible, to such matters as, in their judgment, were of interest to the farmers of the State and connected with the State Board of Agriculture.

They have held, including the meeting last evening, seven meetings during the year. At the meeting on February 14th attention was called to the meeting of a National Pure Food and Drug Congress in Washington on March 2d. A communication from the Secretary of the association was read, and it was decided that a delegate should be sent from the committee to attend said convention.

The resolution from the Morris County Board, referred to the Executive Committee, was also taken up and a special committee appointed to consider and report action on the same. The resolution and action, herewith presented, were sent to all the Secretaries of the County Boards in the State, with the desire that all the Boards might be brought into harmonious action under existing laws.

At the meeting of the committee April 12th the Secretary reported the proceedings of the National Pure Food and Drug Congress, to which he had been sent as a delegate. In this connection we would state that the Governor appointed, to attend this meeting, the President of the Board also.

The law enacted by the Legislature at its last session, in relation to the destruction of the San José scale, which was referred to the Executive Committee of the State Board of Agriculture, requiring them to appoint inspectors in the several counties, was then taken up and a list of inspectors, three for each county, was chosen.

Professor Smith was invited to be present and state what, in his judgment, would be needed in the way of letters, circulars, &c. After hearing his statements, the preparation of them was referred to a special committee, and the Secretary was requested to confer with the Comptroller in reference to printing the law and the blanks needed for the introduction and prosecution of this work in the State.

It will be seen, from the above statements, that new and additional work is, from time to time, placed in the hands of your Executive Committee. The report of this work will be presented fully by Prof. Smith, the State Entomologist.

One meeting was held at New Brunswick on June 16th, at which a Deputy Inspector was appointed to assist Dr. Smith in the

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inspection of nursery stock. The reports of the several County Boards, as submitted, were also at this meeting considered, and an apportionment of funds to them, according to the work done, was made.

The committee, in the afternoon, visited and inspected the College Farm, now a department of the Experiment Station. The members expressed themselves as highly pleased at what they saw, believing that it, with its entire system of experiments and farm work, is worthy of the name and, with the means at its command, which are derived entirely from the farm, there being no State or college appropriation to its support, second to no other in the country. The committee are of the opinion that the dairymen and farmers of the State would find it to their advantage to visit and inspect the methods at this farm.

At a meeting held July 20th the Secretary outlined the Institute dates, as far as made up, and asked with reference to speakers from other States and those in this State. After discussion, the plans as outlined were adopted.

At the meeting September 20th the call for the meeting of the National Association of Farmers' Institute Conductors, to be held at Omaha, October 4th and 5th, was considered, and, inasmuch as we are endeavoring to hold profitable Institutes among the farmers of this State, it was thought desirable to send two delegates to attend that meeting in order to obtain the experiences of others engaged in the same work, whereupon the President and Secretary were appointed to attend said meeting.

The committee also, at that time, considered the advisability and desirability of publishing, for circulation among the farmers of the State, approved formulas for fertilizers for the various farm crops, providing the Comptroller would allow the cost of the same out of this year's appropriation.

Favorable action was taken and Prof. Voorhees was requested to prepare such formulas at a reasonable cost for the work required; edition to comprise 10,000 copies. This bulletin has been published, and, to some extent, circulated. Its value to those who are interested in this subject cannot be questioned. Requests for this circular are being received from farmers throughout this State and even from England.

At the meeting December 23d a communication was received from Prof. John B. Smith, State Entomologist, calling attention to the importance of publishing, at this time, a book covering the

insect fauna of New Jersey, to be published as a supplement to the report of the State Board of Agriculture.

After carefully considering Prof. Smith's suggestions, the committee took the following action :

Resolved, That the committee believe such a work would be of very great value, not only to the farmers, but to all who own trees and shrubs whether in country or city, and earnestly recommend that it be prepared and published as a supplement to the annual report of the State Board of Agriculture, and that the President and Vice President be a committee to present the same to the proper State authorities.

If the Board approves of such a publication it might be well for them to take favorable action concerning it.

The committee, early in the season, authorized the Secretary to arrange for and conduct, as heretofore, a series of Farmers' Institutes throughout the State, believing them to be of exceptional value to any farming community who earnestly co-operate to make them successful.

Members of the committee have attended some of the meetings, and they are encouraged to believe our farmers are coming to appreciate them more and more each year, as the character and purpose of the Institute are better understood. Numerous testimonials from practical farmers have been given, assuring us that they have received ideas and suggestions at these meetings which, put in practice, have resulted in a steady increase in financial returns from their work.

At the meeting of December 23d, also, the Secretary submitted outlines of programme for the annual meeting, of the speakers he had engaged and the subjects to be treated. The programme, after being carefully considered, was adopted as it is presented at this annual meeting.

In the preparation of this for the Twenty-sixth Annual Meeting, your committee have kept in mind the progressive character of this Board. The general questions of agriculture are the same from year to year, but changes are going on around us, and new demands, growing out of new necessities, require a constant study of the situation in order to secure best results.

Some of these questions are presented for treatment and discussion at this meeting, and it is the earnest hope of your committee that much practical and helpful information may thus come to all who

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attend. The members and officers of the Board will, we believe, best advance the interests of agriculture in the State, as by law they are committed to it, by confining its deliberations and discussions close to the questions of practical agriculture.

Wishing a prosperous year to all the farmers of the State, we close this statement of our proceedings.

OFFICE STATE BOARD OF AGRICULTURE.

To Whom It May Concern.

GENTLEMEN—At the Twenty-fifth Annual Meeting of the State Board of Agriculture, held at the State House, January 12th to 14th, 1898, the following resolution, emanating from Morris county, was presented and referred to the Executive Committee of the State Board :

WHEREAS, It is important to increase the interest of County Boards of Agriculture in organizing and reporting their actions and other reports to the State Board ; therefore, be it

Resolved, That the County Boards be permitted to make such laws and regulations as they may deem best to promote their efficiency.

The part of this resolution contained under the preamble, the Executive Committee heartily concur in, believing it is important to increase the interest of County Boards of Agriculture in organizing and reporting their actions and other reports to the State Board. There is a very great defect in some so-called County Boards of Agriculture in reporting as to the condition and progress of agriculture in the county as is required by law.

The second part, under the resolution proper, “that the County Boards be permitted to make such laws and regulations as they may deem best to promote their efficiency,” has never been questioned by the State Board, and if such laws and regulations are made honestly to *promote the efficiency* of said Boards and are made by *bona fide*, properly-organized County Boards, such action would not be questioned ; and, although the law clearly gives the Directors of the State Board of Agriculture or its Executive Committee power to make such laws and adopt such rules for the government of the County Boards of Agriculture, the Executive Committee have never assumed the power given under the law.

But the resolution in question, coupled with complaints that have come to the Executive Committee from certain counties that the existing organization in such counties called the County Board, has, in various ways, excluded from membership in the Board and participation in its proceedings members of other agricultural organizations, the Executive Committee feel constrained to call the attention

of members of all such organizations in the counties to the law governing the organization of County Boards.

“The membership of the State Board is made up of all agricultural and horticultural societies, farmers’ clubs, granges of the patrons of husbandry and other agricultural organizations.” That being the law for the State Board it would be an inconsistency to exclude from the County Boards members of the same organizations existing therein. The law, therefore, clearly states for the organization of the latter, “That the membership of the County Boards shall consist of all the members of the agricultural and horticultural associations of each county and such others as they may elect.”

It is clear from this requirement of the law that any organization claiming to be a County Board and excluding from its membership, by any means, members of the societies named who desire to become members of said Board, is going beyond the law, and delegates elected from such organization to the State Board have no standing therein nor are the proceedings of such organization entitled to a place in the report of the State Board, nor are they entitled to any appropriation from the State.

In view of the resolution referred to and of the complaints made and of the law governing in the case, the Executive Committee would recommend that in any counties where the law has not been complied with and the farmers of the county desire to have a County Board organized auxiliary to the State Board, that a meeting for this purpose be called at the county-seat, and that a previous notice of ten days be sent out and given in the papers of such meeting, and that all agricultural and horticultural organizations of whatever name, if they so desire, take part in the organization of the County Board according to the law referred to.

Further, the law requires that every County Board organized under the act shall file with the Secretary of the State Board a certificate of such organization, giving first, “the name of the County Board filing the same ; second, date of its organization under this act ; third, the names of its officers and directors ; fourth, the names of *bona fide* members in each organization represented in the County Board at the date of organizing said Board, and the names of such organizations.”

Some of the County Boards in the State have not complied with this requirement of the law, and the Executive Committee would suggest that where it has not been done, such Board comply with the law in this respect at an early date. The committee would further recommend that each County Board adopt suitable articles of

association and a constitution and by-laws for their direction and government. A form will be sent to any county desiring a guide in this respect.

The committee would earnestly urge that County Boards of Agriculture endeavor to increase their efficiency by adding to their membership, making it comprise farmers from the whole county, and by holding, at least, four meetings each year ; a suitable time being at the beginning of each quarter—spring, summer, fall and winter. These meetings should take up and discuss the practical questions of agriculture of greatest interest to the farmers of the county, and such other questions as are intimately related to the advancement and improvement of those engaged therein.

By order of the Executive Committee.

FRANKLIN DYE,

Secretary.

REPORT OF THE SECRETARY.

No one industry, during the past two years, has attracted the attention of the business world more than agriculture. The magnitude of its productions and the additions to our exports and to our internal commercial traffic therefrom have exceeded all previous records.

The increasing demand abroad for our agricultural products—and for some of them at an improved price—lifted the general business of the country from stagnation to activity, and from work at no profit to work at a fair remuneration.

All branches of our national industries have felt the life-giving impulse, proving that when agriculture is prosperous other business is correspondingly so, and when agriculture is depressed for any considerable time—as was the case for a number of years past—other business will feel the effect. The improvement noted has been felt by the farmers themselves, especially those of the West.

The wheat crop of 1897 in New Jersey was larger than ever before, and the price enough advanced to give the wheat-growers of this State for that year \$1,000,000 over the sum usually realized for that crop. For some years the market-gardeners and truckers had a hard fight with insect pests, which left little or no profit from their work. The year 1898, however, gave them, in portions of the State, much better returns; while the wheat crop has fallen off in yield per acre from last year, and the price has very materially declined.

There is no fixed, permanent ratio of yield per acre for the several crops, nor of the price for them. Every farmer takes his chances with others according to the particular branch he follows. Whatever the variations in yield or the fluctuations in price may have been, the farmers of the State, as a class, are encouraged and hopeful, believing that with the improving management of their business and the proper direction of the ship of state the business of agriculture will be permanently improved.

Our farmers, while deeply interested in what is possible to produce within New Jersey, are also cognizant of the fact that their prosperity is conditioned somewhat by what their fellow-farmers of other States are doing. For, tied together as we are by railroad lines, the products of any part of the Union find quick transportation to the best market in any other part, however remote. Hence, competition, both of quantity and quality, has to be regarded as a factor regu-

lating profits, even of those nearest the best markets, now as never before.

This being so, they take a deep interest in the further development of any remaining unoccupied lands of our Western and South-western slopes, whether by the opening up of new lands to settlement or by the irrigation of now arid lands.

They are emphatically opposed to the latter at Government expense, believing that if this should be done the farmers of the States not possessing arid lands would be thus taxed to bring into productivity a new and unlimited acreage in competition against themselves. If this is done they believe it should be done by the States individually.

Should this not be done, to any great extent in the near future, it is believed that, with the rapidly-decreasing acreage of new lands possible to open to new settlers and the increasing population of the whole country (and, indeed, of the world) there will be a steady increase in the proportion of demand to supply and a consequent strengthening of the valuations of farm products. This seems reasonable.

Pertinent to this subject is the quite-recent address of Sir William Crooks before the British Association. In it he shows conclusively that the United Kingdom is entirely dependent on other countries for her wheat supply. Of their present total consumption, 75 per cent. is imported. He shows further that the world's demand is increasing in a geometrical ratio. In 1871 the bread-eaters of the world numbered 371,000,000. At the present time they number 516,500,000.

“That high prices have not prevailed in recent years is due to the fact that since 1889 we have had seven world crops of wheat and six of rye, abundantly in excess of the average. But bread-eaters have almost eaten up the reserves of wheat. Practically speaking, reserves are now exhausted, and bread-eaters must be fed from current harvests, accumulation under present conditions being almost impossible.

“This is obvious from the fact that a harvest equal to that of 1894 (the greatest crop on record, both in the yield per acre and in the aggregate) would yield less than current needs.

“For the last thirty years the United States have been the dominant factor in the foreign supply of wheat, exporting no less than 145,000,000 bushels. The entire world's contribution to the food-bearing area has averaged but 4,000,000 acres yearly since 1869. It

is scarcely possible that such an average under existing conditions can be doubled for the coming twenty-five years.

“Almost yearly, since 1885, additions to the wheat-growing area have diminished, while the requirements of the increasing population of the States have advanced, so that the needed American supplies have been drawn from the acreage hitherto used for exportation. Practically there remains no uncultivated prairie land in the United States suitable for wheat-growing. It is almost certain that within a generation the ever-increasing population of the United States will consume all the wheat grown within its borders.

“But if the United States, which grow about one-fifth of the world’s wheat, and contribute one-third of all wheat exportations, are even now dropping out of the race and likely soon to enter the list of wheat-importing countries, what prospect is there that other wheat-growing countries will be able to fill the gap, and, by enlarging their acreage under wheat, replace the supply which the States have so long contributed to the world’s food?”

He then goes on to show the different countries which can be expected to supply the world’s future wheat needs and sums up this part of his address by saying: “Under present conditions of low acre yield, wheat cannot long retain its dominant position among the food-stuffs of the civilized world. The details of the impending catastrophe no one can predict, but its general direction is obvious enough. Should all the wheat-growing countries add to their area to the utmost capacity, on the most careful calculation the yield would give us only an addition of some 100,000,000 acres, supplying at the average world yield of 12.7 bushels to the acre, 1,270,000,000 bushels, just enough to supply the increase of population among bread-eaters till the year 1931.

“When provision shall have been made, if possible, to feed 230,000,000 units likely to be added to the bread-eating population by 1931—by the complete occupancy of the arable areas of the Temperate zone now partially occupied—where can be grown the additional 330,000,000 bushels of wheat required ten years later by a hungry world? What is to happen if the present rate of population is maintained, and if arable areas of sufficient extent cannot be adapted and made contributory to the subsistence of so great a host?”

Having thus written as to possibilities of production with present management, acreage and yield, he suggests the way to larger future

production by the use of nitrogen : "It is now recognized that all crops require what is called a 'dominant' manure. Some need nitrogen, some potash, others phosphates. Wheat pre-eminently demands nitrogen, fixed in the form of ammonia or nitric acid. All other necessary constituents exist in the soil, but nitrogen is mainly of atmospheric origin, and is rendered 'fixed' by a slow and precarious process which requires a combination of rare meteorological and geographical conditions to enable it to advance at a sufficiently rapid rate to become of commercial importance.

"Much has been said of late years, and many hopes raised by the discovery that leguminous plants bear on their roots nodosities abounding in bacteria endowed with the property of fixing atmospheric nitrogen ; and it is proposed that the nitrogen demanded by grain crops should be supplied to the soil by cropping it with clover and plowing in the plant when its nitrogen assimilation is complete. But it is questionable whether such a mode of procedure will lead to the lucrative stimulation of crops.

"It must be admitted that practice has long been ahead of science, and for ages farmers have valued and cultivated leguminous crops. The four-course rotation is turnips, barley, clover, wheat—a sequence popular more than two thousand years ago. On the continent, in certain localities, there has been some extension of microbe cultivation ; at home we have not reached even the experimental stage. Our present knowledge leads to the conclusion that the much more frequent growth of clover on the same land, even with successful microbe seeding and proper mineral supplies, would be attended with uncertainty and difficulties. The land soon becomes 'clover-sick' and barren."

He then refers to other sources of supply of fixed nitrogen, as the drainage of towns, in which there is an enormous annual loss. This loss in the United States must amount to untold millions of dollars annually. The other present source of supply is from the saltpeter mines of Chili. The growing exports of nitrate from Chili amount, at present, to 1,200,000 tons.

"The present acreage devoted to the word's growth of wheat is about 163,000,000 acres. At the average of 12.7 bushels per acre, this gives 2,070,000,000 bushels. But thirty years hence the demand will be 3,260,000,000 bushels, and there will be difficulty in finding the necessary acreage on which to grow the additional amount required. By increasing the present yield per acre from 12.7 to 20 bushels we should, with our present acreage, secure a crop of the

requisite amount. Now, from 12.7 to 20 bushels per acre is a moderate increase of productiveness, and there is no doubt that a dressing with nitrate of soda will give this increase, and more.

“The action of nitrate of soda in improving the yield of wheat has been studied practically by Sir John Lawes and Sir Henry Gilbert. A field was sown with wheat for thirteen consecutive years without manure, and yielded an average of 11.9 bushels to the acre. For the next thirteen years it was sown with wheat, and dressed with five hundredweight of nitrate of soda per acre, other mineral constituents also being present. The average yield for these years was 36.4 bushels per acre, an increase of 24.5 bushels. In other words, 22.86 pounds of nitrate of soda produce an increase of one bushel of wheat.

“At this rate, to increase the world’s crop of wheat by 7.3 bushels, about one and one-half hundredweight of nitrate of soda must annually be applied to each acre. The amount required to raise the world’s crop on 163,000,000 acres from the present supply of 2,070,000,000 bushels to the required 3,260,002,000 bushels will be 12,000,000 tons, in addition to the 1,250,000 tons already absorbed by the world.

“It is difficult to get trustworthy estimates of the amount of nitrate in the niter beds. Common rumor declares the supply to be inexhaustible, but cautious local authorities state that at the present rate of export the material will be exhausted in from twenty to thirty years. If we assume a liberal estimate of nitrate obtained from a lower-grade deposit, and say that it will equal in quantity that from the richer quality, the supply may last, possibly, fifty years, at the rate of a million tons a years ; but at the rate required to augment the world’s supply of wheat to the point demanded thirty years hence, it will not last more than four years.

“The situation may be summed up briefly thus : The world’s demand for wheat—the leading breadstuff—increases in a crescendo ratio year by year. Gradually, all the wheat-bearing land on the globe is appropriated to wheat-growing, until we are within measurable distance of using the last available acre. We must then rely on nitrogenous manures to increase the fertility of the land under wheat, so as to raise the yield from the world’s low average—12.7 bushels per acre—to a higher average.

“To do this efficiently and feed the bread-eaters for a few years will exhaust all the available store of nitrate of soda. For years past we have been spending fixed nitrogen at a culpably extravagant

rate, heedless of the fact that it is fixed with extreme slowness and difficulty, while its liberation in the free state takes place always with rapidity and sometimes with explosive violence.

“There is a gleam of light. In its free state nitrogen is one of the most abundant and pervading bodies on the face of the earth. Every square yard of the earth’s surface has nitrogen gas pressing down on it to the extent of about seven tons ; but this is in the free state, and wheat demands it fixed. For years past attempts have been made to effect the fixation, and some of the processes have met with partial success ; but no process has converted more than a small amount, and this at a cost largely in excess of the present market value of fixed nitrogen.

“The fixation of atmospheric nitrogen, therefore, is one of the great discoveries awaiting the ingenuity of chemists. Unless we can class it among certainties to come, the Caucasian race will cease to be foremost, and will be squeezed out of existence by races to whom wheat bread is not the staff of life.”

Another possible source he believes is in sight—the artificial production of nitrogen from the air by the combustion method. He concludes by saying : “The future can take care of itself. The artificial production of nitrate is clearly within view, and by its aid the land devoted to wheat can be brought up to the thirty-bushels-per-acre standard. In days to come, when demand may again overtake supply, we may safely leave our successors to grapple with the stupendous food problem.”

I have made quotations from this address for the purpose of directing the attention of our farmers who own wheat lands that the time seems to be drawing nearer when it will pay to grow wheat as a market crop, even here in the East. A few years back it was thought that our West would monopolize this business, but the world’s demands, increasing both by population and *per capita* consumption, will soon change this. Successful efforts are being made to increase the consumption of wheat in Asiatic countries. This new demand will soon consume the surplus wheat of the Pacific coast.

There can be no doubt about the future supply of wheat failing to meet the growing demands, unless acreage is increased or yield per acre made larger by improved methods of cultivation and crop-feeding. The acreage of wheat in New Jersey has been reduced in less than two decades 28,000 acres.

A combination of favoring conditions gave a yield per acre in 1897 for our whole State in excess of any former yield, viz., 20.7 bushels

per acre—a yield far in excess of the general average. But there were numerous instances of returns on up from 20 to 40 bushels per acre. Is it not worth while to put forth special efforts to increase the yield to 25 and 30 bushels per acre annually? (For statistics of crop yields, see tables preceding County Board reports.)

The cost of production is largely the same, whether the yield be large or small. But the ratio of profit is dependent upon the increase of yield after the cost of production is taken out. The aim, therefore, should be to increase the yield per acre in every possible rational way. One way to do this is to secure more perfect seed. This is the starting point with every crop, and too much inferior seed is used for greatest profit. Other faults are poorly-prepared seed bed and late sowing.

Still another, in view of the present system of farming, whereby the land for the winter months preceding the sowing of it to wheat is left bare of any growing crop, is lack of nitrogen, as suggested by Sir William Crookes and proven by the experiments of Lawes and Gilbert, already quoted.

I am satisfied that, even at present prices, this crop can be made a profitable one if all the essentials to the highest yield are put in operation. This result, I am equally sure, will follow close along with increasing demand, and the doleful prophecies of Mr. C. Wood Davis, a few years ago, that the world would soon be out of bread, will never be realized.

There is a great diversity of industries in New Jersey, and the farming population bears a fair proportion in numbers to those engaged in any other one calling, although, as against all others, the per cent. of those identified with agriculture is small. In a former report I stated that the number of voters connected with agriculture was, in my judgment, 100,000. I see no reason, at this time, to reduce that number.

The amount of capital invested in the various branches of agriculture and the annual earnings therefrom compare favorably with other leading industries. The number of farms approximates 40,000, embracing a capital for land, fences and buildings alone of \$160,000,000. In addition to this permanently-invested capital there is the additional amount required for stock and implements of over \$15,600,000. What the earnings on this investment are cannot be definitely stated, owing to the fact that no provision is made by law for securing statistics of farm crops.

Such a system could be inaugurated at a nominal expense, and if

the facts thus gathered were tabulated they would reveal to our own people and those seeking information as to the resources of the State, a clear idea of our varied productions and their annual value per acre, not possible to obtain through the yearly reports of the United States Department of Agriculture, owing to the fact that their investigations cover chiefly the cereal crops, potatoes, stock and the larger fruits ; market-garden interests, truck-farming, small fruit, greenhouse and florists' business, poultry and egg production, and dairy returns are not touched.

Careful estimates have been made as to the money-value return per acre of the different farm crops in the several States in a recent census. A comparison showed that New Jersey exceeded any other State by \$2.81 per acre. In the face of this fact, and that also of our proximity to the great markets and our exceptional railroad facilities, farms are lower in New Jersey, considering the advantages named and the improvements on them, than they are in any other State in the Union. This is a somewhat anomalous and inexplicable condition.

Men are pressing to the South and the West, far away, in many cases, from the social, educational and commercial advantages to be found within this State, and paying far more in proportion for land and home. It must be that those seeking homes and farms do not know of our advantages, and more than all, the low price at which the Jersey boys are willing to sell their birthright to the old farm-home.

Numerous letters come to me making inquiries as to the character of our lands, their productions, price, &c. To answer all such, as I try to do, in a satisfactory way, requires a good deal of writing but is cheerfully done, believing that it is good service to the State.

The little hand-book prepared by me for the Columbian Exposition has answered a good purpose as an advertising and descriptive help, but the edition is now exhausted. In my judgment it would be money well spent if this work could be revised and enlarged and published for free distribution, or at a cost price to intending worthy settlers.

FARMERS' INSTITUTES AND COUNTY BOARDS.

The work of the Board in connection with practical agriculture finds expression at its annual meeting in Trenton, once each year, and in the Farmers' Institutes and, to some extent, the County Boards of Agriculture. Of the former, about thirty were held in the different counties of the State during the fall and winter of 1897-98

and the same number has been arranged for during the winter of 1898-99.

By direction of the Executive Committee, these are arranged and conducted by the Secretary, but always in arranging for a meeting the local farmers' organization is conferred with and their co-operation utilized. Where such organizations are found, whether grange, board, club or fruit-growers' association, and co-operate, a much greater interest is awakened usually than where no such society exists.

The value of these meetings is determined by the attendance, by the personal testimony of numerous farmers and their wives to their worth and the improvement manifest in farming operations in any neighborhood where for several years they have been held.

The County Boards organized under the law, of which there are nineteen, hold their meetings more or less frequently throughout the year—usually at the beginning of each agricultural season. The Secretary of the State Board is frequently asked to address these or supply speakers for them.

They deal with practical questions of a local character of value to the farming community, and are worthy of a stronger support by farmers generally in the matter of attendance. These Boards have two Directors each in the State Board. If the farmers of a given county take the interest in these they should they can thus have representation in the State Board, and the Board assumes a representative character that is peculiar to the system in New Jersey.

FARM STOCK AND THE DAIRY.

The law constituting the Tuberculosis Commission makes the Secretary of the State Board a member of that body. A report of its work is presented under that head and I will not take it up in this report.

In my report of 1896, I foreshadowed the possible diminution in the number of dairy cows in the near future, suggesting the advisability of preparing for an advance in price and the importance of at once breeding and rearing more young stock. That condition has occurred, as all who have to purchase cows have realized.

Notwithstanding the advance in the price of cows, however, no advance has been made in the price of milk to the producer. In other commodities cost of production has an important bearing on the price of the article. Should not the price of milk be regulated in

the same way? Can it be done? We are told that to increase the profits we must decrease the cost of production. That is a rule that has a wide application, and should be in force always and in connection with all products. But there is a limit to even this, and there should be a fair margin between a reasonable cost of production and the market price without crowding the producer to the narrowest margin consistent with a mere subsistence.

I believe it would be a valuable movement, could arrangements be made, to hold in all of our cities producers' and consumers' institutes, for the purpose of setting forth before consumers of milk, butter, fruits and some other farm products the difference in composition, purity and food value that exists in different articles of the same general class.

This might lead up to a demand for milk with a guaranteed per cent. of butter fat and lead to selling on merit many products of merit now sold in bulk in the usual way and by which the purchaser, who would be willing to give more for a better or selected article, is debarred from doing so. The annual consumption of milk is large (the city of New York used last year 12,382,106 forty-quart cans at a valuation of \$17,458,759—much of this was produced in New Jersey), but not nearly so great as it should be considering its food value, and every effort should be made to extend and increase its use.

There have been some cases of swine disease reported, but no general outbreak. Much that is thought to be hog cholera is not that disease, but some disorder induced by unwholesome food. Cleanliness of pens, purity of food and drink are requisite to healthful swine, and, in fact, of any other farm stock.

As this whole matter was fully treated at the last annual meeting and the proceedings published in that report, I would refer any who desire further information on this subject to that report.

SANITATION.

Sanitation of country homes is a question to which attention is earnestly called. Although statistics conclusively show that were it not for the influx from the country into the cities of country-raised men and women, the cities would soon decline—morally, physically and in business stability—this fact does not prove that all country homes are as good as they should be in respect to location, sanitation, water-supply and environment.

While it may not be so easy to change location of farm homes, it

will not be so difficult to improve the surroundings. Filthy gutters and the deposit of slops and garbage near the dwelling should not be tolerated. The former should be kept clean and have such fall as not to become stagnant at any point ; the latter should be deposited in a compost heap, where it can be utilized from time to time as plant-food for garden or field crops. The family well should be examined frequently and cleaned out annually. Numerous instances could be given where families have been stricken down with malignant fever or other disease and where deaths have occurred from the use of impure water. Cellars, too, should be guarded. Decaying vegetables, dampness and mould will all have their effect on the atmosphere the members of the family, whose life is largely spent within the home, must breathe. Sunlight and pure air are very essential to health and cheerfulness, as we sometimes experience during protracted periods of wet, muggy weather, but many homes are kept dark and musty because of closed shutters and curtained windows.

DAIRY BARNs AND FARM BUILDINGS.

Even greater reform is needed in the construction and location of dairy barns so as to insure healthy animals and a healthful milk-supply. One point only seems to have been in mind in the construction of a majority of cow stables, and that is warmth, while utterly ignoring ventilation and light. There are some model dairy barns. It would be well if all who produce milk for market would study and pattern after such.

Then, too, the water-supply is in very many cases far from what it ought to be. Wells are too close to the manure yard ; in some instances within the yard and surrounded with manure. I have in mind a case where a closed well, one that had not been used for some months, was opened during a dry time to supply the stock, and, I believe, the family with water. In a short time the cows began to show signs of disease. The farmer himself became sick, the son and daughter, a young man and young woman, both of unusual promise, were also prostrated. The son died. What was the cause of all this? Not a visitation of Providence, but the poisoned well full of disease germs. It would pay farmers to have their water-supply chemically examined occasionally. Nothing is so precious as health and all that can be done to secure and keep it should be.

As intimated in the fore part of this report, truck and market-gar-

den farmers have, as a rule, had a better year financially than those engaged in the production of the old standard crops—the cereals and hay. I would suggest to the latter that they turn their attention to sheep husbandry. It is almost a lost art in this State, at this time, and yet we have tens of thousands of acres perfectly adapted to this business. What better use can be made of the rolling lands of the northern counties?

The annual crop of foul weeds which adorn so many fields, orchards and farms—a disgrace to any neighborhood—would soon be exterminated were sheep allowed access to them. And the hay crop, now so low in price, could be largely utilized at home at a far greater profit if turned into early lambs and mutton; and the increase in the manure product from this source, if wisely managed, would aid materially in soil improvement.

Dogs? Yes; but a good wire fence will exclude these, and a charge of shot will make them harmless. But on our cheaper lands it might pay to keep sheep in larger numbers with a shepherd or keeper in daily and nightly charge.

One great advantage peculiar to the farming business is that it permits a wide diversity of products, and the farmer who expects to make the most out of his business must vary his work to meet changing conditions. Whatever crop seems to promise best returns should be grown, and if the crops grown can be changed into another crop—the market crop—at home, as suggested by the keeping of sheep, why not do it?

Another year of work will soon be on us. Another opening spring will soon call the farmers and the fruit-growers to the field. Let the intervening months between this time and that be devoted to study of the future possibilities, and the maturing of such plans of work as will secure to each the largest return for work and money expended; and withal bring to our rural homes their portion of the good things of the field, with a full portion of those comforts that are found in all happy homes.

**ANNUAL ADDRESS BY D. D. DENISE, PRESIDENT OF
THE BOARD.**

Gentlemen of the State Board of Agriculture—It affords me pleasure to meet you again in annual convention, and especially is it a pleasure to meet gentlemen who have the courage to leave their homes and come here and discuss questions relating to the merits of agriculture.

The year just passed has been a fairly prosperous one. Seed time and harvest have come and gone. The garnered grain attests that Mother Earth has not forgotten her promised yield. The intelligent and industrious husbandman has not been without his reward. But while this is true, possibly, by a more persistent and intelligent effort on our part, even a greater yield might have been had; a few more bushels of grain and a few more blades of grass made to grow.

We have met here to advise together, to talk of new and old methods, to the end that we may lead New Jersey (the grand little State she is, though one of the oldest) to the front rank, as an agricultural and manufacturing State, where, by natural and acquired advantages, she properly belongs.

In magnifying agriculture, I, in no wise, seek to dwarf any other interest. In dignifying the State Board of Agriculture, I am not animated by any desire to lower, in public estimation, any other educational institution. But when I think of agriculture, of farm and field, of all their varied products, of the cattle and all kinds of stock, of what it does for commerce and transportation, for manufactures, for swelling all the grand aggregates of the wealth of my State and my country, I confess to emotions of national pride that are awakened by the contemplation of no other subject connected with the national interests, the wealth, prosperity and power of our country.

What do we hear, every year at certain seasons, when business is dull and languishing? This, "Business will revive when the crops begin to move." The moving of the crops does revive business. Business is dependent upon the crops; without the crops there would be no business. Think of the agricultural industry of this country bringing from foreign countries \$854,000,000 in one year.

The United States stands at the head of all nations of the world in the volume of its agricultural productions; her farmers are the most enterprising, progressive, intelligent and refined. Each year they are producing from their farms a vast aggregation of wealth that flows

through the arteries of trade. The vast wealth annually produced by the farmers furnishes the foundation on which rest the great commercial, manufacturing and transportation interests of the country.

Were it not for agriculture your cities would decay, your railroad trains would stand still, ships would rot in their docks, and the hush of death would hold universal sway. My fellow-farmer, did you ever stop to think what an important factor you are in the world ?

I believe that the man who holds the plow grasps a sceptre of power and empire such as no potentate ever wielded from Cyrus to Cæsar. Destroy the plow and you remand the world back to a wilderness. Do I overestimate the plow if I give it a superlative dignity and designate it as a chosen implement in the hand of God and man to work out the redemption of the world from the thralldom of ignorance ? For one, I believe there is more religion, more morality, more virtue on the farm than elsewhere in the world ; more happy homes in the country than the city. It was the farmers of our State that gave the death blow to the once ruling gambling element in our State.

HINDRANCES TO SUCCESS ON THE FARM.

That there exists to-day, among the farmers, a financial condition that is not in accord with the abundance of the harvest, cannot be denied. The solution of the problem of agricultural depression has been the hobby of politicians, the burden of the press, the voice and labor of thousands of agricultural reformers.

Those are not the hindrances, to my mind, and not what I would call your attention to. Those that exist on the farm and for which we are directly responsible are the hindrances that can be removed by business thought and painstaking care. The farmer of to-day meets with a condition of things which demand a change of operation from that which proved a sure road to success in days gone by.

We are living in an age of machinery, and a consequent reduction in the cost of production must, in a large measure, determine the profit of the work on the farm. If the use of a machine proves but a convenience and not a positive reduction of expenses, it is simply a luxury ; such is not generally the case. Improved machinery has been a blessing to the hard-working farmer. But the careless and needless exposure of machinery, after use, has been a tremendous drain upon the revenue of the farm.

A source of needless expense is the keeping of unprofitable live stock. The dairy interests of our State are very large, and the

farmer should demand that every animal return him a profit. The remedy for this condition of things must be in knowing, by actual test, what each member of the herd is doing, and a prompt disposal of all that are not up to a fixed standard.

In the list of hindrances we would not omit the failure and disappointment in the selection of a wrong rotation, the growing of crops not adapted to soil, the failure of not having something growing on the soil at all times, markets and locations, a disposition to spread out too much, attempting to grow about everything that will mature in our climate.

By growing special crops the cost of production is materially decreased, and creating a market for the same. Again, failing properly to prepare the seed-bed handicaps the crops and invites failure. Sufficient preparation, to many farmers, means nothing more than following a fixed rule as to the number of times they go over the ground, the condition of the seed-bed not taken into consideration.

I am sorry to say this is the case in too many localities. There should be no fixed rules, but put your soil in the best possible condition to receive the seed. There is nothing in the varied list of farm work that requires more careful study than that we may know how and when to cultivate.

I venture the assertion that there are few farmers who fully estimate the value of prompt stirring of the soil at the proper time. The common practice of extreme hilling is pernicious. Prof. I. P. Roberts is quoted as saying: "We do not half estimate the value of culture. There are vast stores of fertility in our soils, if we will only bring them out and render them available by thorough and persistent culture. Good agriculture means, first, culture, and second, careful conservation of farm manures, plus commercial fertilizers."

To the charge of failing to faithfully and carefully save all farm manures, I fear too many of us must plead guilty, though we have had it so often impressed upon us by Prof. E. B. Voorhees, the necessity of saving our manures. The manure yards of some of our best farmers are striking examples of the waste going on in this direction. It is, indeed, difficult to find many yards so constructed and protected that, after a heavy rain, there cannot be found flowing from it a black stream, laden with valuable plant-food. In the face of our boasted agricultural advancement, this thing ought not to be.

The indiscriminate pasturing of cattle, tramping our mowing

fields, is ruinous to the hay crop. The clover plant is recognized as the farmers' most economical and prolific source of nitrogen as well as an agent in bringing up fertility from the subsoil. Any practice that may retard or interfere with a luxuriant growth, should be abandoned at once. Some claim that pasturing new grass fields is best, because of the necessity of reducing the growth to avoid the injury caused by mice during the winter. By the timely use of the mower the condition of things can be changed.

In the daily routine of farm life, possibly the most prolific source of failures is a lack of thoroughness, too much disregard as to the value of little things, such as lack of accuracy in keeping accounts, that we may know the cost of a crop and what we are doing. Having done all, having sown, reaped and profited, let us have a care lest we have an avaricious spirit, an unhealthy love of gain. May we not so blind our vision that we fail to recognize the true measure of success.

FARMERS' INSTITUTES.

Since Farmers' Institutes have become so general and the demand for them so great, it becomes necessary to study all phases of institute work, and see in what line and by what means they may be made to do the greatest amount of good for the labor and money expended.

Farmers' Institutes are efforts in the line of keeping the farmer abreast of the times in all that relates to his business and the happiness and comfort of his family, as well as the public welfare. Extended through all the departments of our government, they act as stimulants to better productions and in competition in efforts to excel each other.

They tend to broaden and enlarge the scope of vision of the ordinary farmer. They are already beginning to bear good fruit. The evidences are plainly visible in many places in our State. More comfortable homes, with modern conveniences provided; better stock, by more intelligent methods of feeding and breeding; a better condition of the soil, made so by a more intelligent use of fertilizers and better methods of purchasing; better implements, operated more thoroughly and successfully; better care and culture of the various crops; better fruit and more of it; larger production of milk and better quality—in fact, higher qualities of all farm products.

Whatever aids in the development of the material resources of the State is clearly in the line of enhancing its prosperity. To the dili-

gent farmer, alert, careful, thoughtful, striving ever to do his best, these Farmers' Institute meetings bring only messages of helpfulness and cheer and words of commendation and inspiration. To his industrious and helpful wife, upon whose co-operation and joint labors, so unostentatiously performed, on which so many of the chances of financial success depend, what message do they bring?

If they shall serve to call attention to the heavy burdens, the long hours and the monotonous character of the work that usually falls to the lot of the female partner upon the farm, they will thereby be doing a most commendable work. When the husband shall come to look upon his wife as his equal partner in the enjoyment of what they have jointly earned, and equally entitled with him to share in the vacations from labor and the recreations of life, who shall estimate the aggregate of the wrongs that shall be righted and the good that shall be done?

I come now to a point of great importance, when I ask the question, "What message do our Farmers' Institute meetings bring to our country boys and girls?" They are fast approaching man's and woman's estate. The boys are considering the question of a life avocation. Shall they leave the farm and learn a trade or profession, or remain upon it and become farmers? The girls are considering, each for herself, whether or not she will accept the lot of a farmer's wife, if there is any way of escape from it.

Can we afford to lose from the farms the country-bred boys and girls? What words of encouragement can we truthfully offer them? What inducements present in order that we may determine their choice in favor of the farmer's occupation? If we once lose them we cannot replace them with material as good drawn from the towns and cities. I leave that question for you that have boys and girls to answer.

PURE FOOD.

The movement for meeting the evil of adulterated food is one of the utmost importance not only to you, but to all who reside in the cities and villages of the State—a movement, the importance of which cannot possibly be overestimated in its effect upon the physical welfare of all our people.

I am exceedingly pleased that we have nearly all branches of industry combined in an effort to have a national pure food law, a measure intended to remedy the evil, perhaps not all it ought to be, but certainly a long step in the right direction.

Every person has a right to know what he is eating and drinking ; but, in these days of adulteration, he is entirely ignorant. The motive which leads to adulteration is to cheapen the commodities so that the manufacturer can undersell his neighbor who manufactures honest goods.

We, as farmers, want the articles to come back to us just as pure as when they went from our farms, and we must have some legislation along this line that will do this ; and, in the name of honesty, honor and health, is it not time our State is doing something more than is already being done to protect honest trade?

Let me ask you what public question surpasses this one in importance to the people of our State? The fraud bears most heavily upon the poor working people, whose necessities compel them to buy cheap food and who are without the means of knowledge which would enable them to protect themselves to some extent.

It also bears heavily upon the farmer, for the adulteration of food products results in the cheapening of farm products, and to what extent our export trade has suffered from the discredit cast upon the food products of the farm no one can tell.

The investigation of food economy is also a matter of the utmost importance to us all. To teach a man how he can live better and for far less than he has been accustomed to expend, certainly is bringing to him and to his an unquestioned blessing, and this, I believe, must come through the scientific use of foods.

A VISIT TO OMAHA.

Out West, beyond the Mississippi, in the open country where men grew famous fighting Indians a generation ago, there is a modern civilization. An exposition was held in a bend of the Missouri river, just outside of Omaha. A few hundred acres of land were covered with gray architecture.

There was a lagoon half a mile long. In its waters perhaps half a score of festive white staff buildings were reflected. Near by were the State buildings, constructed in varying tastes from bad to good. And then, of course, there was the Midway with all its variety of attractions.

There was an Indian camping ground, whereon hundreds of Indians of every kindred, every tribe from Alaska to Florida, were quartered. There were the pens and long rows of stalls for the live

stock, which were well filled with stock, perhaps never excelled in this country.

The Trans-Mississippi Exhibition, not so large as the Chicago Exposition, "The World's Fair," and yet the Trans-Mississippi Exposition disclosed nearly perfect examples of staff architecture. Nothing at Chicago surpassed it as a picture. The ideals of the promoters of the Exposition were set high.

At night twenty thousand electric lights painted a scene from fairy land upon the waters of the lagoon. In the center of the festive scene, surrounded by the toys of modern science, the electric fountain, spouting its colored jets; the resistless motors, the labor-saving machines, all indicate the onward march of progress, which bears testimony to the fineness and beauty that lie in the everlasting perfection of its fitness for the conditions that have to be met.

One is really paying tribute to the brains, energy and character of the Western farmer, whose exhibit for taste displayed, far surpassed anything ever presented to the gaze of the American people in the line of agricultural products.

A new product and a new industry in the Northwest could be seen. The vast quantity of grass that has covered the marsh lands, to the present time, has gone to waste. Its practical usefulness has only recently been discovered.

Machines and processes, recently developed and perfected, have not only made a market for the farmers for this hitherto waste product, and incidentally given value to the lands producing it, but manufacture from it products of necessity to the grain-growers of the North, as well as the cotton-growers of the South, at a price about half that hitherto paid for like products manufactured from imported raw material.

The manufacturing of this grass into binding twine and other cordage, bagging for covering cotton bales, attractive and durable floor matting, rugs and carpet lining, seamless bags for potatoes and numerous other articles of necessity to the farm and home.

This new enterprise proposes to put their twine on the market at from one-third to one-half less money per yard, than is charged for the twine now in use. Statistics show that, in this country, 78,500 tons of binder twine are annually used, which will be a saving of many millions of dollars. In examining the grass from which the various products were made the thought came to my mind, it resembles our marsh grass in this State. Who knows but that it has value equal to the Western marsh grass?

A very interesting piece of work was a representation of how gold is mined in Colorado—how the metal is discovered, mined and separated from the ore. This showed the mine in actual operation from commencement to finish.

The attractiveness of the Exposition was greatly enhanced by the systematic arrangement of a series of Indian encampments representative, in point of costume, habitation and otherwise, of the leading tribes of red men that survive in the great West.

Stately chiefs stroll up and down, great, imposing-looking men. Most striking countenances are seen among them—faces like bronze masks. They wear blankets, feathers, beads, shells, large earrings, and some wear silver medals as large as stove lids. Each costume is a picture and a study.

The men are more picturesque than the women, but the women are worth looking at, too. They wear most wonderful moccasins, and are sometimes covered with beads and bracelets, brass rings and other valuables.

We look at this Indian gathering of thirty-five tribes as a spectacle, but who can tell what it may mean to the Indians themselves in the way of patching up old feuds, of which no man knows anything outside of their own tribes? But is history ever likely to be written from the Indians' standpoint?

The influence of the beauty of the Exposition is almost certain to exert municipal development, as respects public grounds and buildings, and the ornamental side of life, may well prove, in the long run, to have been the best service rendered to Omaha and other trans-Mississippi towns of the brilliant Exposition.

REPORT OF THE STATE ENTOMOLOGIST.

JOHN B. SMITH, SC.D.

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REPORT OF THE STATE ENTOMOLOGIST.

Legislation to restrict, or in some measure control, the spread of injurious insects has been favored by the New Jersey State Board of Agriculture for three years past, as appears by the resolutions spread upon its minutes.

An "Insect Bill" was presented to the Legislature of New Jersey by Hon. D. D. Denise, then a member of the Assembly, in 1896, but it failed of passage.

The demand for certificates of freedom from insect pests, to enable nursery stock to be shipped into adjoining States, enlisted the nurserymen in favor of legislation for their relief, and a new bill, with an addition providing for nursery inspection, was presented early in the session of 1898, and in due time came before committees, was amended, and finally passed.

When signed by the Governor it formed Chapter 104 of the Laws of 1898, and its full provisions may be found in the Session Laws as published.

Briefly stated, the bill is intended to provide a remedy for cases where the carelessness of some one man causes, or is likely to cause, injury to his neighbors. Complaint may be made of such a person to one of the three Commissioners appointed by your Executive Committee in each county. The Commissioners notify the party complained of to mend his ways, and if he declines or omits to do so, the State Entomologist is notified and assumes jurisdiction. Without going into details it is enough to say that refusal to comply with the directions of the Entomologist constitutes an offense punishable by a fine of \$25 and costs, on a conviction in any court having jurisdiction. The fine goes to the State for the payment of Commissioners, &c. The Commissioners, be it noted, draw no pay except where an action is begun against a delinquent, or where they do individual work under the direction of the Board, and the State Entomologist draws no pay under any circumstances. The latter result is obtained by designating the Entomologist of the Agricultural College Experiment Station as the State officer.

The sale of infested plants, trees, shrubs, fruits, &c., is also forbidden, and no such stock, except florists' plants grown under glass, can be legally shipped into New Jersey without bearing a certificate that it has been inspected and found apparently free from injurious insects.

Nurserymen have the right to call on the State Entomologist for an examination of their growing stock, and if it is found free from dangerously-injurious insects, may demand a certificate to that effect. A misuse of this certificate is punishable by a fine of \$100.

The Entomologist is given no summary powers, but only a right of entry to examine stock suspected or complained of, and it is well that this should be clearly understood, for he has been compelled to disappoint expectation on two or three occasions by not peremptorily ordering out or digging up trees infested by the San José scale.

Pursuant to the provisions of the act, the Executive Committee of the State Board of Agriculture appointed three Commissioners for each county, of which the following accepted office :

ATLANTIC COUNTY.

L. H. Parkhurst Hammonton.
 Charles Krause Egg Harbor City.
 Henry Pfeiffer.....Cologne.

BURLINGTON COUNTY.

Nelson P. Creely.....Burlington.
 John M. Lippincott.....Moorestown.
 Edmund Braddock.....Medford.

CAPE MAY COUNTY.

Fred. L. Schmidt.....Woodbine.
 Volney Van Gilder.....Ocean View.
 Dr. E. H. Phillips.....Cape May.

ESSEX COUNTY.

William H. GoldsmithLyons Farms.
 M. S. CraneCaldwell.
 F. C. Goble.....Verona.

HUNTERDON COUNTY.

A. B. Allen.....Flemington.
 John T. Cox.....Readington.
 William Dubon.....Quakertown.

MERCER COUNTY.

H. E. HalePrinceton.
 J. M. DalrympleHopewell.
 W. I. Norton.....Hightstown.

REPORT OF THE STATE ENTOMOLOGIST.

MONMOUTH COUNTY

L. F. S. Schenck Marlboro.
 J. H. Willey..... Keyport.

OCEAN COUNTY.

Charles M. Rorer..... Cassville
 H. R. Willis.. Toms River.
 W. H. Wood..... Lanoka.

SOMERSET COUNTY.

S. S. Voorhees..... Mine Brook.
 Arthur P Sutphen..... Somerville.
 William H. Skillman Rocky Hill.

UNION COUNTY.

F. E. Woodruff..... Cranford.
 Mr. Headley..... Union.
 E. P. Beebe..... Elizabeth.

PASSAIC COUNTY.

T. C. Keavitt..... Athenia.
 John T. Probert Paterson.
 Thomas Belden Little Falls.

BERGEN COUNTY.

Hon Abram C. Holdrum..... Westwood.
 H. W. Collingwood..... Hackensack.
 John H. Ackerman..... West Englewood.

CAMDEN COUNTY.

Daniel W. Horner..... Merchantville.
 Samuel Wood Haddonfield.
 Howard H. Bell..... Mount Ephraim.

CUMBERLAND COUNTY.

T. F. D Baker.. Bridgeton.
 Thomas E. Hunt Greenwich.

GLOUCESTER COUNTY.

J. G. Whitehall Woodbury.
 John Repp Glassboro
 Theo. Brown..... Swedesboro.

HUDSON COUNTY.

Patrick O'Mara Jersey City.
 Abram Duryee*..... Fairfield.
 Hon. Allan Benny Bayonne.

MIDDLESEX COUNTY.

D. C. Lewis Cranbury.
 W. T. Woerner..... Piscataway.
 Zenas Henderson*..... New Brunswick.

* Since deceased.

STATE BOARD OF AGRICULTURE.

MORRIS COUNTY.

E. S. Condit.....	Troy Hills.
Oscar Lindsley.....	Morristown.
D. A. Hopping.....	Hanover.

SALEM COUNTY.

M. D. Dickinson.....	Woodstown.
Woodnut Pettit.....	Salem.
Howard G. Cooper.....	Pedricktown.

SUSSEX COUNTY.

N. A. Stackhouse.....	Andover
David Warbasse.....	Huntsburg.
Samuel Miller.....	Deckertown.

WARREN COUNTY.

John T. Oberly.....	Broadway.
R. B. Yannatta.....	Roxburg.
Samuel Stewart.....	Hackettstown.

To each of these Commissioners was sent a copy of the law under which they were appointed, and a letter outlining in general the policy it was deemed wise to pursue.

The following is a copy of this letter :

May 31st, 1898.

DEAR SIR—Mr. Dye informs me that you have accepted the office of Commissioner under the Insect bill in your county, and that he has sent you a copy of the law under which the appointment was made. I think it important that it should be realized that the law was intended primarily to protect and benefit the farmer and fruit-grower and not to annoy or interfere with any person who has a reasonable regard for the rights of others. The compulsory powers given by the act should never be used unless it is absolutely unavoidable. It is to be assumed that most men are reasonable and will respond to good-natured suggestions, at least as readily as to threats. Great care should be taken not to entertain complaints made through spite or personal enmity. Whenever representations are made the first thing is to ascertain whether there is any basis for them, and if so, it will be best in most cases to bring the matter at once to the attention of the State Entomologist. The object is not to prevent the careless individual from injuring himself, but to prevent him from causing damage to his neighbor, and this should be constantly kept in mind. The ordinary duties of the Commissioners under the act will be best performed by sending the complaints as early as possible to the Entomologist.

A more important feature is the power given in that section of the act which requires certificates on all parcels of plan's introduced into New Jersey. All railroad and express companies doing business in this State have been notified of the requirements of the law, and there is no excuse for the receipt of any stock from outside points without the required certificate attached. Inclosed herewith is also a circular which explains the character of the certificate required and the qualifications of the officer signing it. The signer must be an official and must sign in his official capacity. New Jersey has suffered seriously from introduced insects, and this provision is to check the continued entrance of injurious species. You should

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notify the freight and express agents in your vicinity of the importance of this certificate and of your power to detain stock received without it. Should you find any parcel of uncertified stock at a railroad or express office please notify the agent that he must retain it in his possession until released by the State Entomologist. Please also notify me by first mail of the location of the shipment and to whom it is addressed, that I may arrange for a prompt examination if I consider it necessary. The aim is to make this act positively beneficial to the agricultural interests of the State and yet to execute it so reasonably that there will be no excuse for finding fault.

Yours, &c.,
(Signed) JOHN B. SMITH,
State Entomologist.

All the nurserymen who had in previous years corresponded with the office were notified of the passage of the act, inclosing a printed copy of the law and a circular showing the character of the certificates that were required.

The following are copies of the letter and circular :

D. D. DENISE, President. WM. R. LIPPINCOTT, Treasurer.
E. B. VOORHEES, Vice President. FRANKLIN DYE, Secretary.

STATE OF NEW JERSEY.
STATE BOARD OF AGRICULTURE.
OFFICE OF THE STATE ENTOMOLOGIST.
JOHN B. SMITH, SC.D.

EXECUTIVE COMMITTEE,
JOS. B. WARD, WALTER HERITAGE,
H. F. BODINE.
Also the President, Vice President,
Secretary and Treasurer.

NEW BRUNSWICK,.....189

DEAR SIR—Inclosed is a copy of the "Insect Bill" passed at the 1898 session of the New Jersey Legislature. Your attention is especially called to Sections 9 and 10. In order to avoid trouble and the possible detention of stock, please advise your correspondents, or those growing stock for you outside the State, to secure the necessary certificate which will admit the material into this State. No certificates are required for shipment within the State, but purchasers will be advised to use care in securing stock from nurseries which have not been examined. No nurseryman is compelled to take out a certificate. A certificate is for his convenience only—for his information and to enable him to ship into States where the laws require a certificate. The New Jersey law makes it the right of a nurseryman to ask to have his nursery inspected, and the inspection will be made in all cases as soon after the request is made as it is possible to arrange matters. No fee will be charged for an inspection provided for in this act, and this inspection will be limited to the stock growing upon the nursery examined. The expenses of the examination, if made by the Entomologist, mean traveling and hotel expenses only. In case the examination is made by a deputy the expenses will include three dollars (\$3) per day for compensation.

Purchased stock is not included under the general certificate given to the nursery, and it is a misuse of the certificate to attach it to stock not actually grown by the nurseryman, unless it is accompanied by the following declaration :

I hereby certify that the plants contained in this parcel are a portion of those inspected and covered by the above certificate, or are such as were obtained by me under certificate that they had been properly inspected where they were grown.

Signed by the nurseryman.

This declaration by the nurseryman is to put the purchaser upon his guard, and to prevent him from relying upon a certificate which does not cover the stock actually seen, although sent from an inspected nursery. It is realized that no nurseryman doing a business of any extent grows all his own stock, and it is intended to make the matter just as little burdensome as possible to him.

Inspection will be made of stock that has been purchased and is heeled in, if desired, and a certificate will be given ; but as this inspection is simply to qualify the stock and is strictly for the benefit of the nurseryman only, it will be charged for at the rate of \$10 for each examination made. The certificate given in such a case will apply not to the nursery at large, but to the purchased and heeled-in stock. A special examination of individual shipments will also be made if desired, for a fee of \$10 and expenses, and the certificate given in such cases will apply only to the special stock examined. By making proper arrangements with correspondents, all necessity for such examinations as require a fee will be obviated.

Yours, &c.,

.....
State Entomologist.

CIRCULAR SHOWING CHARACTER OF CERTIFICATES REQUIRED.

To make plants admissible into New Jersey, the certificates attached should state essentially as follows :

This is to certify that I have this day of 189 , examined the nursery stock grown on the Nurseries, Proprietor, at (State), and that I have found the same apparently free from San José scale or other dangerously-injurious insects liable to be transferred from the nursery to the orchard.

Signed by a properly-appointed official

A properly-appointed official is the Entomologist of an Experiment Station, a State Entomologist, or a person appointed by the Department of Agriculture of any State.

Each certificate must be accompanied by a declaration written or printed at the foot of the formal certificate above described, to the following effect :

I hereby certify that the plants contained in this parcel are a portion of those inspected and covered by the above certificate, or are such as were obtained by me under certificate that they had been properly inspected where they were grown.

Signed by the nurseryman.

Special certificates, testifying to the freedom of the contents of a specific parcel, bale, box or carload, are admissible, provided they state the essential facts of the general certificate. So, also, a certificate may state that purchased or trenched-in-

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stock, grown elsewhere for the nursery sending it out, has been received under proper certificate at the nursery shipping it, and that the examining officer has found the stock apparently clear and the certificate regular.

Stock found at any station or in any express office without a certificate must, under the law, be held until it is examined by the State Entomologist, without regard to the fact whether or not it is actually infested. If found by him, on examination, to be infested in any way, it may be re-shipped at the expense of the carrier, or destroyed, in his discretion. This discretion will generally be exercised by attempting to re-ship the stock to the shipper under the provisions of the law. If for any reason that proves impossible, the stock will be destroyed.

To enlist the common carriers in the execution of the law the following letter, inclosing a copy of the act, was sent to the general manager or freight manager of every express and railroad company doing business in New Jersey :

May 12th, 1898.

DEAR SIR—Inclosed herewith is a copy of Chapter 104 of the Laws of 1898, entitled "An act to prevent the introduction into and the spread of injurious insects in New Jersey," &c. Your attention is called to Section 10 of this act, which prohibits the importation into or delivery in New Jersey of nursery stock and plants not accompanied by a certificate that the same have been inspected and found free from injurious insects. Inclosed herewith is also a form of a certificate which, in its essentials, must be complied with. The wording is not imperative, but the facts mentioned in the certificate must be stated. The certificate must also contain a declaration by the nurseryman that the plants contained in the parcel, bale or package are part of those covered by the certificate or were received under certificate. You will note that florists' plants are exempt from the provisions of the act, and no certificate is required where the tag plainly states that the contents are florists' plants grown under glass. Cut flowers are not included in the prohibition contained in the act. There is no disposition to interfere more than is absolutely necessary with the free transportation of nursery stock, and it is hoped that agents of your company will be notified to accept stock addressed to points in this State from shippers or connecting lines or companies only when accompanied by certificates which comply with the requirements of the New Jersey law. No certificates are required from New Jersey nurseries shipping to other points in this State.

Yours, &c.,

(Signed) JOHN B. SMITH,
State Entomologist.

Almost all the letters were acknowledged, and in three cases copies of the circular of instructions sent to their freight agents, were also sent to me, showing a satisfactory intention to comply with the requirements of the bill.

As the execution of the law was practically placed under direction of the State Board of Agriculture, an outline of the work it was intended to accomplish was submitted to the Executive Committee, and the following scheme met with their approval :

OUTLINE OF WORK TO BE DONE BY THE STATE ENTOMOLOGIST.

First. Have printed one thousand copies of the law.

Second. Prepare a circular letter to be addressed to the chief freight agents of all railroads doing business in New Jersey, notifying them of the requirements of the law and of the character of the certificates that must be attached to nursery stock introduced into the State.

Third. A similar letter to the managing agents of all express companies doing business in the State of New Jersey.

Fourth. Notification, with copy of the law, to the Entomologists of all the States, informing them of the requirements of the certificates that will be recognized in this State.

Fifth. A circular to the nurserymen inclosing a copy of the law stating the scope of the certificates that will be given and the character of the examination that will be made, supplying them with a formula which they can use when a parcel shipped by them contains stock that has been received under certificate but was not grown by them.

Sixth. Formulate a certificate which will contain a statement of its limitations and the conditions under which it can be used. This certificate should be printed and bound so as to be torn from a book, leaving a stub which will contain the essentials of the certificate.

Seventh. There should be a meeting of the Executive Committee of the State Board of Agriculture in which the Commissioners should be appointed as provided in the act, and these Commissioners should each receive a copy of the law, with a circular letter of instructions.

Eighth. The most important work to be done under this office is to attempt to ascertain the exact limitations of the San José scale, and, if possible, to visit every infested orchard in order to give personal directions to every orchardist.

Ninth. All possible efforts should be made to avoid using the compulsory powers given to the Commissioners or to the Entomologist.

Tenth. Prepare a series of leaflets, not more than four pages in any case, giving concise directions for the treatment of all the common farm and shade-tree pests. These can be used to answer letters and to notify persons against whom proceedings are to be taken under the law. They could form a series of circulars of the Experiment Station if desired.

Five hundred dollars was appropriated by the Legislature in the deficiency bill for 1898, and this sum was available to carry out the

scheme until the beginning of the regular fiscal year, November 1st. An assistant at \$30 per month was employed for two months during the summer, to aid in the necessary mechanical and other work of the busiest season ; but all the clerical aid was given by the Experiment Station.

Twenty circulars were prepared and printed, giving concise descriptions of insecticides and their method of preparation, with directions as to their use and range of usefulness, and also suggestions as to the treatment of some fifteen of the more common injurious insects. These circulars are to be used in replying to letters asking information, to inform the Commissioners, and to accompany formal notices to delinquents under the act.

The following is a list of the circulars and their titles :

- No. 1. Directions for Treating the Tulip Soft Scale.
- No. 2. Arsenical Poisons, and How to Use them.
- No. 3. Kerosene as an Insecticide.
- No. 4. The Cottony Maple Scale.
- No. 5. Whale-oil Soap and its Uses.
- No. 6. How to Treat the San José Scale.
- No. 7. The Elm Leaf Beetle.
- No. 8. The Bag Worm or Drop Worm.
- No. 9. The Vaporier Moth.
- No. 10. Cabbage Worms.
- No. 11. Cut Worms.
- No. 12. The Codling Moth.
- No. 13. Arsenate of Lead.
- No. 14. The Apple Borer.
- No. 15. Lime as an Insecticide.
- No. 16. Tobacco as an Insecticide.
- No. 17. The Plum Curculio.
- No. 18. Asparagus Beetles.
- No. 19. The Scurfy Scale.
- No. 20. The Oyster-shell Bark Louse.

It is a matter of congratulation that, while a number of complaints were made to or through Commissioners concerning the occurrence of serious insect pests, it has not been necessary to resort to coercive measures in even a single instance. In all cases it has been sufficient to point out to the party complained of the exact position of the case, and the advantage that he himself would derive. On the the other hand, not a single baseless charge has been

made. In every instance the complainant had made sure of his facts before he presented his case, and in two instances I was called in merely to decide the best measures to adopt.

It is an open secret that practically all the legislation against insect pests enacted during recent years in several States, however general in terms, has been directed against the San José or pernicious scale, and among the most important duties devolving upon the Entomologist was fixing the exact distribution of this pest within the State and preventing its further spread either from centers already established or on stock coming from other States.

The latter task has proved on the whole the most difficult, and to explain this it is necessary to touch for a few moments upon nursery methods and certificates.

When the farmer decides upon setting out an orchard he must in the majority of cases purchase his trees. If there is a nursery near by he may buy from that; but he is just as apt to send for a catalogue or a number of catalogues from firms advertising in his paper or of whom he learns in other ways, or he may patronize the first tree agent that calls on him.

In the majority of cases a nurseryman's catalogue contains almost all the varieties of all the ordinary orchard fruits, so that a single order only need be made. But the stock listed in such a catalogue is rarely, if ever, all grown by the nurseryman who sends it out; indeed, there are firms that list almost every known variety of shrub or tree and grow not a slip of it themselves. Though called nurserymen they are really dealers in nursery stock, and almost all real nurserymen are also dealers to a greater or less extent. Peach stock can be grown better and more cheaply in New Jersey than in most other States; hence it sends out close to 5,000,000 such trees annually, which are directly or indirectly sold to farmers all over the United States—not always as grown in New Jersey either. On the other hand, we cannot grow apple stock as cheaply and good as it can be grown in New York; hence a large proportion of the trees sold in New Jersey are really grown in another State. The method has its advantages and, on the whole, the farmer obtains under it better and cheaper trees; but it adds wonderfully to the danger of distributing insect pests, since there is nothing to indicate whether a lot of 1,000 orchard trees of mixed sorts or varieties was grown in one or a dozen different States.

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CERTIFICATES.

A certificate as nowadays understood in the nursery trade is a declaration on the part of an officer, usually an entomologist, that the stock growing on a described nursery has been examined and found apparently free from injurious insects. Usually the San José scale is especially mentioned, and sometimes peach yellows, or other plant diseases are also specified.

Now, if any inspection could really be so thorough that a really positive statement could be made, the method would be most valuable ; but imagine an effort to examine a lot of 750,000 peach trees, which one firm in this State offers for sale this year, so as to be able to say positively that no scales are present ! The thing is an impossibility, of course, and the history of the nursery, its location and surroundings and the source of the buds, must be mainly relied on, supplemented by crossing the plots to look for indications. I have thus far missed spotting an infested block only once in three years, so far as I have been able to ascertain ; but it may happen at any time when the infestation was introduced on recent buds and is very slight.

If no scale or other pest is found, the nurseryman gets a certificate to that effect, and prints it in his catalogue and on his tags. He buys a lot of plum stock from the South, a lot of apple and pear stock from the North, some cherries in the East or West, and whatever he thinks he needs for his fall or spring trade, and he sends it all out again under one certificate. He probably insists on certificates for all that he buys ; but I found this year three blocks of apples, two of plums and one of pears—left-over nursery stock—all received under certificate, and all more or less scaly ! Part of this stock was sold by the nurserymen in New Jersey or elsewhere, and shipped with my certificate and the nurseryman's declaration that all the stock was certificated here or elsewhere ! I found at least half a dozen places this year where stock purchased in other States was really infested when received, though bearing certificates.

These cases are difficult to discover, because there is no reason for suspicion, and I do most strongly urge that neither nurserymen nor fruit-growers rely too strongly on a certificate. Every lot of stock received should be most carefully examined and if anything suspicious is discovered, a sample should be sent to the Entomologist. It will cost nothing !

I have during the fall of 1898, inspected nurseries and have given general or special certificates to the following :

No. 1. F. & F. Nurseries, Springfield, Union county, Flemer & Felmly, proprietors.

No. 2. Union County Nurseries, Elizabeth, Union county, Hiram T. Jones, proprietor.

No. 3. Manalapan Nurseries, Manalapan, Monmouth county, David Baird & Son, proprietors.

No. 4. Robbinsville Nurseries, Newtown, Mercer county, C. A. Bennett, proprietor.

No. 5. Charles Black Nurseries, Hightstown, Mercer county, Charles Black, proprietor.

No. 6. West Jersey Nurseries, Bridgeton, Cumberland county, Stanton B. Cole, proprietor.

No. 7. Village Nurseries, Hightstown, Mercer county, Jos. H. Black, Son & Co., proprietors.

No. 8. Elizabeth Nursery, Elizabeth, Union county, Elizabeth Nursery Co., proprietors. Small fruits, shade and ornamentals only.

No. 9. Bay View Nursery, Atlantic Highlands, Monmouth county, James McColgan & Co., proprietors.

No. 10. Peach Nursery, Jamesburg, Middlesex county, George A. Shultz, proprietor. Peach trees only grown.

No. 11. Henderson trial grounds, Jersey City Heights, Hudson county, Peter Henderson & Co., proprietors.

No. 12. Ribsam Nurseries, Trenton, Mercer county, C. Ribsam & Son, proprietors.

No. 13. Locust Grove Nurseries, Millstone, Somerset county, S. T. Pullen & Son, proprietors.

No. 14. Dreer's Nurseries, Riverton, Burlington county, Henry A. Dreer, Inc., proprietors.

No. 15. Valley View Nurseries, Washington, Warren county, L. W. Gardner, proprietor.

No. 16. Collins Nurseries, Moorestown, Burlington county, Arthur J. Collins, proprietor. Blackberries and raspberries only.

Special certificates covering purchased stock were given to :

Collins Nurseries, Moorestown, Burlington county, Arthur J. Collins, proprietor.

Small fruit and plant farm, Moorestown, Burlington county, Samuel C. De Cou, proprietor.

Special certificates cover either purchased stock, stock of specified

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kinds, or special shipments, and indicate nothing as to the general condition of the nursery examined.

Certificates were entirely refused in four cases only, but in four other cases blocks of left-over stock were destroyed as a condition precedent to granting them, and altogether several hundred trees of various kinds were taken out and burnt. A currant block of 10,000 plants, out one year, was also destroyed, because scale was discovered among them. Altogether I am gratified to be able to say that most of the nurseries in our State doing an export trade are in excellent condition.

Laws requiring certificates to admit stock now exist in five States other than New Jersey, to wit, Iowa, Kentucky, Maryland, Michigan and North Carolina, while inspection laws exist in fifteen States, some of them giving very wide and summary powers to the Entomologist.

All the certificate acts vary in their requirements, but in a general way require a statement of freedom from the San José scale and other injurious insects and from certain plant diseases as well. Some contain local restrictions, and one at least requires a bond and license fee from all nurserymen doing business in the State.

Canada has entirely excluded American nursery stock, and Germany, Holland and Belgium have made regulations concerning the import of fruits as well. France has given notice in the same direction, and altogether there is a very absurd and unnecessary foreign scare which becomes actually childish when dried fruits are objected to, because these are absolutely incapable of supporting live scale.

It is a matter of regret that apparent justification for all this has been given by the somewhat hysterical reports and publications concerning this insect, made by American societies, and even Station officials, a year or two ago.

On the subject of remedial measures and insecticides I have nothing to say here ; that feature of the matter is treated in my report to the Experiment Station.

The matter of imported enemies for the pernicious scale yet holds its place in the minds of many fruit-growers, and while the question may be considered settled as against the Californian or Australian species, owing to climatic conditions, the question of Japanese species becomes more promising.

It seems now fairly well settled that Japan is one of the natural homes of the pernicious scale, and it is equally certain that it is by

no means a common or injurious species there. This opens a fair prospect for a study of the natural checks of the species in Japan, and their possible introduction into the United States. The matter would be somewhat expensive, perhaps, and success could not be guaranteed, but the outlook would be vastly more promising than it was for the experiment already made. We know that Japan has a considerable number of scale-eating Coccinellids, and by a systematic arrangement it should be possible to get them alive into the United States. In fact, I did get one such sending this past summer.

A systematic effort was made to ascertain the exact distribution of the scale in our State, so as to relieve it in large part at least of the bad reputation imposed upon it in this matter, and most of the counties were visited in that behalf. The work is by no means completed, but I am so confident that the main points have been discovered that I have prepared a map showing the distribution so far ascertained and present it as a part of this report.

For convenience of record, the counties are arranged alphabetically.

Atlantic.—There are a few trees at Hammonton which became infested from plum trees received from Alabama some five years ago. The original trees were still in existence last summer, but were to be destroyed. There has been some spread in the town itself, and it has been found on a few young apples, but thus far none has been found in any orchard round about.

At Egg Harbor City one point of infestation has existed for several years. No radical treatments have been adopted, but the scale has been kept in check by winter spraying with whale-oil soap on such trees as showed any number of scales during the summer. The orchard is somewhat isolated, but even within it there has been very little spread and absolutely no injury. It is probable that other points exist in the immediate vicinity.

A few miles southeast of Egg Harbor, at Cologne, Germania and Pomerania, there are quite a number of infested orchards. At least eight are known to me, and there are sure to be several more. A number of peach trees have been killed off and some few other trees are in bad shape, but on the whole the growers are getting the better of the insect. Some of them profess to find no difficulty in keeping it in check, but find extermination apparently beyond them.

The scale here is inclosed in a five-mile square so far as my records show, but in some stretches almost every orchard has some infestation. Systematic work is now being done, largely under the direction

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of Commissioner Pfeiffer, who is also making a careful canvass of his locality to determine the exact distribution of the insect.

There are said to be some infested trees at or near Mays Landing which were treated by whale-oil soap and cleaned out; but this locality has not yet been satisfactorily examined.

Bergen.—So far as I am aware, scale in this county is confined to gardens in the towns of Rutherford and Hackensack. It is more than likely that some similar cases occur in other towns; but thus far I have seen nothing of them, nor have I had any records from fruit-growers or orchards.

Burlington.—It is in this county that the scale has secured the greatest foothold, because at least two and possibly three nurseries within its limits have aided in distributing it for several years; and because three, if not more, of the largest orchards have been unfortunate enough to get infested stock from other States—chiefly New York.

First of all, almost all the orchards along the Delaware river, from a little below Bordentown to Burlington, have more or less of the scale. It is worst from Florence to East Burlington, a distance of about six miles, but at least ten miles of the river front is more or less infested.

South of Burlington, infested orchards are found in each direction, east nearly to Camden, west to a little beyond Mount Holly. In a general way, it may be said that the territory between the railroad lines from Burlington to Mount Holly, to Medford, to Haddonfield, to Camden, and along the Delaware river back to Burlington, is infested. This territory covers over one hundred square miles of the best orchard section in New Jersey, and, while by no means all or even half of the orchards are affected, there is certainly a very large percentage in which some scale may be found. This tract includes the Parry nurseries, into which the scale was originally introduced from California, and it is here also that the insect has escaped from control and is in wild land and along roadsides.

From Burlington toward Camden, along the Delaware river, is an almost unbroken succession of towns and villages, and in these, in the gardens and back yards, the scale is universally distributed. Many of the scaly trees originally set out are dead; others will die very soon if their disgusted owners do not take them out before; but the pernicious scale will survive on the roses, hedges and ornamentals that are everywhere planted.

Outside of this territory, I have a record from Columbus only,

and here but a single tree seemed to be infested. It was a fancy plum tree, but was taken up and burnt to avoid further trouble.

While the scale thus covers a large territory, and has in some cases caused decided injury, nevertheless by far the greatest portion of the county seems to be yet entirely free.

It is here that most of my observations have been made, and here that insecticide work is now most generally carried on.

It is also worthy of note that in this very territory, setting out new orchards is general, which indicates better than anything else the horticulturists' belief in the possibility of controlling the insect satisfactorily.

Camden.—The notes of scale in this county are from Magnolia, Haddonfield and Merchantville. There was an infested Seckel pear on Cramer Hill, which was taken out when the scale was discovered, and there may be other trees in the outskirts of Camden itself.

At each of the other localities more than one point of infestation exists, but only one of them is at all extensive. Even here the insect is under control, and only a few acres of territory in the entire county contain scaly trees so far as I have any knowledge.

Cape May.—One locality only is known to me, near Tuckahoe, and of this I learnt recently that it has been entirely cleaned by the use of kerosene.

Cumberland.—In this county scale has come from Shiloh, Bridgeton and Vineland. At Shiloh it is definitely located on pear at one point only, and there treated ; but it is not certain that there are not a few other infested trees in that vicinity.

Bridgeton is noted only because some trees purchased from an agent and dealer there proved to have some specimens in another county ; but I could not find any evidence of scale in the town itself nor in the vicinity.

At Vineland there are a few scaly trees in the city gardens, but how many I cannot tell. So far as I know of them, all have been taken out or treated, and their owners instructed as to the danger to be apprehended. In the country surrounding, I located three infested points. In one case a few infested apple trees have been thoroughly kerosened, and show no present indications of live scale. In another a single tree had apparently been infested, had died and been removed, leaving a scattering on the surrounding trees which will be thoroughly treated this winter. The third case is in a way the most serious, since the scale occurs in a portion of a lot of some 2,000 trees one year out. But all these trees are yet small, the

infestation is very slight and it will be easy to clean out the whole lot this winter.

The examination at Vineland covered all parts of the tract, but by no means all the farms on it. The local grange took up the subject, and those members who were in the least suspicious joined in asking an inspection, which was duly made under the guidance of one of them. The route to be taken was published in the local paper, and at almost every orchard several persons had assembled to witness the inspection and to ask questions.

This, it seems to me, is an indication of what similar bodies in other sections could do in behalf of their members.

Essex.—At Montclair and its vicinity a number of gardens and part of one orchard just at the edge of the town are infested to some extent. The orchard trees are quite old, but the infestation is comparatively slight. Some of the garden trees are already severely injured, and a few have died. It also infests roses in these gardens as well as fruit trees, and extermination here will prove as unsatisfactory a task as elsewhere in similar situations. There is a probability that at Orange and in the series of little towns containing so many handsome gardens surrounding it, this pest will be found on many isolated trees, and that it will get into shrubs and hedges as generally as it has done in Burlington county.

Gloucester.—The only definite locality in this county is about Glassboro, and several orchards are infested to some extent. It is believed that the insect is here practically under control, and as trucking is a much more important industry in this county than fruit-growing, there is not much chance of its serious spread.

Hudson.—A large number of gardens on Jersey City Heights, and extending into Hoboken, have scale-infested trees, and quite a number of these have died. Others are so bad that they will die, and in all probability the same general infestation will result here, if, indeed, it has not already resulted, that we find in the Delaware river towns. So far as I know, there is not an orchard in the county, and the natural topographical conditions will prevent much spread, except possibly to the north.

Hunterdon county has not a single case of scale so far as I am aware, and this is one of our best peach-growing sections.

Mercer.—I believe that at the present time this county is almost free from scale. Near Trenton I found a lot of overgrown nursery stock to be somewhat infested, and this was taken out and destroyed as soon as the insects were discovered. Near Hightstown a few

Southern plum trees were found infested, and these also were uprooted and destroyed. There is now only one point at a little distance from Hightstown where I know of any scale, and here scattering examples were seen on a young orchard. As soon as this infestation can be definitely limited radical measures for its extermination will be adopted.

Middlesex.—Three scale points exist in this county. One of them is in my own garden and forms the experiment orchard, where the insect is under control and where it can be exterminated at any time by simply taking out the trees. The second is also near New Brunswick on some young trees, which will be treated during the winter or destroyed. The third is near Prospect Plains, and two small orchards are rather seriously affected.

As there seemed to be a good chance of a more general distribution, Mr. D. C. Lewis, one of the Commissioners for the county, was requested to and did make a careful inspection of the orchards in this general district, extending to Jamesburg and including Monroe, South Monroe, Half Acre, Cranbury and parts of North and South Brunswick townships.

Mr. Lewis reports that nothing in the least suspicious was found except in the two orchards where its existence was already known.

Monmouth.—This stands with Burlington and Atlantic counties, and is second in the number of infested points. The Lovett nurseries, at Little Silver, distributed scaly trees from Long Branch to Keyport, along the coast, and at several points near Freehold. At the latter place most of the infestation is in gardens, only two large orchards being affected, and these not badly.

The situation along the shore is more serious. In gardens near Long Branch and Red Bank there are quite a number of scaly trees, and the insect has gotten into large, old apple trees, from which it can scarcely be dislodged. In quite a number of cases peach and plum trees were so seriously infested that they died or were taken out. Others were severely cut back for radical treatment, but the situation is not yet entirely satisfactory.

Morris.—Samples of scale have been received from Morristown and Dover—once from the latter, several times from the former locality. In each instance garden trees only were involved, and in all cases the owners promised to either take out or treat the trees; some of the promises were kept, I know. No reports have come from orchards thus far, but I would not be much surprised if more come from the towns.

Ocean.—I do not have at present any known case of pernicious scale in this county.

Passaic.—The only points known to me where scaly trees exist are at Passaic and Paterson in gardens. From the latter city I have received several samples and the situation probably resembles that in the other infested town sites.

Salem.—Near the town of Salem itself a few fruit trees are infested by the pernicious scale in one orchard only. The trees are small, of little value, and the owner promised to take them out altogether.

Like Gloucester, this is largely a trucking county, but with a considerable sprinkling of fruit. The farmers are an intelligent body as a whole, and I can scarcely believe that the scale could be present to any extent without my having heard of it.

Somerset.—Two orchards near Bedminster, belonging to one owner and both leased to farmers, were reported through one of the Commissioners. One of these was a peach orchard in very bad condition generally and this was taken out. The other was a lot of young trees that had done practically nothing since they were set out. The worst infested of these were taken out at once and a few were left for treatment. The scale had made so little headway here that there was no risk in this course.

The peach orchard, though dying and in part dead, had not been killed by the scale, but by a combination of borers, disease and neglect, with the scale as a notable factor on some trees.

This is the only locality in Somerset county, so far as I am aware, and this infestation can be easily disposed of. One place is already clean, the other can be made so at any time by sacrificing a few trees of no especial value, if the treatment proves unsatisfactory.

Sussex.—I have no record of scale in this county.

Union.—Scale has been introduced three times at three different points from three different States, but at two of the localities the insects have been rooted out by the simple process of destroying the trees, while at the third, though the plants originally infested are now out, yet there may have been some spread and the locality is yet under observation. All the cases are near the city of Elizabeth, but I have no evidence that it is in the gardens here or in any of the nearby towns.

Warren.—Three points of infestation were discovered, and two of them have been cleared out. At Harmony a single tree only was infested, and this was taken up and burnt. Near Mauch Chunk a few scaly apple trees were set out, and one of these was taken out.

The others were treated with kerosene during the winter of 1897, and when I saw them late in the summer of 1898 not a scale was left on the trees. Traces of their previous presence were obvious, but the insects themselves were gone.

The third locality is at Washington, where a lot of infested plum trees received from Alabama were distributed by a local nurseryman. Several of these trees died the year after and others were taken out and replaced, yet others were treated with kerosene or soap, and on the original trees, so far as any remain, the scales are pretty well cleaned out. At one point, however, adjoining trees became infested, and these have not been dealt with thus far; indeed, unless the scales show themselves able to increase much faster than they did since 1896, no very heroic treatment will be necessary.

It seems thus, that out of twenty-one counties in the State, three only have no scale records. In five counties, all northern, the insects occur only in gardens, and no orchards are known to be infested. In three counties only a single point of infestation is known, and in one case this is probably entirely wiped out.

As a matter of fact, serious infestations exist only in Burlington, Atlantic and Monmouth counties. In the counties north of Mercer and Middlesex I know of not a single infested orchard at the present time. The one case near Bedminster, in Somerset county, which was above noted, had been cleared out.

The distinctly unsatisfactory feature of the remaining infestation is that it is in gardens and small grounds, where it can be gotten at only with great difficulty. Geology and climate are both modified in such situations, and the elements that seem to have excluded the insect from the northern half of our State cannot act as they do in the open country.

Funds have been too scant during the summer of 1898 to authorize any general attempt to clean out any one badly-infested locality. It is even uncertain whether much more can be done this year, because the appropriation made for 1898 was only \$500, instead of \$1,000, as was authorized by law. If we can get the additional \$500, to which we are entitled, some systematic work can be done, and a little assistance can perhaps be given in some instances, as by loaning a proper sprayer, where the limited amount of work to be done makes the farmer reluctant to purchase a proper machine himself. An investment of \$50 for sprayers of this kind might pay very heavily in some cases, and might aid in cleaning up completely the more limited localities.

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In some cases the Commissioners could be trusted to look after the proper use of the machines, and it would prove an exceeding great benefit to get gradually a body of men scattered throughout the State who could be relied upon to give timely notice of new or unusual appearances, and who could be applied to by farmers near by for much practical information as to methods of applying insecticides, &c. It would be bringing the practical education offered through the Board directly home to many men, and would, I believe, be of use in drawing them into closer connection with it.

As a move in this direction a quantity of good lenses of moderate price were purchased, and a few of these have been distributed to Commissioners who have shown an ability to use them.

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WHAT BIRDS MEAN TO FARMERS.

DR. C. C. ABBOTT, TRENTON, N. J.

WHAT BIRDS MEAN TO FARMERS.

Mr. President and Gentlemen—Perhaps, after all, you may think what I have to say is of too trivial importance to bring before such a learned body of men as I see before me. Nevertheless, I have been invited by your Secretary, Mr. Dye, to talk to you about birds, and the sin must be visited on his head, if sin there be. [Applause.]

The Secretary—I will stand it. [Laughter.]

I have not thought it well to occupy your time with a list of reasons for every statement made. On the other hand, I do not propose to make any statement that cannot be verified by the observations I have made, covering a period of many years. All my life I have been a student of local natural history, and necessarily the influence exerted by any one class of animal life upon its immediate surroundings, has not escaped notice. Patiently tabulating results, not of one year, but of many, I have reached certain general conclusions, and it is no little satisfaction to know that these conclusions are not at variance with those set forth by various bureaus, both of the general and various State governments. I have nothing new to state, but facts that can never grow old or out of date, for they are of such weighty moment that no farmer, if he loves his farm, can afford to turn to them a deaf ear. In all the reports on birds as related to agricultural interests that I have read, their authors have begun at the end of the subject and worked backwards to the beginning. In other words, they have elaborately set forth all the damage done, and then hurried through a brief peroration as to the good accomplished; all which, I claim, is misleading, illogical, unjust, unscientific—everything, in short, that ought not to be, and precious little that ought.

Mankind is not a failure as a phase of animal life on this earth, notwithstanding there are so many men that are too mean to live; and surely, because of individual failures, the race does not merit annihilation. The fact is, the very titles of nine-tenths or more of the essays in government reports and agricultural periodicals are

objectionable ; using the term "injurious" or some synonym. I say objectionable, because the reader, at the very outset, is impressed with the idea that the damage, destruction, disaster and all the dismal conditions of devastation brought about by birds, far exceed any benefits conferred. This is not true, even where birds are most abundant. I say this because I believe it, and I came here to express my own opinion, and not to epitomize and discuss the views of others. Of course, a bird is capable of doing damage, as we look upon it, but that little damage may have a far-reaching significance which is not recognized. We fret over the stain upon the carpet where water fell, and forget that this same obnoxious water quenched the flames that would have destroyed the whole house. No farmer ever guided the plow with such accuracy that not one hill of corn suffered just a little ; but must we refrain from cultivating because of such trivial occurrences? This is true of the bird-life about us. A little loss is sustained, but what of the great general good accomplished? He is a poor farmer who is not an observant one ; but observation is idle if we stop short at the fact. Practically we are absolutely ignorant, howsoever many facts may have been acquired, if we know nothing of their significance. There is not a man who has lived in the country that has not heard of or seen a hawk pounce upon a chicken. Indeed, in our nursery days, we have the naughtiness of hawks mingled with Mother Goose, and later, as a consequence, when as children of a larger growth, we finally go alone into the fields, using our own eyes and ears, it is with no thought of seeing what else a hawk may possibly do. We are forever watching for the sin to be committed, and are disappointed if only righteous deeds are done. The hawk that strikes at a chicken is chased, and, if it escapes, is remembered as an outlaw ; but one of these birds busy at catching mice all day never so much as receives a passing thought, a moment's consideration, and I fancy the farmer would be looked upon with suspicion as to his sanity if he paused for a moment while at work and breathed a God-speed to a mousing hawk. Yet it would be far more sensible than the common practice of cursing all birds of prey.

Birds of prey, hawks and owls, when pressed by hunger, are forced by a law that excuses them, that of self-preservation, to attack poultry, but the conditions that bring this about, the pangs of hunger, are such that poultry would be better off if sheltered. Deep snows and intense cold are not favorable for chanticleer or dame partlet, and it is not at other times that the larger hawks are likely to be

about. In North America, exclusive of Mexico, there are some seventy-three different species of hawks and owls, including the eagles, and it has been ascertained by careful observation and the examinations of thousands of their stomachs, that only six of these seventy-three are so far destructive to man's interests as to call for interference, and three of these six destructive species are too rare to count for anything. All the others call for our protection if we would protect our own interests. In New Jersey we have, say, twenty-two species of hawks and owls, of which a considerable number are winter visitors only. Now, there is but one comment to be made ; if, of a given class of birds, some are useful and others obnoxious, it is our duty to learn to distinguish the one from the other. The cry need not be set up, "I can't." You can ; anyone can, but the trouble is, you won't. The mushroom-eater has learned to tell the difference between edible and poisonous fungi ; his life depends upon it, and so the knowledge called for was acquired ; and our interests demand, which are close akin to our lives, that only that which is inimical shall be arrested. Even if you are willing to suffer through your own ignorance, I question the moral right at least to destroy that which does you no harm and is a benefit to myself. The hawk that you do not want, I do. You may prefer to have the fields tunneled by mice. I do not. Drive off every hawk and owl, if you will, but do not kill them. They are not yours or mine, but the property of the community, if any ownership exists, and I am blessed by their visits to my fields. There are four exceptions, and these we must learn to recognize. First, the goshawk, two feet long, dark-bluish slate color, with under parts white with close-set wavy lines of dull gray. A bold, bad hawk, it must be confessed, but happily, here in New Jersey, it is not at all abundant, and the three small, bluish-backed, barred-tailed, brown-splotted birds, about the common pigeon's size, but with longer tails and a quick, nervous, jerky flight that is unmistakable. These three hawks known to ornithologists as the pigeon, Cooper's and sharpshinned hawks, are not to be tolerated. They will kill a chicken or pigeon every chance they get, and get a great many more chances than is desirable. They do not depend simply upon celerity of movement, but know that cunning must be exercised not so much to outwit their prey, as to outwit man, and they exercise it. They watch, from some happily-chosen coigne of vantage, and swoop with fatal certainty, when the farmer's back is turned. If I induce anyone here present to give more attention to birds than heretofore, let me say to him, do not for one moment suppose that

birds are mere machines guided by instinct. That word "instinct" is the responsible parent of more ignorance in natural history than all other conditions, superstitions and misconceptions put together. Birds have instincts, it is true, but they have also excellent reasoning power. Cause and effect is not beyond them.

But, it is asked, if hawks do no harm, very good, but what useful act is to be placed to their credit? The destruction of mice. I will not weary you with statistics. These have been published, and all recent experience confirms the melancholy array of sadly-significant figures. I have often wondered if any farmer ever realized what a mouse really is. I will say this much, as an engine of destruction it is immense. A mouse not only destroys the ground, but the desirable growths we aim to have in the ground. They do not burrow to the extent that a mole does, but sufficiently to let in more air and water than are wanted, and a hundred such underground retreats in a pasture—and I have found as many—mark just that number of sorry-looking spots on the surface, where is nothing that we desire. How little food will serve to keep a mouse alive, I do not know, but as in all cases of healthy animal life, the appetite is equal to the opportunity, and where grass roots and grain are abundant, the destruction of them will be proportionately great. Again, digestion appears to be as continuous as the beating of the heart, and no mouse has ever so important an engagement that it will not break it, that it may eat. Lastly, the mouse eats precious little that the farmer does not want and prodigiously of what the farmer wishes to preserve, and mice are everywhere.

All this, from our standpoint, is an obvious defect, but we are warranted in finding fault with nature because of it. Nature cares very little for man's comfort, it is true, but here in New Jersey we bring upon ourselves this plague of mice. How so? do you ask? I have only to point, in reply, to the side of many a barn, where are nailed trophies of the marksman's skill, many a hawk and owl; and these are the birds that kindly nature sent to hold in check the accursed pest of mice.

When the farmer is done with his field, when every trace of human activity has been withdrawn and the wide areas are left to the kindly care of nature, then in the glaring sunshine basks the wary hawk, and not a mouse dares move but it risks its life. Here and there a slight trembling of the dead grass, no human eye could detect, but it tells its story to the watchful hawk, and swift as a sunbeam in the crystal air strikes the hungry bird. All day long, here, there and

everywhere, this blessed work is going on ; this all-important preparation for the coming year and its harvest ; and yet there has been, and still is, and perhaps forever will be, a feeling that every mousing hawk is a foe to human interest, and energy is bent to put a check upon the check which nature has provided that we may not suffer overmuch from the curse of mice. Nor does nature's work cease with the day. Comes the gloaming and there is life and the bustle of life in many a hollow tree. From some half-hidden opening, high up among the branches, peers out a strange, round face ; looks with a searching glance from knowing eyes ; eyes that startle you, if you meet them suddenly at night ; and then the owl, the bird of darkness whose deeds are not evil because the night covers them, comes shyly forth, and scouring again the same mice-ridden fields, destroys hundreds of these pests. I say comes forth "shyly," and why? Because we have been led to believe that these birds merited only condemnation. Let some fool start a silly lie and the world will chase after it, as if a fortune were at their fingers' ends ; and it is only after fortunes have been spent in making fools of ourselves that a streak of common sense illuminates the intellectual darkness and somebody cries "halt!" I am glad to state that a halt has been called upon this killing of owls. Ignorance, in some places, has no longer the upper hand in every place. The value of the owl is being recognized by warehousemen, and this bird is found to be more effective in destroying mice and rats than dogs, cats and ferrets put together, and they take care of themselves too and ask for no attention from us. But let a barn-owl or any other species take up its quarters in the farm outbuildings and what chance has it of a friendly reception?

It is "Johnny, get your gun," as soon as the bird is discovered ; and yet an owl will rid the barn or stable of mice, never do a particle of harm, and only asks the privilege of occasionally hooting in a rather mournful fashion. Let what the owl is and owl does be brought to mind by its hooting, and the significance of the sound will change the melancholy to music. When we realize what the sounds of nature mean, we are not disturbed as by unmeaning clatter, but appreciate the harmony that pervades nature as a whole. The owl deserves the unqualified approbation of every right-thinking man, and particularly true is this of the little-known "monkey-faced" owl, the ruin-haunting owl of Europe, found also here. If welcomed everywhere and at all times, the losses incident to the destruction by mice would be lessened a thousandfold. And here I

do not echo merely the views of others and jump at conclusions not warranted by facts. We cannot be too careful in handling the problems of nature. The apparent is by no means always the real ; but I fear not the searchlight of persistent observation in this direction ; and repeat, and shall persist in repeating while my strength lasts, protect the owl and the owl will protect us—against the curse of mice.

But let us to another and livelier phase of the subject. All birds are not hawks and owls. When the mysterious force of evolution began its wonderful activities in the line of birds, variety resulted with as great a wealth in form and color as with blooming plants, and long before man came into being, the songbird and the summer rose were features of each recurring season. Happily, this is still true, and vast is the expenditure of time, energy and money to secure marvelous results of color, but how little do we spend on sound. Ever eager to gratify the eye, but seldom as enthusiastic concerning our ears. Taking genuine pleasure in the blossom-laden bush, but not always aware of the melodious thrush that is nesting in its branches. It has been said that we have a tangible result in what we see, and so as a matter-of-fact folk, appreciate the object seen, but the song of a bird is intangible, a mere passing pleasure and then forgotten forever. So far as this is true—and I fear, very often, it is true—it is a very sharp criticism of a farmer. To speak paradoxically, the farmer who is too busy to listen to a singing bird, is not busy enough for his own good. Let him rest assured that nothing occurs on the farm that has no significance. If a bird sings, there is a reason for its so doing, and that reason does concern the farmer very closely. The bird sings because it is happy, and happy because well fed. Here, now, let the farmer prick up his ears : Upon what has the bird been feeding? In the three months of April, May and June, it is very safe to say, upon insects. Is it nothing then to a farmer that the song of every catbird on his place, is the funeral hymn of hundreds of insects, which allowed to remain, unmolested, mean the futility of his labors? Let us consider a singing bird a little more closely, and I select a catbird, because known to everyone and yet looked upon lovingly by few. Here is the initial blunder. Every catbird is worth its weight in gold—a statement that can be verified by reasonable statistics—but let the consideration be from another point of view. Where there is one catbird, there is sure to be another, and where the two are, there is the nest, with four young birds. We see one catbird and must count it six ; we think of insects, not enough to supply its needs, but of the

needs of six, and we must face large numbers when we come to put pencil to paper. It has been said that a saw-mill has an excellent appetite for logs, but it is as nothing in comparison to the nestling's demand for bugs. Figures are not suggestive when simply stated, but if anyone will do, as I have done, sit quietly by a nest, for a long time and note the coming of the parent birds, some idea of the quantity of insect-life brought as food to a family of young birds, will be realized; but here are a few figures: For fifteen days of thirteen hours each, or one hundred and ninety-five hours, each one of the four young catbirds received an insect, at a reasonable calculation, every ten minutes, or six an hour. It is often more, but put it at that; or, eleven hundred and seventy insects during the birds' stay in the nest. The four young birds will require forty-six hundred and eighty insects, and the parent birds for their own sustaining half as many; a total of seven thousand and twenty.

Now, given a pair of catbirds to every five acres of a hundred-acre farm, and it is too small an allotment, we have one hundred and forty thousand odd insects destroyed during the two weeks between the hatching and departure of the young birds from the nest; but the work does not stop then. Catbirds come about the first of May and stay with us for six months. I called your attention to one of them singing, a moment ago. Had not the clear, ringing notes a significance worthy your regard?

So very varied are the conditions of the farms scattered over the State, that no observation made with reference to one locality is sure of application to another; and certainly no class of animals is more influenced by the physical conditions than are birds. There is such a thing, even, as being too neat, and where every little clump of native bushes is weeded out, the spot will be forsaken by certain species which insist upon having the world as nature made it and not as man mars it. Again, farms near water-courses will have more birds than those situated more inland, and there are birds found on farms near the seacoast that do not occur in the center of the State or along the river that forms our western boundary; and there is a marked difference between the farms of Sussex and Warren and those of Atlantic and Cape May. Confronted by these facts, it has proved a rather difficult task to tabulate the average conditions, and give a fairly-correct idea of the birds, as to number of kinds, or species, to be found on the average farm. I am fairly correct, I think, in stating that we have on the average farm, thirty-five species of birds that are resident; that is, remain

there year in and out, until they die. There are fifteen species that come to us from the north and remain from October to April, and forty-five species that come to us in April from the south, and remain until the autumn has well advanced; a total of ninety-five species. Of course, it must be understood that this is not all the birds we have in New Jersey. As a matter of fact, it is not one-half of them, but it does cover the birds that most nearly concern the farmer. And here, let me touch upon one phase of the subject that seems to have received little or no consideration—the birds about us during winter days. Busy from dawn to dark are the two nut-hatches and the little brown tree-creeper; busy, I say, and at what? Hunting for insects hidden in the innumerable cracks and crannies of our trees. Possibly there are many who have never seen a tree-creeper, but there is such a bird, and it is not discouraged in its good work because unappreciated by us. How active it is, is indicated by the short time it requires to go from end to end of a tree-trunk, creeping, like a mouse, and then passing to another and another tree. Such constant movement makes large demands upon it, and the energy stored in its little body would soon be exhausted was it not that the supply of food was inexhaustible, and this food is wholly insects. The same is true of the winter wren. It comes soon after the common summer house wren has left us, and never a busier bird. No weather too cold, no day too stormy for it, and its sole occupation hunting insects and insect larvæ. It is marvelous how keen is its hearing, how acute its sight, how excellent its judgment, and from many a nook and cranny it draws forth hidden insects that would have escaped your observation, had you been bug-hunting. I have known a golden-crowned kinglet to spend three entire days in an old pear tree in midwinter, and you may rest assured that this bird was there for no other reason than that food was abundant. No bird threads the twiggy labyrinth of an old tree from other than the most practical, prosaic motives. A bird's highest ambition, like that of many a man, is a good dinner. No bird ever stayed in a tree for a day, or even an hour, unless sure of food; and from our point of view, a fruit tree that attracts birds is in need of their attentions. The farmer may be too busy to notice the birds that throng the orchard during the winter, but they are doing him no less a good turn because he does not know it.

In a few short weeks over the whole State there will be heard the silvery, bell-like, tinkling notes of a little sparrow that, braving the possible frosts of a tardy spring, seem glad to be again in the fields

where a year ago they spent a happy summer. These are the *avant couriers* of that feathered host which will so soon be on the way. The robin to the orchard, the wren to the box you have set up for its use, the pee-wee to the wagon-house or bridge, the catbird to the garden, the oriole to the door-yard elm and the swallows whithersoever there is open air. They do not come for our benefit, but for purposes all their own, but their purposes fit ours and we are the gainers. Let that suffice. We need not speculate as to nature's methods; it leads too often to a vain wish to improve upon them. We all know birds when we see them, and let our satisfaction at the sight of them be as broad as our knowledge. There are no birds of ill-omen among them. If too numerous, which is not probable, drive them away, but do not kill them. Withhold your anger if they are too presuming, and consider their quest in time to come. Remember,

“ Who takes the cherry ripe to-day,
Will seek for worms to-morrow.”

Think always when you see a bird of the many possibilities for good, and dwell not on the few actualities of evil. Think of every bird as one with a career covering the whole twelve months and not the little mischief of a few days, and be sure that what you look upon as mischief is really such. An act, as we witness it, may seem the very acme of destruction, but are we all such adepts at interpretation that our decision falls forever upon the right side? Again, I say our birds are our friends, and he is a sane farmer who, meeting them in his fields, his meadow and woodland, gives them, one and all, a hearty welcome. Learn to love the birds and they will learn to love you, and their affection carries a substantial blessing with it.

Prof. Smith—The English sparrow is an importation. The leopard moth, which occurs in some States, is also an importation, and the two exist on very friendly terms. This leopard moth is very destructive to the foliage of shade trees, and the area of this moth is absolutely coincident with that of the English sparrow. As soon as this moth gets into the country the native birds keep it in check, but the English sparrow will neither touch the moth nor the caterpillars. The two are absolutely coincident. I speak of this as I think it well you should understand that such is the absolute fact.

Mr. Roberts—The English sparrow was brought here for a special purpose. Many of you will remember when the trees in the cities were covered with the so-called measuring worms, although the

young generation never hear of them now. The corn worm is also another worm they will eat greedily, although they will not eat a caterpillar ; but because it will not eat these woolly-coated worms is no reason why we should condemn them utterly. I believe it has its merits, although it is a nuisance in the grain field.

ROOT TUBERCLES AND NITROGEN
APPROPRIATION.

BY BYRON D. HALSTED.

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ROOT TUBERCLES AND NITROGEN APPROPRIATION.

The problem of nitrogen appropriation by plants as viewed in the light of modern science is so largely a biological one that it addresses itself directly to the vegetable physiologist and bacteriologist. While laying no special claims to either of these two departments of botany, the speaker ventures to place some of the results of many scientific investigations in this exceedingly important point of research before this representative body of American farmers.

Nitrogen is one of the most essential of the constituents of plants ; it enters into all those compounds in which life inheres and the vital functions take place. It is also equally well known that this same element has been, and still is, the most expensive of the three leading substances usually applied to a cropped soil. While potash and phosphoric acid each cost four and a half cents, nitrogen is quoted at fourteen cents per pound, and this excess is partly due to the soluble nature of its compounds, and therefore there is a constant movement of the salts of nitrogen from the cultivated land to the streams, rivers and the seas.

These annual losses are in part restored by the large amounts of fertilizer from the nitrate beds of Chili and the guano of the islands of the South Pacific. But these stores are exhaustible, and the eye of the thoughtful nitrogen consumer, that is, the crop-producer, turns, where else than to the atmosphere, the inexhaustible reservoir of nitrogen, making up four-fifths of the air that bathes each and every normal leaf waving in the summer sunshine.

Experiments of the leading students of vegetable nutrition, over long periods, led in the past to the generally-accepted fact that while ordinary crop plants were thus constantly surrounded and even permeated by atmospheric nitrogen, they have no ability to lay hold and appropriate it to their use. For example, Messrs. Lawes and Gilbert, in their world-renowned experiments at Rothamstead, England, near the middle of the present century, confirmed the earlier

opinion of Boussingault, that crop plants could not assimilate free nitrogen from the air ; but the fact remained that clover grew well without nitrogenous manures, and was a good preparatory crop for the cereals. In 1868, Dr. Voelcker showed that the soil gained in nitrogen during the growth of clover, and expressed his opinion that in some unknown way the atmosphere contributed directly from its limitless storehouse of free nitrogen to this accumulation of combined nitrogen in the soil.

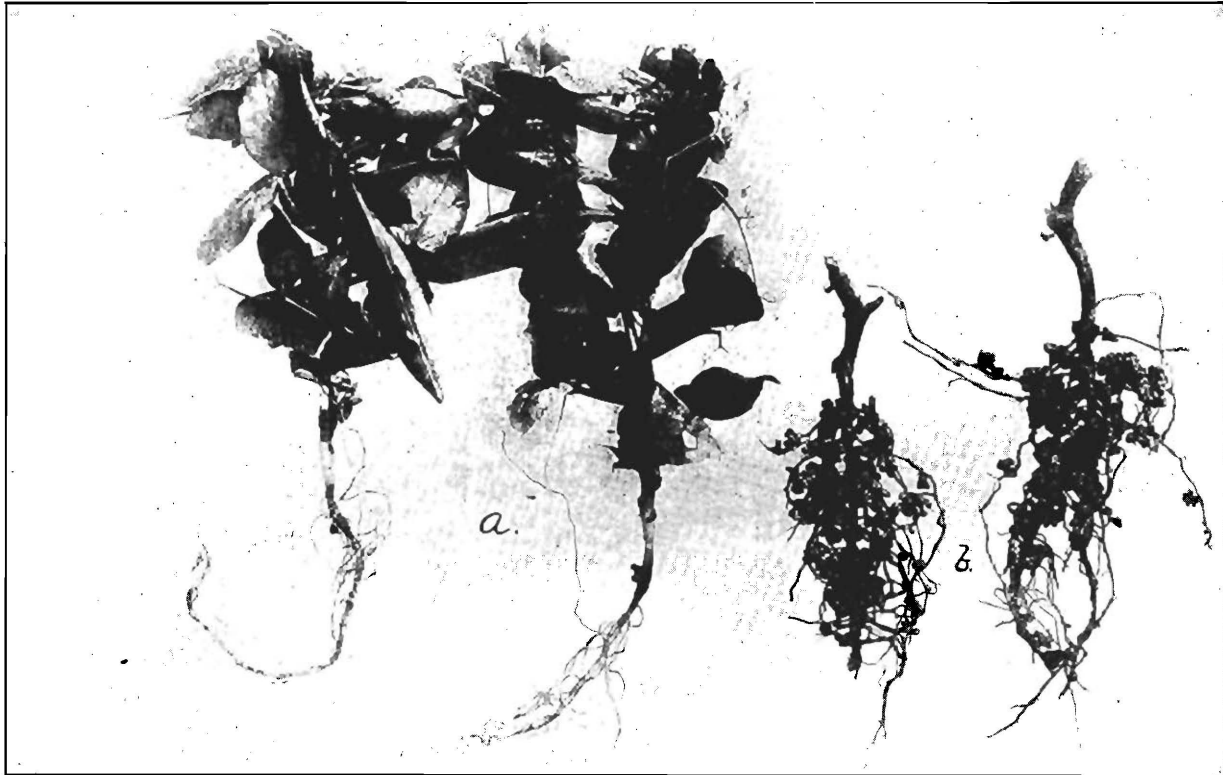
In our own country, Prof. Atwater, in a series of pot experiments at Middletown, Conn., in 1881-2, showed that there was a considerable increase in the nitrogenous compounds in peas when the plants were grown with access to no other than the free nitrogen of the soil and air.

This hint, namely, that in some way the clover and clover-like plants were renovators of the soil, became as an entering wedge to open a field of study that is now actively entered upon. Experiment followed experiment, and test succeeded test, until at the present time we can rejoice in a fund of information that, while it does not satisfy, at the same time becomes an earnest of what may be hoped for in the near future. It would seem that the new century will open with a bright day for the crop-grower. The secrets of nature long kept hidden from the toiling millions are being exposed to view, and the fears of a decline in the most useful industry upon the earth will be replaced by high hopes for an exhalted and crowned agriculture.

As early as 1615, a genus of plants was given its name because of the galls that were generally found upon the roots. Malpighi, before 1687, concluded that these enlargements were caused by insects, and De Candalle, a famous botanist of a hundred years ago, regarded the tubercles as the result of some disease. During the present century many opinions have been expressed upon the nature and origin of the galls, some thinking they were dwarfed, diseased roots ; others, imperfect buds, while others still considered them as organs for storing food.

It is within the last thirty years that anything definite has been determined concerning the excrescences in question. The structure of the galls has been carefully studied and the kinds of cellular tissue composing them have become known. Organisms were found mingled with, and contained in, the cells. Some thought such were accidental, while others maintained that they caused the abnormal growth in which they were found. Mr. B. Frank has much of the credit of showing, as the results of his investigation, in his paper in

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Two Pea Plants of Autumn Growth are shown at *a*, while the Roots of two Pea Plants grown in the same soil in the Spring are seen at *b*

1879, that there were both threads or fungous strands and multitudes of bacteria-like bodies in the tissue of the gall. There were soon many students in the field, and rejoinder followed rejoinder, all of which helped to clear up one of the most obscure and important of problems in botany as well as in practical crop-growing.

Eleven years ago (1887) Ward brought out his results in soil inoculation, showing clearly that the tubercles are produced by some germ in the ground. He found the fungous threads entering the plant through the root hairs, and afterwards a tubercle resulted at the region of infection with the production within the abnormal tissue of multitudes of bacterioids. He also showed that the presence of these galls was beneficial to the plant bearing them.

In 1888 was begun a series of experiments that has made the name of Hellriegel famous. It was shown that there was a parallel between the development of root tubercles and the power of obtaining nitrogen. Hellriegel and his associate, Wilfarth, demonstrated that these tubercles are not constant upon the roots of Leguminosæ, but produced there by some organisms when the latter are present in the surrounding soil. For example, pea plants grown in sterilized soil produce no galls, while similar ones in soil watered with extract from an old pea field produced tubercles and appropriated nitrogen, while the uninoculated plants did not. When the soil-extract was sterilized no inoculation followed. The chain of evidence was thus complete that made the germ theory of the origin of the tubercles tenable, and a stimulus was given to the study of the subject commensurate with its incalculable importance to the world.

In the same year (1888) Beyerinck grew the organism artificially and named it *Bacillus radicicola*. Two years later Frank published an elaborate paper, and, not agreeing with Beyerinck in the bacterial nature of the germ, called it *Rhizobium leguminosarum*, and by both of these botanical names it is known to science to-day.

There are, of course, many questions still unanswered and observations made that do not harmonize. We will indulge the hope that with more time and better methods of study in a new and difficult field the animosities may be outgrown, and from the fiery furnace of misunderstanding and controversy may come in our own time the full statement of the whole truth, unmixed with the dross of ignorance and personalities.

Under the circumstances, a statement of the probabilities in the case is the best that can be hoped for at the present time. The tubercle-producing germs are exceedingly small and, of course, may

be exceedingly numerous. It seems to be a general law that the smaller the size the greater the number. Great men are small in number. These germs inhabit the soil, and from it reach the surface of young, active roots, often the hairs of the roots, and penetrate the thin wall that separates them from the interior of the plant. A stimulus is felt by the root, and it begins to enlarge its cells and form new ones in the vicinity of the invasion, and as a result a swelling of the tissue is produced, ending in a fully-developed tubercle.

There seems to be no guesswork about this, for the germs have been isolated, made to multiply in proper media and from there introduced into the normal root and the tubercles follow. The same has been confirmed by growing plants in water to which the germs were added, so that the action of the germ and the fact of its being the initiative of the tubercle are established by water culture. But the nature of the germ is somewhat in doubt, and many points as to its action upon the host plant are reserved for future investigations.

Some hold to the view, for example, that there are many species of these organisms, while others maintain as boldly that there is but one. The tubercles vary in size and shape upon different kinds of crop plants, as, for example, those of the bean are quite different from those of the pea.

A soil-extract is not equally effective for all leguminous plants and shows a preference for the kind of crop that had been grown upon the soil used for the extract. In short, a clover-soil extract is better for clover than for peas, and *vice versa*.

When viewed with the high powers of the microscope there seem to be no considerable and constant differences, in size, shape or other qualities upon which to base a claim for distinct species, and those who oppose the idea of a multiplicity of species feel that any difference in the form of the tubercles themselves is due to the different species of plant producing the gall and not the inducing germ. They meet the fact of diversity of susceptibility by attributing it to the impression that the plant has had upon the germ. In other words, a pea plant will strengthen the capacity of the germ to grow upon peas and correspondingly weaken it for any other crop. It is our pleasure to let the controversy go on and not take issue, for they all may be partly in the right and somewhat in the wrong. They need neither disturb us nor make us afraid.

There is a sort of fascination in all these struggles toward the truth. An idea may be born in an instant, but a principle sometimes re-

quires the travail of a century. It will do us no harm at least to glance at a side of this intensely-practical subject that for the present is entirely in the region of mystery. It is in connection with a question that anyone might naturally ask, namely, how is the nitrogen appropriated? No attempt will be made to give an answer; but we can talk around the subject briefly. One group of investigators maintain that all plants have the power of making use of the free nitrogen, and the Leguminosæ only hold this in an unusual degree. This view seems to be refuted by such extended and careful field experiments as those of Messrs. Lawes and Gilbert, but there is no predicting the final results of the ultimate refinements of science.

The second view is that the nitrogen is "fixed" or brought into a combined form in the soil by means of the micro-organisms there abounding and the tubercle germs assist in this. Third, I quote from H. Marshall Ward's paper in "Nature" (March 29th, 1894): "The fixation of the atmospheric nitrogen could be conceived of as a powerful act of the machinery of the leguminous plant, urged to the necessary expenditure of energy by the stimulating action of the symbiotic organism at its roots."

A fourth view is that the organisms in the roots merely accumulate the nitrogenous materials obtained from the soil, and ultimately the plant appropriates them to its own use.

Loew suggests that the following formula may express the action of the micro-organisms: $2N + 2H_2O = N O_2 N H_4$.

Time does not permit of a discussion of these theories, and the bare mention of them suffices to show that the primary question of how the tubercles and their germs fix the free nitrogen is still open for all the world.

Having accepted the facts in the case, so far as they have been demonstrated, let us see, in closing this necessarily brief paper, what their bearing is upon the production of crops. In other words, if certain germs are to be credited with the appropriation by crop plants of the most expensive of all essential food elements, what may be the methods for the profitable application of these microscopic adjuncts to agriculture? Laying aside the theoretical, is there anything on the practical side? Has the farmer any means at hand in these tubercle germs for increasing the productiveness of his soil and adding to his wealth, be it a better farm or a larger bank account, or both? Let us see.

Dr. Salfeld, of Lingen, Hanover, was one of the first to put Hellriegel's discovery to practical use in the field, the first trials being

made eleven years ago with peaty soils upon the Experiment Station grounds.

The amounts of inoculating soil ranged from 16 cwt. to 24 cwt. and 32 cwt. per acre, and the results were equal to that of 3 cwt. of nitrate of soda in the case of peas. With clover 8 cwt. of the inoculating soil per acre was used, and the difference in the development of the plants was very much in favor of the inoculated ground. The crops of potatoes and rye following the latter were both considerably benefited by the soil inoculation with the previous clover crop.

Dr. Salfeld tested the micro-organism upon sandy soil, also inoculating with 8 cwt. of old lupine land before sowing to lupines. The results in product were as 100 to 552 in favor of the inoculated land.

It may be said in passing that the roots of the plants upon the inoculated land were generally well stocked with tubercles, while those elsewhere were nearly free from them.

The most striking results are quite uniformly obtained with the poor soils, where a leguminous crop will not naturally grow with any profit, and therefore old rich lands may not always receive much benefit from the treatment.

Upon the New Jersey Station Experiment grounds observations and experiments have been made along this line, chiefly with beans and peas. Beans, for example, have been grown upon the same soil, two crops each season, for the past five years. The tubercles form quickly and abundantly upon the roots of the spring sowing of beans, while the same sorts upon land new to beans rarely become galled.

Last spring peas were sown upon land where no leguminous crop had grown for many years, the last being clover fully eight years before. To one portion of this soil one bushel of soil from old pea land was sown in the open drill partly before and partly after the peas were dropped. Another strip of land had two bushels thus added, while a third strip received none of the old pea soil.

There was a marked difference in the plants from the time they were two inches high, those upon the control strip being smaller and of a sickly hue, in striking contrast with the deep green of the more vigorous plants where the old pea soil had been added. At harvest time the yield was considerably in favor of the seeded land, and there the individual pods were noticeably larger than upon the untreated land. Ten plants were taken from the seeded, and an equal number from the unseeded land, and the tubercles counted, there being 54 upon the ten plants from the untreated land to 482 upon the seeded-soil plants.

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Two Root Systems of Autumn-grown Bean Plants are shown at *a*, and at *b* two from the same soil grown in the Spring.

ROOT TUBERCLES AND NITROGEN. 111

Another fact brought out by other experiments with the autumn crop of beans and peas is of more than passing interest. For example, beans that were grown for the tenth successive crop upon a plot of ground, produced very few, almost no tubercles, while the previous spring crop upon the same land showed an abundance of them. The chief apparent difference in the conditions seems to be the greater warmth of air and soil surrounding the growing crop in August than in June, and the reason for the remarkable falling off of the tubercles is to be sought in the greater availability of nitrogen compounds in the midsummer soil over that of the spring. There is no question about the tubercle germs being abundantly present, but the bean plants did not get "nitrogen-hungry," as it may be termed, and this is the condition favoring the growth of the root nodules. This result confirms those obtained by others along similar lines, namely, that a soil poor in combined nitrogen is best suited for a favorable response to seeding with tubercle germs.

Dr. Nobbe, of the Experiment Station at Tharand, Saxony, has been very active in pushing the inoculation investigations by isolating the specific organisms from the tubercles and growing them free from all others. These germs were grown upon gelatine in the same manner as for the production of pure cultures of cholera, tuberculosis or other specific microbes of well-known bacterial diseases. While not able to distinguish any microscopic differences between the germs of, for example, the pea and the locust galls, the clover or the bean, he recognized that there was a difference in action. It would seem from his studies that for the successful appropriation of free nitrogen there needs to be (1) a soil weak in combined nitrogen, (2) the presence in abundance of the germs of the crop to be grown at the place in the soil where inoculation will take place.

Dr. Nobbe and his associate, Professor Hiltner, were led to prepare pure cultures of the nodule germs for various crops, and within the past three years they have been produced commercially and sold as bottled lymph under the name of "Nitragin."

In practice, the methods of using the "Nitragin" are to either inoculate the seed by wetting it in a watery solution of the former or adding the solution to some earth, and sprinkling this over the field and raking or harrowing it in below the surface.

Dr. Voelcker has made an extensive practical test of "Nitragin" in England. Plat experiments were conducted at Woburn, and under his supervision at two other places in England. In every case drought seriously interfered with the sowing and growth of the crops,

and the experiments can only be considered as of a preliminary nature. Eleven different leguminous plants were experimented with at Woburn, and the effect of treating the seed with "Nitragin" and also soil treatment were tested. The sowing, which was made in May, was followed by drought, and the plants did not come to maturity at the proper time, and had to be cut green. The inoculated plants in this case were as good as the others, but no better. In the case of beans and peas, there was greater root development in the treated plants than on the untreated, but the tubercles were plentiful in both. With other plants the untreated plants seemed better.

In one of the experiments the crops used were green peas, sweet peas and two kinds of beans. In these experiments soil-inoculation and seed-inoculation were tried and compared with no treatment. Taken as a whole, it was concluded that inoculation of the soil proved the most efficacious, and that both it and inoculation of seed were superior to no treatment.

In the other series of experiments the effect of soil and seed-inoculations on fifteen different leguminous crops was tested, and in the case of twelve of them there was more root growth on the treated than on the untreated plants, while in three instances the untreated plants showed the greatest root growth. The three exceptions were kidney vetch, peas and beans. It should be stated, however, that beans had previously been grown upon the land, and it is very probable that the organisms suited for bean and pea growth were already abundantly present. The necessity for inoculation with "Nitragin" derived from the same crop as that to which it is applied is not forcibly shown.

In general the inoculation of leguminous crops produces greater root development and more tubercle formation. As between the inoculation of the seed and the soil there was no very conclusive evidence, but the balance seemed to be in favor of soil inoculation. (E. S. R. '97, 865.)

Prof. Duggar, of the Alabama Experiment Station, has made somewhat extensive experiments with "Nitragin" upon crimson clover and the hairy vetch. According to the latest report in Bulletin No. 96, for August last, crimson clover inoculated with "Nitragin" gave a crop of 4,057 pounds, while untreated seed produced only 761 pounds per acre, and with hairy vetch it raised the yield from 564 to 3,270 pounds per acre, the cost of the inoculation being \$2.25 per acre. In an earlier experiment the hairy vetch was inoculated

with soil from an old vetch field at but a slight expense, and increased the yield more than a ton per acre.

Prof. Duggar maintains that "in many portions of Alabama the frequent failure of clovers, alfalfa and other rarely-grown legumes was due to the absence or insufficiency of the corresponding root nodule bacteria in the soil."

Another interesting point brought out by the Alabama experiments is that of the much higher nitrogen content of the plants grown upon inoculated soil. In short, not only the quantity but the quality of the crop is changed, the percentage of the nitrogen in the plants being practically doubled.

It is no wonder that the thoughtful, progressive farmers of the Southern States are enthusiastic over a factor in their agriculture that is almost revolutionary.

There are many failures recorded against "Nitragin," and partly because the germ fertilizer is perishable, losing its power when long exposed to heat or light. Again, the soil may not be in the proper condition—slightly acid, for example—to foster these germs, or there may be enough of the desired microbes already in the soil. As with other substances of its nature, special care needs to be taken with the virus at every step, and for this reason the natural methods of inoculation will probably prove the most fruitful. The "Nitragin" may be used to start the tubercles upon a limited area, and from this the soil may be taken for the further spread of the nitrogen-gathering bacteria.

In some of the newer parts of our country abundant opportunity offers for testing inoculation, for there many staple leguminous crops are unknown to the soil. Soy beans (*Glycine hispida* Max.), for example, have been the favorable subject of a test at the Kansas Experiment Station by Mr. D. H. Otis, the native soil being free from the germs. Soil from Massachusetts, where the tubercles seem indigenous, was obtained, certain plots were treated with an extract of the Massachusetts soil, with striking results in both yield of crop and development of tubercles.

Prof. Bolley* has shown that the native legumes of the Dakotas are well supplied with tubercles, while many of the introduced species, as red clover, often fail, and but few tubercles are met with upon their roots. However, when red clover is preceded by the white clover it does well and abounds in nodules. In a similar manner other introduced species at first fail upon a soil new to them.

* "Agricultural Science," pp. 7, 58, 1893.

It is only fair to the subject that one other citation be made, and this time from the older portion of our country. The following is from the Tenth Annual Report of Hatch Station, Massachusetts, pp. 26, 27, 1897, and by Dr. Goessmann: " 'Nitragin' has been tried in accordance with directions upon crimson clover and alfalfa without apparent benefit. It has also been tried upon common red clover. On this crop, as with the others, no difference in growth attributable to the 'Nitragin' has been noticed; and, so far as can be judged at the present time, the use of this germ fertilizer for our common clovers is not to be advised. 'Nitragin' undoubtedly contains the germs of the appropriate nodular bacteria—the name of Prof. Nobbe is sufficient guarantee of this. The failure of the material to benefit the crop appears to be due to the fact that our soils contain the nodular bacteria of the common leguminous crops in sufficient numbers, so that the addition of a few more by the use of 'Nitragin' counts for nothing. Experience in the open field in most parts of Germany and England has been similar to our own, and I believe that we may safely conclude that only when we are about to begin the culture of a leguminous crop, new to a particular locality, will it be found advantageous to employ 'Nitragin.' In such cases the soil lacks the appropriate nodular bacteria; 'Nitragin' furnishes these, and the result is a better growth, because the crop is enabled to make use of the free nitrogen of the air from the first, which it could not do in the absence of the proper bacteria."

Hilliegel, Nobbe and others have shown that the growth of stem and leaf is increased in greater ratio than the seed, and therefore the germs are particularly important in the production of a forage crop. In other words, the fostering of the tubercles gives more promise of profitable results with clover, vetches, lupines and the like than with peas, beans and other crops grown chiefly for their seeds.

It is evident that the micro-organisms found in the tubercles are the primary cause of the abnormal root growth and, in some way not yet explained, the means of absorption of free nitrogen by the plants harboring them. In other words, the galls are not a hindrance but a welcome malformation of the host plant. These swellings, while generally associated with the Leguminosæ, are not confined to them, but have been found upon the roots of various other plants, and doubtless the number of known gall-bearing roots will increase as the subject is more fully investigated.

This union of two distinct kinds of plants for the mutual helpfulness of each, while of the deepest interest in the case under consider-

ation, is not unique. There are in nature all gradations between the seemingly perfectly independent plant and those that are dependent upon others. Likewise all intergrading may be met with between the parasite that is entirely destructive in its tendencies and the mutualism that exists in the tubercle germ and the host plant that entertains it. It is no uncommon thing to meet with plants that owe their existence to an infesting fungus, which in turn is favored by the conditions that render it helpful to the plant it infests.

There are, for example, many humus plants, so-called, that live upon the organic matter of the soil, being helped so to thrive by having their roots covered by an absorbing felt of fungous threads. Instead of the roots being provided with hairs of their own, as is the case with ordinary independent plants, there is an absorbing surface of fungous filaments that stands between the organic substance it can utilize and the host plant needing such a transmuter of the elements of growth. The toadstool is a fungus that grows upon the organic substance and needs no sunlight for its vital activity. The "corpse plant" is a toadstool, and more because the fungus instead of being alone is attached to the host plant, and this latter makes use of the food furnished it for the production of stem, flowers and seeds. Similar to the toadstool, the corpse plant has no green substance, the leaves are abortive, and sunshine is not essential for its normal growth.

In a similar manner many trees and shrubs, especially those that frequent localities abounding in decaying vegetable matter, have their roots coated more or less completely with an absorbing layer of fungous tissue, and by means of this, instead of the ordinary root hairs, the substances of the bog, or the humus-covered forest, is absorbed and prepared for the nourishment of trees that supplement this mutualistic life by the ordinary processes of food-making through the green cells of leaves and the light of the sun.

There are, in fact, whole groups of plants embracing thousands of species that exist only as they observe the rules of mutual helpfulness. They are of low stature and small economic value, but are of interest here as showing us that in the root tubercles we have a method of dependent growth that is met with elsewhere to a degree that is quite marvelous in its perfect adaptation. The lichens, for example, are made up of a fungus associated with an equally low plant, provided with green in its cells. By mutual agreement, so to speak, the composite structure is built up, partly fungus and partly alga, and collectively a lichen that may flourish upon a stone wall, a tree trunk or the soil itself.

It is thus seen that from the botanical standpoint the bacterium of the root tubercle is in its relationship not unlike other fungi as met with elsewhere and in the last analysis it is doing the very thing that might be expected of it under the circumstances.

The mystery of the advantageous union in certain instances is not so great as that of so happy a combination not being universal.

The germ fertilizer, "Nitragin," has been considered in this paper chiefly as a clinching argument, and not from the standpoint of an advocate for its general use. It is, it seems to me, a final proof that the galls are due to micro-organisms which enter from the soil, and as other experiments show, and not least those with the pure cultures of the germs in the field, that the invaded plant is assisted thereby to obtain a supply of nitrogen, that other things remaining the same would not otherwise be appropriated.

The bottled lymph shows us how very small an amount of the virus, so to speak, may be of service and helps to make clear to the mind the surprising effect that may follow from the sowing of a few hundredweight of old legume soil upon land that is new to the crop to be grown. In short, the growing of a clover or clover-like crop upon a soil poor in combined nitrogen and the microbes is so much a matter of germ inoculation that the process may well engage the attention of the keenest bacteriologist and the most learned vegetable physiologist. All the theories of individual susceptibility of the host, to this and that germ, as determined among the human and other species and the acquired characters of the microbes themselves consequent upon the combined growth of micro and macro-symbionts, all lend a word of explanation in the consideration of the most vital practical subject that is upon the horizon as the sun of this nineteenth century makes its brilliant setting.

INSECTICIDES AND PARASITES.

BY JOHN B. SMITH, SC.D.

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INSECTICIDES AND PARASITES.

In a way there is little connection between the two subjects of my title, and yet they have this one point at least in common : parasites are among the natural checks to insect increase ; insecticides are artificial checks of man's invention, and useful if not essential to supplement the work carried on by nature. The natural checks prevent the undue increase of an insect in relation to its natural surroundings ; the artificial check is intended to decrease the proportion with reference to the cultivated crop for the benefit of the farmer who applied the insecticide.

While there is thus a real relation between my topics, the treatment of them will be disconnected. Under the head of insecticides I intend to present only the results of a few experiments made during the season just past, and in speaking of parasites I will give only an outline of the place of these insects in the natural system and of the way in which they act.

The advent of the pernicious scale in New Jersey has made it necessary to use insecticide substances much more caustic or penetrating than any that have been heretofore required to deal with native scale, or other insects of this character, and the question as to the effect of these washes upon the trees was so often asked without securing a satisfactory answer that much experimentation was and is still needed.

One of the first things that was learned was that we really did not know very much about the matter, and that we had been in the habit of assuming too much upon very hollow bases. The next was that what had been done on the Pacific coast could not be accepted as a certain indication of what could be accomplished here. Local conditions of climate make it possible for them to do some things that it is impossible for us to do as well, or at all, and some applications can be made in our moist climate that would probably be fatal if attempted in the dry air of California. On this point I need not go into detail here, for this subject was discussed in a previous talk before this Board, shortly after my return from California.

I will start at once by saying that at the last meeting, in conversation with two members, the subject of insecticides was discussed and two suggestions were made, which were deemed worthy of trial in connection with other planned experiments. One of these suggestions was that if rosin could be dissolved in kerosene and the resulting mixture used instead of the kerosene alone, we would have a water-proof rosin wash or varnish that would be much more effective than the oil alone. The other suggestion was that crude petroleum should be employed instead of the refined kerosene.

Since I spoke to you last year, kerosene has been very largely used in the State and much scale has been killed with it. Whole orchards of peach, apple, pear and plum have been treated, and with general good results. Some peach trees have been injured, no doubt, but in most cases where this has happened the trees were already weakened by insect attack, and in a few instances the trees were over-treated or too young. Quite enough work was done to make it certain that with proper precautions kerosene is entirely safe, even on peach trees, and is more fatal to the scale than any other material, except, perhaps, crude oil. Summer treatments have been made in a considerable number of cases, and I have carried on some experiments in spraying a mechanical mixture of kerosene and water, applying it several times instead of making one severe application. Where the infestation is not a particularly bad one I am inclined to believe that this is the more satisfactory method, because you can make your application much more thorough, and in consequence stand a better chance of hitting everything there is to be hit. But as one of the results of my 1898 experiments, we now have the knowledge that a number of the insecticides can be used in summer on growing trees, with just as much safety as they can be employed in winter on the dormant trees. In fact, it is not at all certain whether we do not actually do less harm by summer treatment, when the wood is active and vigorous, and only leaves are apt to be injured, than we do in winter, when wood is likely to be killed and fruit buds may be destroyed for next year.

Pear trees, for instance, were sprayed with the full-strength winter wash of whale-oil soap, two pounds in water one gallon, just before the blossoms opened, just after the fruit had set and about the middle of June, a different lot of trees being used in each case, and in no instance was any more injury done than a slight burning of the foliage.

Incidentally, it may be said here that some of the work done with

the whale-oil soap in this State was not as successful as it should have been, because lime was used with the application. Wherever this was done the effectiveness of the caustic in the soap was very much reduced, and, in fact, in some instances there was no effect at all. Only recently I met a Burlington farmer who told me a very pretty story to illustrate this very point. He treated a lot of peach trees with the soap mixture, and, desiring to make a very clean job, he went over a portion of them again with whitewash over the soap. Where he had used the soap alone without any additions the scale was pretty well cleared out. Where he had used the lime after it, it killed the soap completely, and the soap itself did not kill the scale! I am instructed by Prof. Voorhees that this is good chemistry, and that lime has no place in soap mixtures.

The kerosene and rosin mixture was experimented with in a commercial orchard near Riverton, and also on my experimental orchard, for I have myself joined the ranks of fruit-growers and have fifty trees of my very own, set around a house that is not yet all my own. These trees are of all kinds and of quite a variety of sizes; but most of them have two great advantages: they are scaly and they are mine to kill if I wish to do so.

In the commercial orchard, a tree of moderate size was thoroughly painted in January with kerosene three ounces and rosin one ounce, or in that proportion, and from the tip of every twig to the surface of the ground, every spot was completely coated with the varnish. It took a long time to do it; but it was well done, and I felt assured that if this material would ever kill a tree, that tree would be killed. It was a little late in starting in the spring; but it was very full of leaves all summer, though without any fruit. Whether this absence of fruit was due to the mixture painted on or not, cannot be satisfactorily determined, because there was considerable lack of fruit in parts of this orchard and round about. It is fair, however, to assume that some influence was exerted, because there was no blossoming at all. No other harm was done to the tree, and in October, when the picture was taken, it was in as nice a condition as any tree in the vicinity. The varnish stuck until well along in spring, and then it cleaned off finally by chipping and weathering, which left a perfectly clean, healthy bark without a trace of scale; whereas when the work was done, there was no portion of the bark on the entire tree visible to the naked eye.

The summer application on my experiment trees was less successful, and I killed two plum trees and seriously injured a pear.

The plum tree was not very much to brag of in the first place, and was rescued from the brush pile to which it had been consigned as unfit to be planted. Half of the tree died before any treatment was applied, and the other half died immediately after. The pear tree is not yet dead, but I rather doubt whether it will come through the winter in anything like decent shape. Another set of experiments with nursery trees also resulted badly, and I concluded to abandon the rosin as an addition to the kerosene. It added to the expense and to the danger, while it did not seem to add a sufficiently-great proportion of effectiveness against the scale.

A much better result was reached with the crude petroleum. At first blush it would seem as if this material should be almost certainly fatal to plant life, yet, as a matter of fact, experiments seem to indicate that it is much less harmful than kerosene. Indeed, it seems to be rather a stimulant under some circumstances than otherwise. It can be sprayed pure or mixed with water by an emulsion sprayer just like the refined product, and it is at least as effective, if not considerably more so, on insect life. My first effort was to have a tree painted in January so thoroughly as to make sure the oil would kill the tree if it was within its power. The work was put on a Duchesse dwarf, and it was certainly well done, for the oil could be easily seen six months after the application. Long before the tree started it was seen that the scale was dead, for whole flakes of the scurf could be lifted up without any trouble, and the scale coverings had been simply soaked off everywhere.

The tree not only survived this treatment, but put forth a good crop of leaves, a full set of blossoms and a very fair crop of fruit, which was carried throughout the season and matured free from scale, where the year before there had been nothing but nubbins—scaly and useless for market purposes. One of the most interesting facts that developed through the season was that this tree had deeper-colored foliage, ranker and healthier in appearance, than any similar tree around it, and the first impression was that it had been stimulated with some nitrogenous manure. That this was not due to an accident entirely, is proved by the fact that other trees that were sprayed in March presented the same characteristic dark appearance.

The trees that were sprayed in March had little of the foliage burnt, and one or two of the inside shoots were somewhat injured, but practically no harm was done even to the set of fruit and certainly none to the trees themselves. On the experiment orchard peach, apple and pear trees were sprayed with crude oil during the

growing-season, and in all cases without injury. In fact, I have done absolutely no harm with this crude oil used on the plants, no matter under what circumstances the applications were made. Several of my trees were sprayed twice, and one tree was sprayed with crude oil and twice with kerosene. It was alive when I looked at it last, a few days ago. I rather expect it to survive the winter, and to make at least a start next spring.

My object is not to give you in detail what I have done. You will find all that noted in the annual report. I simply wish to indicate that there is yet something to be learnt, and that while progress is slow, it is yet progress, and even the pernicious scale is not spreading more rapidly than we can check it with the means already at our disposal. If the crude oil works out according to its present promise I think the scale problem may be considered as ready for settlement whenever the fruit-growers themselves are ready to settle it.

What is needed is a constant pegging away at the problem, a constant studying of the various factors involved, and digging away, so to speak, and unearthing facts.

Of course, there are all sorts of facts that are to be dug out not always connected with economic problems, and sometimes it is necessary to prepare your facts, to place them in condition to be dug out.

The second branch of my topic, parasites, is one that is incidentally touched upon in almost every essay on an injurious species, when the Entomologist tells the farmer how much nature is doing for him when it does not allow the injurious insect to eat up everything he plants.

Somehow we get the idea that parasites, because of their habits, are degraded, lowly-organized creatures, ranking well down in the scale of development; but as a matter of fact this is not at all the case. None of the primitive orders of insects contain parasites, and even at the present day parasitism is best developed in the two most highly-specialized orders that we have, that is, the Diptera or flies and the Hymenoptera, which include the bees, wasps and ants. Indeed, as developed in the insects, parasites are high in the scale, and are among the most specialized of all. It would carry me too far if I were to attempt to explain in detail why this is so, but it is, to a large extent at least, a necessary result of changing conditions. In geologic times, when roaches were from six inches to a foot in length, and dragon flies expanded two feet, there were hordes of insectivorous animals that kept the vegetable feeders in check. As

these animals died out, and the insects eventually became modified on a smaller scale, so as to give man a chance, parasitism became established until a balance was secured—an adjustment, that is—between the vegetable feeders on the one side and their enemies on the other.

This balance is the result of ages of persistent experiments on the part of nature, continued until all is so nicely adjusted that neither host nor parasite varies much in the long run under normal conditions.

Parasitism is, of course, only one of nature's methods, and perhaps not even the most important, but for the present we can ignore all other factors for the sake of studying this one more closely. As an example of the kind of adjustment that comes by long habit it is interesting to refer to the Phylloxera.

In America, where the Phylloxera is at home, the vines gradually become accustomed to the insects. Those that did not die, the others grew up together and the fittest only survived, so that now we have what we call resistant stocks. There being no Phylloxera attacking grape in Europe, the vines that developed there never became used to anything of the kind; hence, when the insect was introduced into that country, it threatened ruin and did cause widespread disaster until some genius discovered the very obvious method, the using of American resistant stocks.

It is, first of all, an important consideration that parasites act as checks only to undue development, and that the ratio of insect to plant is about the same from year to year. Extermination is not aimed at; it is live and let live. This ratio, I say, remains about the same, and is very apt to accompany a cultivated crop no matter how much the area is increased. That is, if one in twenty plants is about the number destroyed by insects under natural conditions, at least as much injury will be caused when this crop is cultivated. Parasites destroy millions of their hosts annually; next year there are just as many more to be destroyed. In other words, while the farmer could not grow crops without parasites upon the plant-feeders, he cannot depend upon these parasites to prevent all injury to his plants.

When this fact is once fully realized we will be much less inclined to expect impossibilities, for instance, that an established vegetable feeder should be reduced to a harmless point by an introduced predatory or parasitic form. But let me also be quite clear on this point, so that I do not appear to contradict facts. If an insect, such as a

scale, be transported from a country where it does no injury to a new territory where it increases so as to become a pest, it is quite possible to bring into this same new territory the natural enemies that checked it at home, and there is at least a fair chance that they will do as much in the new conditions.

That is what was once done in California and what has been since done in Hawaii, in both cases successfully. It was not what was attempted when Californian "lady-bird" species were sent into New Jersey three years ago, and the latter experiment was almost foredoomed to failure. I have said that parasitism is not an early development among the insects; it is really a modification of a predatory habit, and we find a great many cases even now where it is a question whether we have a case of real parasitism or not.

When an insect by force of arms or legs captures another and eats it, it is a clear case of predatory habit; and it is nearly as clear when the wasp captures caterpillars, grasshoppers and spiders, stings them into insensibility and stores them for her larvæ to feed upon.

When a wasp captures a cicada, stings it, carries it to a burrow, lays an egg on it and the larva develops by feeding on this paralyzed cicada, there is a little change, for now the larva is dependent upon a single host specimen only, and if this proves bad the wasp larva dies. When the wasp lays its egg in the burrow of a wood-borer, and the little larva crawls along this until it finds the borer, upon which it fastens at the outside, sucking the juices of the host which continues alive, then I suppose that we have a true parasite.

So we have quite a lot of wasps that hunt white grubs—that is, larvæ of May beetles—and lay their eggs upon or close to them. The larva attacks the white grub from the outside and clings to it, literally for dear life, until it is full grown, and nothing is left of the host.

It is only a small step from this to a case where an egg is laid in a caterpillar and the larva develops in the body of the host, feeding only on the non-vital parts, but when this step has been made a very important change has really taken place. Living on the inside of its host and depending on it for a living, the well-being of the host itself is of great importance to the parasite, and it carefully avoids all vital organs. It must not cause irritation sufficient to produce inflammation in the host, hence it cannot excrete; therefore in the larvæ of parasitic wasps that feed internally the alimentary canal ends blindly, and only when full grown and when the life of the host is no longer important is an anus formed through which the waste matter produced during its entire life is at once discharged.

Once fully established in the Hymenoptera, parasitism extended in all directions ; hundreds were developed, feeding on all families and orders, and on insects in all stages from the eggs to the adult.

There is no insect so small that it does not support a parasite ; there is no insect larva so obscure or so well protected that parasites do not find it. We have little wasps that hunt up the eggs of other insects and lay their own into them ; and these kinds of parasites, be it said incidentally, are of the utmost use, because here the host is nipped in the bud, and every insect egg destroyed by a parasite is a positive gain for the farmer. This is not by any manner of means the case always. In some instances the parasites lay their eggs in caterpillars, the caterpillars feed and so do the parasitic larvæ. Eventually the caterpillar dies without making a moth ; but what has the farmer gained by it ? To be sure the parasite has destroyed the caterpillar, but the caterpillar fed upon the farmer's plants during the entire summer in order that it might make tissue enough to supply the parasite feeding inside of it. This is another point that we must keep in mind and must not lose sight of when we speak of benefit from parasites. True, they destroy caterpillars ; but they do not always destroy the caterpillars until after they have done all the damage that they are ordinarily expected to do in the course of the season.

During the latter part of summer we find on tomato or potato vines great large green caterpillars with a horn on the tail ; a "horn worm," as it is locally known. We find that a considerable number of these, perhaps the most of them, will become covered with little white, egg-like bodies, and indeed they are generally supposed to be caterpillar eggs, but they are really the cocoons of little parasitic wasps, and the caterpillar dies ; but that same caterpillar has eaten a large proportion of the tomato vine, and has eaten, in fact, quite as much as if it had not been parasitized at all.

If we look at the cut-worms that occur in considerable numbers in our fields each spring, we will find that on a number of them are little white eggs, usually near the head.

Every one of these eggs makes a maggot that feeds in the caterpillar and when the caterpillar is full grown we get from it instead of a moth or miller, a mass of flies. Out of a hundred "worms" that we find in the field in spring, probably not 2 per cent. escape to produce moths ; but while only 2 per cent. make moths, the other 98 per cent. cut the farmer's cabbages and sweet potatoes or whatever else he had upon the ground, just exactly as if they also would produce

adults in good season. Next year the two that were left over will provide for the other 98 per cent. that were killed off, and caterpillars will be present in just exactly the numbers they were before. This is another illustration of the statement that a balance only is maintained and that it will not pay to rely upon nature to lessen its allotted numbers.

The man that relies upon natural enemies to prevent injury from insects, or to do any other act for his benefit, is the man who gets left every time. Nature owes him a living but only if he works for it, and it does not owe him clothing, nor a piano for his daughter, nor a race-horse for his son, nor a bicycle for himself and wife. All these things, if he wants them, he must work for and he must tear them by sheer force from nature's storehouse, and by fighting the naturally-established order.

The smallest as well as the largest insects are subject to parasitic attack, and there is no plant louse and no scale so inconspicuous or minute that it has not a species which is on the lookout for a chance to attack it. It is not an infrequent thing for me to have a farmer speak of the San José or pernicious scale as something so small that it can hardly be seen, yet there is a wasp that hunts up these scales, lays an egg through them into the half-grown creature beneath, from which egg comes a larva that finds all the necessary nourishment to bring it to maturity in this little scale.

It is a matter that is certainly deserving of thought, that in a compass so small that the human eye scarcely perceives it, we have a fully-organized creature, with life, with intelligence of its kind, with a nervous system so minute that it requires a microscope even to see it, and yet organized so as to furnish organs of sight, organs of touch and organs of taste, if not of smell, as well. We have a digestive system in this minute creature in which the same processes take place that occur in larger forms. We have a muscular system so elaborate as to enable the insect to go through all the motions performed by creatures many hundred times its size. We have sexual organs in which all the necessary cells, eggs, &c., are elaborated, and all this in a compass so small that the parts themselves seem scarcely capable of holding the functions that they actually accomplish. It is exactly the difference between a Corliss engine actuating an immense steam hammer and a lady's watch of the smallest size. Both are perfect of their kind, and these little creatures are as highly organized within their limits as are any others. They have their function in life and they perform it. They work towards an end,

though they may not be conscious of the end towards which they work, and with or against them may be acting a considerable number of other species concerning which they probably know nothing.

Insects are not by any means confined to *one* parasite. There may be half a dozen, or even more, attacking a given species, and usually the more widely distributed a form is the greater the number of insects that are parasitic upon it.

As an illustration of this fact the honey bee may serve. This has a parasite that lives upon it outside, among the hair—a louse, in other words. It has a parasite that lives in the abdomen. There is a beetle that gets into the combs and attacks the larva or the food provided for the larva. There is another that gets upon the bees when they visit the flowers, is carried into the nests, and lives upon what it can pick up among the combs or cells; and so there are several others, all of whom attack the bee in different stages or in different ways, so that its life is made as troublesome and as miserable as that of man, with his array of tapeworms, trichina, liver flukes and other creatures that get into his internal or external economy.

With all these parasites the aim of nature is still the same, to keep the host at a certain limited point, and all the parasites and all the diseases working to the same end do not accomplish more than just this one feature.

It is interesting to watch a parasitic insect after its prey. When it finds, say, for instance, a plant louse, if that is the host, the minute little wasp will hover over it, will apparently inspect it from all sides to make certain that some other creature like itself has not been ahead of it in laying an egg, and will, in short, test and select its prey with the same care that would be exercised by a careful butcher in killing something for his own particular consumption. When everything is found to be satisfactory, it darts down, ovipositor extended, punctures the insect with a point finer than the finest needle, and away it goes, leaving an egg in place almost before the plant louse has been able to kick. Kicking, indeed, does not avail, and as the pain caused cannot be severe anyway, the host insect immediately resumes its feeding, and the egg in due time hatches.

Now this ovipositor or sting is also a very interesting and complicated structure. It is finer than the finest needle that can be made, and yet, minute as it is, so that you can scarce see it without a microscope, it is formed of no less than three separate pieces, which slide upon each other and between which the egg is passed at the time the puncture is made. It is a tool perfectly adapted for its purpose, and

the smallest of the parasites has it as complicated in all respects as has the largest.

It is not to be believed that all parasites are small. On the contrary, there are some comparative giants among them, and one of these is a creature that is not infrequently seen under circumstances that are so suspicious that it is not surprising that it has been believed to be a plant-borer itself.

This creature has an ovipositor or egg-laying tube nearly six inches long, and this bristle-like structure it drives into the solid wood of trees of various kinds, looking by means of its tail for the gallery of a wood-borer. These ichneumons are perfectly able to recognize an infested tree, and they seem to be able to tell closely about where a gallery of the borer runs. Having satisfied themselves upon this point, they drive into the tree, sometimes for four inches or even more, until they strike the gallery that they had determined to exist. When it is reached, an egg is laid. There is no pretense in this case of hitting the actual borer. If the gallery is hit, it is all that can be expected. The egg is attached anywhere, and when this hatches the resulting larva makes its own hunt for the borer. In a sufficient number of cases it succeeds, and the borer never reaches maturity. Of course, the parasite itself sometimes fails to find a borer. In such a case an egg is wasted, but this does not amount to very much, because nature always provides for an enormous duplication of life. Life is the cheapest thing that nature has to deal in, and it is absolutely reckless in its disposition of it. Millions of living beings are brought into existence only to be killed off, and sometimes in a very brief period. We have a number of insects that deposit more than 1,000 eggs; some of them that lay between 4,000 and 5,000; great quantities that lay 400 and 500 each year. In the long run two individuals, a male and a female, are all that survive out of these thousands. The other eggs hatch into living beings, but are destroyed before they reach maturity or get an opportunity to reproduce, and so we find in the insects that the ovaries are among the largest and most prominent of the organs.

Eggs are produced in enormous quantities, a dozen being sometimes laid where only one is expected to survive. Of course, the vegetable feeders are equally well provided, and they lay a great quantity of eggs, that there may be a chance for the parasites as well as to keep themselves alive.

I have merely touched here upon the general subject—merely given you a few suggestions—some few things to think about. To

go into the subject at all exhaustively would take a book, and not a small one at that. I want to clear your minds, if possible, of the idea of a reliance upon parasites. They have their function in nature, but their function was established by nature, not by man. They were not established for the benefit of the farmer, they were established for the benefit of the plants that were threatened by the creatures that feed upon them. The plant species is not threatened with destruction, because the farmer loses half his crop. It is the farmer's business either directly or indirectly to discover the insect status of the case; he must find out just what it is that threatens his plants; he must find out just how far natural checks control the development of the insect that threatens his crop, and when he has discovered that, and has learned just exactly what nature has done for the plant, he must do all the rest for himself. These investigations sometimes occupy considerable lengths of time. It is rare that we can learn anything definite concerning an insect in less than a year. In fact, the result of one year's work may be no more than to show us what we must do the year following in order to actually learn something. Indications are sometimes deceptive, and yet we must have a certain showing, that teaches us that there is something to be found.

We may find little heaps of sand in the barren places in our pine woods. We have learned by experience that there are insects beneath there working, carrying on an existence under ground, and if we wish to learn anything concerning these insect we must dig—we must enter the ranks of the diggers and delvers ourselves, and after a long day's work we frequently carry home the results in a very small box. Just so the farmer must very gradually accumulate the material that will enable him to raise crops intelligently. I think the time has passed when it is believed that anybody can be a farmer, or that anybody can raise crops. It never was true anyway. Crops of a sort can be raised without very much intelligence, of course, but raising such crops as the land will give, of such a quality as it is possible to obtain, and in such quantity as will supply all a farmer's needs and some of the luxuries for his wife, requires intelligence, patient and persistence. Good, intense farming is as much a drain upon ability as was the conception of that wonderful piece of engineering, the bridge that connects the two cities of New York and Brooklyn.

REPORT OF THE COMMISSION ON TUBERCU-
LOSIS IN ANIMALS, 1898.

REPORT OF THE COMMISSION ON TUBERCULOSIS IN ANIMALS, 1898.

In reporting the work of the Tuberculosis Commission of New Jersey for the fiscal year ending October 31st, 1898, we might give a statement simply of what has been done and stop with that, but as milk is an article of such great importance as a human food, of such magnitude commercially, prominent in its proportions as a farm product, and hence requiring an immense capital to maintain and the continuous employment of a large army of workers, the subject deserves more than a passing notice.

We may well begin this report with the closing paragraph of that of 1897, and for the purpose of emphasizing some of the points there enumerated under the head of "Some of the greatest defects." These were stated as: "Crowding too many animals on a limited floor space. Lack of air space above, in front and behind the animals. Lack of sufficient ventilation, or ventilation so arranged as to make dangerous draughts of air on the animals. Great deficiency of light. Damp stables and, if dirt floors, constantly wet—even muddy. Stables and doors barricaded with rotting manure. Surrounding barnyard (the cattle's playground) a quagmire of filth. Unsuitable bedding, as half-rotted, mouldy straw, bog hay and the like. Dirty, untidy methods in feeding, allowing hay-seeds, dirt, dust, roots, silage, malt sprouts, &c., in varying degrees of mixture and decomposition, to accumulate, thus aiding to further pollute the air, besides furnishing the best conditions for bacterial growth. Allowing diseased animals to remain in stables with healthy ones. Putting healthy animals into disease-polluted stables. Failure to use disinfectants and absorbents. Feeding badly-fermented food and musty hay and stalks. Infrequent watering, impure water, exposure to cold and to stormy weather."

Crowding.—There seems to be a general disposition to economize in lumber at the expense of health. Taking the whole floor space, stalls, entry, manger space and bins, the average breathing space to

each animal is not more than three hundred and fifty cubic feet. It will readily be seen that in a stable containing a number of cows with no more breathing room than this, unless ventilation is about perfect, this body of air will be rebreathed thousands of times during twelve hours, and must therefore become soon destitute of the necessary quantity of oxygen. Result, cattle are weakened, enfeebled and made an easier prey to disease, and their product correspondingly reduced in its life-sustaining qualities.

Ventilation.—This for humans as well as bovines is a most important subject. There seems to be no generally-accepted plan or system for ventilating stables that can be recommended for adoption by all. Buildings are so differently constructed and conditions so varied, each one does as, to him, seems best. But that there is great room for improvement, and that improvements could be made at a small cost, is evident from what we have seen of the stables throughout the State.

In fact in very many stables that have come under our notice this subject seems to be entirely ignored. The thought in their construction seems to have been to exclude outside air in order to have the stables warm. Warm they should be, but warmth should be made possible with abundance of fresh air and not conditioned upon its exclusion. Study the various plans and adopt that which has proved to be effectual.

Light.—As a life-giver, health-preserver and purifier, light seems also to be greatly underestimated. A very small per cent. of stables have enough. It is impossible to have absolutely healthy conditions without it—even if the cattle are stabled only at night, light is needed. And if sunlight direct can be secured for some portion of the day, so much the better.

Germ life will not thrive so well nor multiply so rapidly where this prevails. But if cattle are stabled during the day, and good dairy-men will not leave them exposed outside in cold and stormy weather, it is criminal to shut them up in gloomy, dark stables. The effect of light on life is well illustrated in the case of a growing plant placed in a dark cellar. It soon becomes weak and sickly. To the eye the effect on animal life may not be so soon visible, but the injurious effect is there just the same.

The purpose should be to make the stables comfortable, cheerful and healthy. Securing these is to secure the greatest profit from the animals.

Milk, if produced by healthy animals from wholesome food and

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drink, is more nearly a perfect food than any other natural product. Strictly it is the product of maternity, of animal life to support animal life. There is no other product like it. A complete food in itself, it also enters, to a large extent, in the composition of other articles of the daily meal; while butter and cheese are products of this product.

Being to so large an extent a substitute for human mothers' milk in supporting infant life and being so susceptible to invasion by deleterious odors and disease germs, suggests further the great need there is of the utmost care in stable location, construction and drainage, and also as to absolute cleanliness of milking utensils and in handling the milk.

Much has been written concerning the best stall and fasten for cattle and somewhat as to the best floor. Whatever the material used, the floor should be so constructed as to prevent the collection of liquids under and near the floor. If cattle are stabled over a basement, this objection is obviated—and they had better be stabled over it than in it, as a rule. Here a plank floor answers a good purpose.

Cement floors for this reason would seem to be best. They have the further advantage of saving all the manurial elements excreted by the animals, providing the manure is judiciously managed when taken from the stables. Next to cement a well-made earth floor is good, providing the trough for the droppings is so constructed that it will not leak. With earth floors the trough should have a plank on either side of a foot in width, to prevent treading up the earth near its edges and thus prevent a wet and muddy surface.

Stables should be thoroughly and frequently cleaned and occasional applications of land-plaster, lime or some other suitable deodorizer, to fix the ammonia and purify the air, should be made. So applicable to this general question, as enumerated in the quotation from our last report, are the views of M. N. Ross, B.S.A., as published in the September 27th number of "Farming" a Canadian paper published at Toronto, we give the article entire and commend its perusal to every dairyman:

"The science of bacteriology is forcing more attention to be paid to the details in the production and manufacture of our chief food substances than has hitherto been thought necessary. As a result many kinds of food can now be obtained in a purer and better condition than was possible under the old methods, and at the same time the cost of their production has been much lessened, owing to

the prevention of waste and decay, and, what is still more important, a great deal of sickness and disease is prevented.

“It has long been known that milk obtained from cattle kept in filthy and ill-ventilated stables becomes impregnated with the odor of the stable, and turns sour or rotten sooner than milk produced in clean stables. But it is only comparatively recently that the exact cause of these changes in the milk has been ascertained, and owing to this knowledge it is now possible to take steps which will enable the milk to be secured and kept wholesome by the employment of the most economical and effective methods.

“Science shows that all the changes and most of the taints in milk are caused by living organisms; it shows that these organisms require food in order to multiply; that there are certain temperatures at which they grow most rapidly; others at which their growth will be checked, and others at which they will be killed entirely. It shows also that as long as these organisms are growing they are either acting upon the substance in which they live in order to render it more suitable for their own nourishment, or that they are giving off excretory products which may act upon the food substance so as to change its composition, and which may also act as poison to any person eating the food. Some germs found in milk have no appreciable effect on it.

“In order to guard against the losses caused by tainted or sour milk, the farmer has to employ no expensive or tedious methods. He must first ascertain how the organisms gain access to the milk; what the conditions are which are most favorable for their growth, and then how they may most economically be got rid of or controlled. The sources of contamination are many, but those which are most completely under the control of the farmer are the cow's hide, the fodder, the bedding and the manure.

“By far the largest number of germs which are found in the milk come from the cow's coat and udder while being milked, and it will depend entirely upon the manner in which the cow is kept what number, and, to a great extent, what kind of germs will be found upon her; every hair and particle of manure which falls from the cow is covered with bacteria, and it is only by allowing the milk to stand for several hours and then examining the sediment that any idea of the enormous quantity of dirt there is, even in strained milk. As soon as the germs fall into milk they commence to grow and reproduce; the warm temperature of the new milk being favorable for their most rapid development. A great deal may be done to remove

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this source of contamination by keeping the cow well groomed, and by damping her flanks and udder with a wet cloth immediately before milking. This is done because it is impossible for germs to leave a moist surface, and thus they remain on the cow instead of falling into the milk.

“The fodder, if it is dry fodder, such as hay or straw, should, if possible, always be cut and then dampened before being brought into the stable. This will prevent the formation of dust and the consequent dissemination of bacteria. All decaying foods, such as spoiled silage, musty hay, old brewers' grains or rotten roots, should strictly be guarded against. It is now known that their decay and odor are due to the action on them of bacteria, usually putrefactive, or moulds, and if any of these are brought into the stable and the germs fall into the milk, they will, in many cases, reproduce in it the same bad smell that they caused in the rotting food.

“The manure is probably the source of the most injurious germs. Any particles which are splashed upon the walls or passage and allowed to dry there will be distributed through the air as fine dust whenever disturbed. Cow manure contains large numbers of germs, one of the commonest being the *bacillus cote communis*. This germ is really allied to that which produces typhoid fever, and it, together with others frequently found in milk, and which have originated in the manure, are the direct cause of most of the cases of diarrhœa met with amongst babies and children, and which often ends in death. A great part of the disagreeable odor of cow manure is owing to the presence in it of bacteria, and that in many cases the similar disgusting taint met with in milk is due to the presence in it of these bacteria is certain, because milk which has not stood in the stable for a longer period than the time it took to milk will often develop a strong cow taste after several hours. In those cases in which the taint is absorbed from bad air, it will tend to grow less instead of greater the longer the milk is kept.

“Flies are a great factor in the distribution of germs. They assemble upon and crawl over any filth and putrefying matter, which is always full of germs. These will cling to the legs and bodies of the flies, and will be carried by them wherever they go, often onto the hands of the milker, the teats of the cows, and even directly into the milk-pail. In many cases they cause blood-poisoning and gangrene when carried by the flies onto open wounds and scratches. For these reasons flies should be carefully excluded from the stable in summer.”

“Allowing diseased animals to remain in stables with healthy ones.” This is a quite common practice, and the excuse for it is frequently made, “We have no other place to put her.” Whatever the character of the ailment, the owner should immediately, on its discovery, seek the advice of a competent veterinarian and, if the disease is incurable, the animal should be permanently removed from the herd, and even if the disease is such that a cure is hoped for it is questionable whether the milk, during this period, should be used for human food. But whatever the trouble, don't make a hospital of the dairy stable.

So also do not put healthy animals in stalls long occupied by tuberculous animals, until thoroughly fumigated or cleansed. This is to invite a continuance of the disease which the State is assisting you to eradicate. The Commission must insist upon improvement in conditions and management where these are defective. Much work is required to purify water taken from a polluted stream. Better go at once to the source and remove the causes of contamination. Precisely so it is in dairy matters. To have a good, pure, healthful milk-supply, begin at the beginning.

Have healthy animals provided with wholesome food and pure water. Keep them in clean and healthy conditions. Guard the milk from contamination while it is being taken from the cow and in all its subsequent handlings, until it reaches the consumer. Have everything connected with the dairy above suspicion. It is impossible to furnish a pure and healthful milk-supply to consumers from conditions the opposite of those described. Who can bring a clean thing out of an unclean? Not one.

The province of legislation in the matter of pure food may be questioned by some. But who will protect the helpless consumer against unwholesome foods and miserable adulterations if the State does not? Anyone who sets himself up to supply food to the human race should be compelled, if necessary, to furnish honest goods. In the absence of adulteration there is no excuse for putting such an article as milk on the market in a polluted condition.

In the matter of adulteration, whether of milk or other articles of food, the avarice of man is measured only by his ability to deceive. The State alone can compel the adulterater or mixer of natural foods to make them free from injurious substances, and to sell them labeled for what they contain, and the State should do this. Consumers have a right to this protection.

The Treasurer's report will show the number of animals examined and the number condemned, with other details of the work done

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during the year. The increase in the appropriation granted by the Legislature and approved by Acting Governor Voorhees has been of great benefit, as without it many applications would have been denied assistance.

The results following our work have been very beneficial, animals believed to be affected with the disease have been slaughtered, stables cleaned and watchful care enjoined over the remaining animals.

In the matter of purchases, too, dairymen are becoming more careful lest they introduce diseased animal in place of those destroyed. Aiming to control and, as far as possible, overcome this disease within the State, suggests consideration of the question whether the State should allow the indiscriminate importation of cattle from other States into this without some guarantee as to their condition of health. Pennsylvania has placed a legal barrier against unhealthy cattle from other States. For New Jersey to do so would be to stop one possibly prolific source of continuous infection. And persons intending to purchase cows to put into their herds and stables should be very careful to know that such cows are in a healthy condition, whether they are purchased from cattle brought into the State by cattle dealers or from a neighboring herd. Promiscuous sales of diseased herds have contaminated many others.

From the experience of the Commission and with that of others, both scientific and otherwise, and the observations of both radical and conservative writers on the subject of tuberculosis and its treatment, the Commission believe they are pursuing the right course in the prosecution of this work. The tuberculin test is not used except on cattle that are found to be suspicious from a physical examination and yet not sufficiently advanced to condemn from such examination.

Our aim is to remove animals whose diseased condition cannot be doubted, improve conditions and help cow-owners to a better understanding of this disease, of conditions favorable to its propagation and, conversely, what is required for its eradication, and in this way to educate, so to speak, cow-owners to improvement in dairy management in order to a healthful milk-supply.

But where a herd has been for a long time contaminated, where year by year animals have died or have been slaughtered because of the prevalence of this disease among them, and the conditions of stable and environment are conducive to the continuance of the trouble, the Commission in such cases test the entire herd, recommend the reforms needed, and thus enable the owner to make a new start with a healthy herd and in conditions that may be considered safe.

Another matter to which, in the prosecution of this work, attention has been called, is the fact that there are men in different parts of the State who make a business of buying cows of doubtful soundness for the purpose of slaughter and sale as beef. Unless our cities and towns, through their boards of health or in some other way, exercise supervision of their meat-supply, such unscrupulous persons will be permitted to carry on this nefarious business without hindrance, regardless of its effects upon consumers, who are usually not qualified to discern that the meat they are asked to purchase and consume is from diseased animals.

The report of examinations made, cattle tested, cattle condemned, &c., is as follows :

County.	Total No. examined.	Total No. condemned.	Total sum paid.
Bergen	59	7	\$186 75
Burlington.....	153	38	971 25
Camden.....	14	1	27 00
Cape May.....	25	3	76 50
Cumberland	39	1	10 50
Gloucester.....	29	2	45 00
Hunterdon	156	17	316 50
Mercer.....	375	93	1,480 95
Middlesex	20	3	82 50
Monmouth.....	22	1	6 00
Morris.....	8	2	56 25
Passaic.....	2	...	.....
Ocean.....	20	...	.....
Salem.....	209	22	363 75
Somerset.....	102	47	1,272 75
Sussex.....	56	2	18 75
Union	1	1	11 25
Warren.....	143	5	172 50
Total appropriation.....			\$7,500 00
Total sum paid for cows.....		\$5,098 20	
Expenses of inspection.....		1,179 00	
Expenses of Commission.....		156 57	
Secretary and stenographer.....		834 00	
Expressage, printing, postage and stationery...		118 87	
		<hr/>	7,386 64

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CONTAGIOUS DISEASES OF ANIMALS

Reported Between October 8th, 1897, and October 27th, 1898.

CONTAGIOUS DISEASES OF ANIMALS

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DATE.	NAME AND ADDRESS OF OWNERS	DISEASE.	BY WHOM REPORTED.	ACTION TAKEN.
1897.				
Oct. 8	Edward Greene, Newark	Glanders 1	Dr. W. Runge.....	Animal destroyed.
" 17	John Anderson	" 1	" "	" "
" 19	Windsor Truck Co., Hilton... ..	" 1	" "	" "
" 21	Doremus Bros., Newark.....	" 1	" "	" "
" 29	E. Clark	" 1	" "	" "
Nov. 29	Mr. Atwood, Hopewell	" 6	Dr. Hawley	" "
Dec. 2	Isaac Scull, Newark.....	" 1	Dr. W. Runge	Mallein test negative
" 12	—, South Branch	Hog cholera .. 1	Dr. Morrell.....	200 animals died.
" 21	A. C. Orr, Newark.....	Glanders... 1	"	Animal destroyed.
" 28	R. Page Jersey City.....	" 1	D. W. Benjamin.. ..	" "
Feb. 8	—, Plane St., Newark	" 1	" "	" "
" 11	U. S. Express stables, J. City..	" 1	" "	" "
" 25	—	" 1	" "	" "
Mar. 8	G. Ternell, Newark	" 2	Dr. W. Runge	" "
" 8	Mr. Speck, Pomona	" 1	Dr. E. A. Smith	" "
" 24	—, 34 Grace St., J. City.....	" 1	D. W. Benjamin.....	" "
" 25	—, Bound Brook	{ Suspec'd pleu- ro-pneumo'a }	{ Mr. Negus.....	No case found.
April 1	E. S. Davidson, Harrisonville	Tuberculosis... ..	Owner.....	{ Referred to Tuber- culosis Commission
" 3	Barney & Co., Newark.....	Glanders ... 1	D. D. Chandler.....	Animal destroyed.
" 12	J. B. Simpson,	" 1	Dr. W. Runge.....	" "
" 17	E. G. Detrick, Orange.....	" 1	" "	" "
" 27	J. B. Simpson, Newark.....	" 1	" "	" "
May to June	{ Dairies in Caldwell town- ship	{ Vaccinia... ..210	{ Dr. R. B. Smith and Dr. W. Runge.....	{ Isolation.
May 7	U. S. Express Co., J. City.....	Glanders... 1	Dr. Mathews.....	Animal destroyed.
" 12	—, " Hoboken.....	" 1	Dr. Dixon.....	" "
" 28	—, "	" 1	" "	" "
June 1	—, 78 Griffith St., J. City.	" 1	D. W. Benjamin.. .	" "
" 6	—, Rutherford.....	Tuberculosis 1	{ Local Board of Health.....	{ " "
July 5	Jas. Smith, Martinville.....	" 1	Dr. Voorhees	{ Referred to Tuber- culosis Commission
" 8	Geo. Disbrough, Martinville..	" 1	" "	{ Referred to Tuber- culosis Commission
" 15	{ Kennedy & Dailey Co., Trenton.....	Glanders... 1	Dr. A. S. Baldwin	Animal destroyed.
" 15	H. Owens, Trenton	" 1	" "	" "
" 22	Mrs Hunter, Paterson.....	Tuberculosis 1	Owner	{ Referred to Tuber- culosis Commission
Aug. 9	G. Johnson, Stockton	" 1	" "	No case found.
" 11	F. Helb, Newark	Glanders... 1	Dr. W. Runge	Animal destroyed.
Sept. 11	J. Schnalls, Lyons Farms.....	" 1	{ Drs. Runge and Zucker	{ " "
Oct. 4	John Keffler, Newark.....	" 1	Dr. W. Runge.....	" "
" 27	Tookey & Son, Harrison.	" 1	" "	" "

Very respectfully,

HENRY MITCHELL.

Secretary.

OFFICE OF THE BOARD OF HEALTH OF
THE STATE OF NEW JERSEY,
TRENTON, NOV. 30th, 1898. }

Mr. Franklin Dye, Secretary Board of Agriculture, Trenton, N. J. :

DEAR SIR—In accordance with the provisions of the act approved May 4th, 1886, the State Board of Health reports as follows :

No extensive outbreak of contagious disease among animals has occurred in New Jersey during the past year. Tuberculosis has continued to spread as usual from cow to cow in the dairy herds in many parts of the State, and hog cholera has appeared in limited areas, the largest losses from this affection having been in Somerset and Cumberland counties.

A few cases of actinomycosis were brought to the attention of the Board. A localized epidemic of vaccinia occurred in Essex county in May and June, and proved interesting because of the rarity of this disease in the United States. About five or six hundred cattle were affected by the disease, which ran a short course, developing the typical lesion on the udder and thighs.

The character of the disease was first recognized by R. B. Smith, D.V.S., and afterward the diagnosis was confirmed by W. J. Coates, M.D., D.V.S., lecturer on diseases of animals in the American Veterinary College, New York, and by Dr. A. H. Doty, Quarantine Officer of the Port of New York.

Dr. W. Runge, of Newark, also expressed the opinion that the disease was vaccinia.

Following is a letter stating the views of Prof. Coates :

[Copy.]

AMERICAN VETERINARY COLLEGE.

H. Liantard, M.D., V.M., Medical Director.
W. J. Coates, M.D., D.V.S., Chief Surgeon.

139 W. 54TH ST.,
NEW YORK, May 21st, 1898. }

This is to certify that on March 16th, at the request of the New Jersey State Board of Health, and in company with Drs. Mitchell and Hunt of said Board, I examined the cows of the Fairfield Dairy Farm, at Caldwell, N. J., especially those which were marked and set aside by Drs. Smith and Runge, and found said cows in various stage of the disease called vaccinia (cowpox), some with papules, others with vesicles and pustles, and many in the desquamative stage. Also examined three cows which had been vaccinated with the lymph of cowpox, and these three cows simulated the lesions found on the udders of the cows affected.

(Signed) W. J. COATES, M.D., D.V.S.

CONTAGIOUS DISEASES OF ANIMALS.

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At a meeting of the Monmouth County Board of Agriculture held September 3d, 1898, it was by resolution ordered that the Secretary should request the State Board of Health to take action when the next outbreak of hog cholera shall occur to stamp out the scourge. The following reply was made :

OFFICE OF THE BOARD OF HEALTH OF THE
STATE OF NEW JERSEY,
TRENTON, Sept. 14th, 1898. }

Mr. D. A. Vanderveer, Secretary Monmouth County Board of Agriculture, Freehold, N. J.:

DEAR SIR—Yours of September 6th received, together with newspaper clipping, and we are pleased to learn that the farmers of Monmouth county are preparing to prevent the spread of hog cholera.

You are, of course, aware that no remedial measures have heretofore been found effectual for the cure of animals once affected by this disease, but there seems now to be reason to believe that the application of the serum treatment for the prevention as well as the cure of this affection may work a revolution in the near future in dealing with this ailment.

A recent communication from the Bureau of Animal Industry, Washington, D. C., states that the amount of hog cholera serum available for use has thus far been insufficient to meet the demand of those who desire to employ it, but it is believed that an ample supply will soon be ready, and we shall then be anxious to begin its use in New Jersey. At the present time the only known measure which can be depended upon to prevent the spread of hog cholera is the separation of the uninfected animals from those which have been attacked by the disease or exposed to the infection. The owner of the animals can himself conduct this quarantine or isolation, and we find that all thrifty farmers promptly apply this means to prevent losses which would attend the mingling of the sick with those which have not been attacked, and it is necessary to introduce official control only in the case of neglectful hog-owners.

Very respectfully,

HENRY MITCHELL,
Secretary.

A considerable trade seems to have recently sprung up in the purchase, slaughter and sale of tuberculous cows. This disreputable business is carried on by parties who shield themselves behind the statement that they "Did not know that the animal was sick," and as the carcasses are almost without exception sent to market outside of the State, information concerning the transaction is rarely obtained from the health officers of New Jersey. The diseased animals are generally shipped from some rural point, and the township authorities often give no heed whatever to cases of this nature when the carcass is not offered for sale within the local jurisdiction.

The State Board of Health takes prompt action to enforce the penalty for the violation of the law whenever the facts and evidence will secure a conviction, but no inspection service is maintained by the State to seize and condemn all carcasses unfit for food, and the detection of diseased meat is not often undertaken by local health officers except in a few cities.

The following letter indicates the trying position in which the farmer is placed by the knowledge that he has tuberculous animals in his herd :

—, N. J., June 7th, 1898.

Henry Mitchell, M.D., Secretary State Board of Health, Trenton, N. J.:

DEAR SIR—I am a practicing veterinarian, and was called about January 1st, 1898, to visit a cow belonging to a dairyman who runs a retail milk wagon in a neighboring town, having a very fine herd of grade Jerseys and Guerneys said to be worth an average of about \$75 a head. This herd numbers twenty-five animals. The cow referred to I found suffering from a very severe type of tuberculosis, and I slaughtered her, holding post-mortem examination which confirmed the diagnosis. I then made a very careful physical examination of balance of the herd, finding three more which were affected with the disease, and which were killed. The remaining cattle were fat and in every way in fine condition. I visited the herd a number of times during the next three months, finding everything straight, when last Saturday I was again called to visit another cow which I found affected in like manner. I killed her this afternoon and made post-mortem examination, confirming diagnosis. The owner of this herd is solely dependent on his dairy for his support, and if this disease becomes general he will lose his farm and his all. This farm is one of the finest in our county, and the trouble came through a cow purchased some eighteen months ago in Camden county.

What would you advise me to do in the premises? I had a long talk with the owner to-day, and he stated that if this thing became known he might as well quit business at once, as competition is so great in his business that if the other dealers in milk heard of his misfortune they would use it for their own gain. He is very careful as regards cleanliness, and would under no circumstances sell a drop of milk from a diseased cow. I suggested to him to try the tuberculin test, but he would not listen to it unless it could be used privately.

Can tuberculin be procured through your Board, to be used privately?

Please advise me also in reference to the best method of disposing of the carcasses. During the past nine months I have condemned and slaughtered six other animals with this trouble. I am satisfied that very few herds in our county are free from this disease, and dairy interests have a dull prospect.

Very respectfully,

— — —, V. S.

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The following reply was made to the foregoing letter :

OFFICE OF THE BOARD OF HEALTH OF THE }
STATE OF NEW JERSEY, }
TRENTON, June 14th, 1898. }

Dr.——,

DEAR SIR—The questions presented in your letter of June 7th are full of interest from a sanitary point of view. Under the law approved May 22d, 1894, bovine tuberculosis is placed in the hands of a special commission, and, unlike other communicable diseases affecting animals, this disease does not come under the control of this Board. All persons who are familiar with the tendency of the times must realize that a popular demand is bound to be created for clean milk from healthy cows, and unquestionably the day is not distant when the revolution which has already begun in the milk business will be fully accomplished, and cleanliness in taking the milk, cleanliness in the storage, transportation and delivery of milk, will be the rule instead of the exception as at present. The communicability of tuberculosis from animal to animal and to man is now so well understood that it is incautious, to say the least, for an owner of cattle to add to his herd a cow which has not been tested by the use of tuberculin, and it is equally careless to stable cows in infected buildings or under conditions where insufficient light and air are provided. Tuberculin cannot be procured through this Board, but a letter to Mr. Franklin Dye, Secretary of the Tuberculosis Commission, Trenton, will probably bring the information you desire.

Yours truly,
HENRY MITCHELL,
Secretary.

STRUCTURE AND INDIVIDUALITY OF
ANIMALS AS RELATED TO
PURPOSE.

BY DR. GEORGE M. TWITCHELL, EDITOR OF "THE MAINE FARMER,"
AUGUSTA, MAINE.

STRUCTURE AND INDIVIDUALITY OF ANIMALS AS RELATED TO PURPOSE.

Mr. President, Ladies and Gentlemen—It is with no thought of instructing that I have journeyed from the snow-covered hills of the Pine Tree State to talk with you for an hour concerning this most important problem. Simply as a student do I rise to suggest what, in my investigations, have been forced upon my mind as fundamental facts concerning cow-structure. If I am able to provoke discussion, to turn your thoughts just outside the channel of daily investigation, the full purpose of this paper will have been realized.

Concerning the physical structure of our domestic animals, much is already known ; concerning functions, their origin, purpose and development, much also is known ; concerning the relation of physical structure to purpose, the result of functions abnormally developed, less is known. In either case, a great undiscovered country is before us, inviting explorers to search by the torches of science and practice after the hidden secrets at the fountainhead.

Whence comes the relation between the eye and the udder of the dairy cow ?

Why, after finding the udder development good, the milk veins, so-called, large and circuitous, the barrel of good size and tapering in right directions, does the practical dairyman pass to the head to decide the value of the individual animal? It is because we are learning that this marvelous machine, weighing less than one thousand pounds, is capable of pouring out ten times, and more, its gross weight of rich milk, and piling up, during the year, a mass of golden butter more than half her gross weight.

Why not confine our study to the skin, shape and size of barrel and udder, length of tail, width and reach of escutcheon? It is because the point has been reached in our search after knowledge where something more than a machine is demanded. This first of

all in its framework is essential, but as the standard has in the centuries passed been raised through the directing agency of a dominant will on the part of individuals, there has come the necessity for more knowledge as to how and why the machine acts so freely.

Life is a wonderful transformer, but never a creator. Control over the animal kingdom, given into man's hand as the crowning work of creation was completed, has been gained only as men have realized that the mental must dominate the physical. So, gradually, as one reads the story of the past, there has been coming this larger comprehension and apprehension of the machines under our care and guidance, and, with this, the fact that all control is that of mind over mind and matter, never that of matter over matter. Brute strength may subdue the forests, but mental activity alone makes the fields to bloom and bring forth.

Physical control over the animals under our care is maintained only by exercise of a positive will, showing itself in a definite purpose persistently being worked out. With this thought we realize why the skilled dairyman gives such critical attention to the eye, nostril, ear, head and external evidences of brain activity in the selection of his dairy cows.

Let us here mark clearly and sharply the distinction between temperaments, for it is certain that natural tendencies inhere in differing types. What marks the distinction between the hog and the cow? It is not essentially in bony structure, but in the adjustment of that structure to the natural instincts and tendencies of the animals. The cow before us with such harmony and symmetry of outline and perfection of parts is no accident. At the same time she was not so created. Mark this, for it plays an important part in the lesson I hope to urge upon you to-day. In bony structure she has not radically changed since the day her great-grandmother walked into the ark for protection. She carries the same number of bones, but they have been essentially changed in adjustment as well as form. Why? do you ask. Because at some period a man brighter than his neighbors began to dream of increasing the natural functions and utilizing the larger product. That was the first step towards the 10,000-pound cow. On the other hand, sometime some man began to dream dreams of a sleek, symmetrical, squarely-built body, whose meat product would be superior, and he began the work which is before us to-day in the stock-yards and on the breeding farms of the beef-maker in every civilized nation. Natural in its creation, it is artificial in its present relations and functions. As the numbers

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increased of those who had dreams of what they would have and sought diligently after them, there came gradually the conforming on the part of the animals to the will of the owners, and, while each carried the same number of bones, distributed alike over the body, they began to draw apart in their physical, as well as mental, make-up. On the other hand, there came the shortening of the space between the extremities, a deepening of the brisket, a broadening of the shoulders, a thickening of the neck, a rounding of the ribs, both in length and width, and a conforming in the physical make-up of the animal to the purpose working through her brain and coming from her owner.

As increase of product in the dairy cow began to show itself, the physical adjustment to the dominating purpose began in like degree to shape conditions favorable for a frictionless working of the machine. There came the lengthening of the intersecting spaces between the vertebræ, the sloping of the shoulders, the deepening of the barrel, the general looseness of the physical organism and the intensifying of the maternal functions. It may be that in this intensifying there came the reflex influence tending to harmonize the physical with the mental.

Place your hand on the full quarter of the blocky beef animal and attempt to sway her body, and you note at once its natural power of resistance, partly physical, partly that of temperament, but pass to the well-developed milk type and she bends like a withe under the swaying pressure of your hand.

One is compact, the other open ; one is closely built by reason of purpose and temperament, the other yielding and supple. The same distinction is clearly seen in horses. Neither the race horse nor the draft horse was created, but we may trace the steps of progress along the one line or the other towards fixedness in type, necessary for extreme performance. The performances on the race track have marvelously attested the skill and directing energy of individual breeders, but the small per cent. of successes tells the story of want of continuity in breeding and lack of appreciation of the essentials embodied in type. The old-time Morgan filled the place as an all-round stylish roadster, but it may seriously be questioned whether its type to-day could compete with the flyers about the two-minute mark. Its form was compact, with an approach to blockiness, and, with its round, symmetrical quarters, it filled a place not yet supplied by any other family. To-day, the distinction is nearly as well marked

between the two-minute pacer or trotter and the Morgan as between the latter and the draft conformation.

All the way along, we read in type of animals the thought of a controlling purpose exercising itself to bring greater harmony for specific objects. To-day the extremes are before us, yet nothing new has been created ; we have simply builded upon what we had, changed form, intensified function, enlarged possibilities, aroused ambition and stimulated energies. At the same time we must be all the while aware that the functions we are seeking to stimulate are those inhering in the nervous temperament. You never can make a profitable dairy cow out of a cold, phlegmatic animal. The conditions are as incompatible as those dividing the hog from the race horse. One works for itself, always, and reaches its end for humanity by an indirect channel, the other is spending nerve and food force continually for the good of others. Between these extremes—the beef and dairy cow—we have the all-round, general-purpose, dual-purpose and nondescript cows, their value depending entirely upon their blood inheritance and environments. I do not propose to discuss this class, for while valuable to the man whose fancy leads in both directions, no one will question that for the milk or meat maker the extremes yield the most at least cost for food and waste of energy.

For profitable milk and butter production to-day, every step must be made to conserve this one end. Physical structure, intelligence and ability to digest and assimilate food are the factors demanded on the part of the cow. A positive will and definite purpose, an appreciation of the machine and the ability to maintain the right environment, are the responsibilities to be assumed by the individual owner.

Surrounded by busy manufacturing towns and cities, you are making milk production your business. You do this because it is the most profitable, and the animal wanted is that one which will consume the food you so skillfully feed and convert into the largest quantity of milk, carrying sufficient solids to satisfy the law. The question of the meat value of the cow when it has completed its work, or of the calves it may produce, must be cast one side, else they remain to thwart the chief object for which you are striving—milk production.

In the hands of others more remote from market the other factors may enter in, just as would any other business proposition. We must deal with extremes when touching interests lying contiguous to active markets.

STRUCTURE AND INDIVIDUALITY OF ANIMALS. 155

In the sharp competition thrust into every department of labor there is coming to be a clear-cut demand for individual merit. Pedigree is not being ignored, but made real through performance. In the great business centers the first question asked is not of parentage but ability to do. What is true on your business street holds with equal force in every breeding establishment in the land which is claiming public attention.

As there is one universal law at the foundation of success in business, so is there in stock husbandry. There may be subdivisions for the multitudinous classes and varieties, but the underlying principle is the same and it is for that we must be continually searching with eyes sharpened by our necessities, and that friction which alone can promote growth.

I sat one day and watched the mighty, Mogul engine drawing after it up a heavy grade seventy-two loaded cars, and then recalled a day not many years back when the acme of mechanical ingenuity was thought to have been reached and a train of forty-two cars was the limit. The Northup loom so automatically adjusted that one person can take charge of twenty-four in full operation, increases the weekly output of that pair of hands threefold and to that extent reduces cost of manufacture; the band saw in our mills in Maine sings its musical rhythm as it sweeps through forty-five thousand feet daily, saving one cut in eight, while its neighbor, the old up-and-down saw, spends its time upon six thousand. Out of the necessities of the hour, through greater knowledge of the law of mechanics have come these improvements, every one intended to reduce friction and secure greater harmony in adjustment, part with part.

In this study of merit, the first step is the appreciation of that harmony in structure and adjustment of parts which will enable the machine to perform the greatest volume of service at the minimum of waste. So, first of all, must there be rare appreciation of structure, not with the thought of arbitrary markings or of fancy points, but with an eye single to ultimate purpose.

We must pass from the inanimate to the animate creation, and this other factor enters at once.

In the changed conditions family ties and fancy markings have been relegated to their proper place, save as they evidence utility in the whirl of busy activities. The boy from the farm in New Jersey or the granite hills of Maine passes, and must pass, through the fiery furnace of that test which alone can demonstrate individual worth. The driving-wheels of the countless activities of the hour are running

under high pressure, and back of blood inheritance there must be willing brain service keyed to rapid action. One general law prevails in all departments, and the animals under our care must be not only able but willing to respond to the call of a dominant will, else they pass over to the great majority of non-producers, because not able to make gain over the food of support.

To fully comprehend the underlying conditions and requirements of to-day is as necessary for the breeder as the manufacturer.

Merit in the man is the power and ability to grasp the situation in which he is placed, and make circumstances and environments servants to do his bidding.

Pedigree is simply the inheritance of blood established through successive generations. It may be backed by strong individuality and therefore carry with it prepotency and ability to perform, or it may simply cover outward conformation and general type characteristics. I trust I may be pardoned if I draw my illustrations from a somewhat narrow field—the lesson has wide application. When the fourteen-pound test was adopted by friends of the Jersey, the death knell of strictly fancy markings was struck. The large per cent. then able to respond surprised the friends of the breed, but it simply demonstrated the lesson before us to-day, that certain individuals had been fixing type with reference to purpose, as well as color of switch and tongue. Where men failed to appreciate this higher law—as many did—their animals took on beautiful, deer-like structures and markings, but rapidly lost power to perform.

Following the application of this test, and growing out of the avowed desire of breeders to enter same, marked individuality in families began to appear. The fineness of the original Rioters, one of the best, gave way to the stronger type of the Stoke Pogis and St. Lamberts, until family characteristics came to be as pronounced as breed and merit in the individual established as the supreme evidence of worth.

These facts, patent to every live breeder and fancier, demand emphasis from the platform, for the reason that men with narrow vision are still chasing the will-o'-the-wisp of pedigree or pinning their faith and financial salvation to the false cow theology of blood alone. No one can be unmindful of the value of good breeding; no one can be allowed to forget that continuity in fixed lines alone can establish traits.

At the same time the want of appreciation of individual merit, and failure to feed and care for animals along the line of their highest

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possible production, is keeping thousands of cows in both States in the ranks of non-payers. The cows are willing, the owners are the stumbling-blocks.

To accurately measure the capacity of the cow machinery, the owner must have a definite conception of structure and positive ideas of purpose. Meeting the lower range of prices, certain that the future is to bring no improvement, the line of research must be to find that harmony in structure and mental faculties which will enable the skilled feeder to swell output in milk and butter fat and find profit with each animal.

Searching diligently for ultimate product, the breeder as well as the animal will respond to the demand for increasing merit.

Blood is at the foundation of all improvement, but blood alone does not improve. The best dairy cow or trotting horse left to itself or cared for by one indifferent to its high calling, will surely lose power and ability to do at the pail or on the track. Breeding, alone, will not solve the problem even though that be in accord with established rules.

The animals under our care are either accidents, and these either reproduce themselves, or they come in response to skill wisely directed. The choicest bred deteriorate rapidly, and a few generations will wipe out a family if the controlling spirit of the herd does not appreciate the essentials entering into its life history. The finely-strung, nervous temperament of the trotting horse or milch cow must be treated in every respect from the standpoint of extreme speed or milk production.

Mark the sharp distinction between nervous and irritable. The one relates to normal condition, the other to disturbed or unbalanced functions.

Breeds have been built upon blood, but merit has come through brain development.

If all this be true, then certain important questions demand attention. If merit is the outcome of breeding with the single thought of individual excellence, then it is to be measured by individual performance, and arbitrary, fancy markings lose their hold upon public attention, except as they evidence the higher quality.

Let me lead you out of the realm of practical demonstration and present what is forced home upon my mind as it has been upon yours as reaching very closely to the solution of this question. The supreme type of nervous temperament is found in intensified motherhood, exemplified in the human family by the mother, and I say it with all

reverence, the one who spent herself physically and mentally for our upbuilding, who gave her best that we might be, and, in the animal kingdom, by that cow yielding ten times her gross weight yearly in rich milk, from which more pounds of butter are made than her body can balance on the scales. She voices her complete unselfishness by her unceasing efforts to respond to our necessities, and surrenders from her own tissues to maintain what we term her individuality, but which is the established law of her being.

The first step to be taken in this study of merit is to obtain a clear, sharp, definite conception of the two extremes of temperament, the nervous and phlegmatic, as indicated by physical structure and evidenced by mental balance.

We pass here from a general to a specific study of parts as related to the whole, and must see in structure the approach to harmony and may be able to approximate to a fair knowledge of mental capacity and mental balance. That some portion of this last may be intuitive I grant, but nevertheless it must be fixed and clear in the mind of the breeder, else, failing to appreciate capacity in individual animals, he will surely fail to direct mental and physical forces, and the natural law of reversion will assert itself. Dealing with intensified functions, unnatural and abnormal, the positive influence of a well-defined ideal is absolutely necessary to hold an animal to its present standard of service, to say nothing of raising the limit of productions in future generations. My thought centers around the accepted fact that the objective mind will control the subjective, and that milk and butter in cows, speed and action in horses, or eggs in hens, being the outcome of nerve force, the directing influence must be the will power fixed by habit, that to be directed and controlled by the broader comprehension of the man at the head.

Large men having large ideas are necessary to-day to lead the subtle forces in our animal economy, as in any other field. Small men with narrow conceptions will dwarf, do dwarf, the possible powers of every noble animal with which they come in contact. Not a breeder present but has had this fact pressed home in the failures resulting from the sale of promising, well-bred animals. They passed into the control of those whose conceptions of speed or production were below that of the controlling influence in the herd or stable from which they came, and they fell to the level of their surroundings.

Merit in animals is the reflection of the appreciation of merit in owners and care-takers. No man with a 300-pound conception can

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plant a 500-pound herd. No man whose ideal limit of details is two-thirty can breed two-minute horses. No man satisfied with the low, gliding action of some families of trotters, surely no man whose delight is a pacer, will ever make his mark as the breeder of the round, trappy, pleasing roadster, with fold of knee and flex of hock which always excites admiration. The lines of merit do not run in these directions. More than this, there must be at the fountainhead and in every department harmony of purpose in details. Dealing with subtle forces, I propose to place the will of the man at the head, in fixing merit in our animals, because he who grasps most in this direction will appreciate best the importance of seemingly-insignificant steps in detail.

One writer declares that "the reason for our slow advance in civilization is because we have been traveling with our noses close to the ground." The greater always controls the less, and the larger the comprehension and apprehension, the higher the standard of production in animal or herd.

When in volume or size it passes beyond the man at the head, improvement ceases, and a retrograde movement sets in. A well-known authority says: "Whatever has resulted in perfecting fixity of type and strong and enduring qualities, either in individual or species, has been the outcome of the survival of the fittest in the struggle for existence. The method is and must be the study of individualism, that character of individuality which enables the individual possessing it to win over all obstacles of whatever name or nature presented by its environment."

One thing must be remembered in this connection, that is, the elemental structure in the stronger is the same as in the weaker, the difference being solely in the individualism of the individual. "The factor is this," again says the writer, "that given an equal perfection of development in all things purely physical, and the acme of individual survival must be sought in the fact that brains win." Everywhere it is the same—whether among the beasts of the jungle or in the realm of science, anywhere, everywhere, brains win. We cannot change the laws of nature, but we can be changed to conform to them.

THE VALUE OF RIGHT ENVIRONMENT.

For brains to win they must be developed, educated, led out of natural surroundings into most positive fields of service, else tissues become dormant and inactive. Here again is the demand for the clear-headed leader and organizer. Let me illustrate.

In 1897 I had the pleasure of awarding the prizes at the great exhibition at St. John, N. B., in the dairy classes from a dairy standpoint. The Ayrshires were the first class shown, a magnificent lot from both the upper and lower Provinces. Among them were some of the prize-winners at the World's Fair. For a lover of dairy types it was a picture not to be forgotten. One young man having charge of a herd especially pleased me. He was kind, gentle, yet firm, and watchful always of the comfort of the animals. A few weeks later he came to Maine with some cattle, and after going through one of our best barns, built expressly for milch cows, called to see me. He expressed himself pleased with the construction and arrangement of the building, and also with the quality of the stock, but said, "Why, Doctor, we couldn't do that way in Canada. Those cows were on bare floors and almost all were standing. We try to bed them so completely that they will lie down and be comfortable all the time, knowing that thereby we get more milk." Ten days after, that young man went into that barn to care for those cows, and at once there was a perceptible increase in quantity. He sought the comfort of the animals and invited more milk, and it came, not through change of ration but change in environment.

There is hardly a noted horse before the public, or has been for the past twenty years, but has passed through several hands before that perfect harmony necessary was established for extreme speed and the low record made. The speed was latent all the while, but the right environment was wanting, the directing power lacking. When the man and the machine came together, he comprehending what he wanted and it responding to his purpose, the work was accomplished. (Maud S.)

The wonderful records made by Brown Bessie and others from Hood Farm at Chicago proved not only the remarkable powers of the individuals but the masterly leadership of Mr. Fuller. Without the skill of the latter the records could not have been possible, yet the cows were there all the same, ready to do as they did. The story of the tests made by Mr. Fuller forms one of the strongest links in the chain of evidence for mental control. As we rise from the scale of natural production to construct our animals into willing machines, ready to convert large quantities of food and equally ready to assist in making milk and butter records, the skill necessary on the part of the organizer increases in fully equal ratio with the increase in production.

A friend of mine is growing fine horses. He is not by nature a

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horseman but an intense lover of large, stylish, pleasing, courageous roadsters. I have watched him for years as he has groped his way toward the end desired, conscious in general of what he would have but hampered by lack of a definite appreciation of details and still more by assistants who saw in a horse simply an animal of service or speed. Gradually ultimate purpose has been shaping itself in his mind, and obstacles in the form of men, not in full harmony with his conception, have given way for those which were in full sympathy with his thought and alive to the same demand. The change in the stock is most remarkable, in the unmistakable evidences of quality and wonderful uniformity in energy as well as conformation. The horses and colts are the same as before, they are not receiving any better care or feed, but the man in charge is an out-and-out road horse man, knowing what is wanted and appreciating the steps to be taken and there has been an immediate response manifested in the style and finish as well as in the more prompt and trappy action on the part of all, even the youngest.

Accepting the position taken that merit is secured not alone by breeding, but by mental control, there comes at once the thought that this must be untrammelled. From fountainhead to pail or buggy no obstruction can be allowed. Every agent entering in is to be in harmony, else reduced product will be the result. Am I putting it too strongly? Let us see. A friend owning one of the best herds of Jerseys in Maine, an inbred family noted for quantity and quality of milk, found it necessary to exclude from the stable a hired man having a sharp, squeaky voice, as his presence always affected the milk, especially the butter fat yield. Gov. Hoard's pin scratch across the abdomen of his heifer and the immediate withdrawal of a portion of the butter fat seems visionary, but can you doubt it? John Gould advises singing to the cows a crooning song when milking, because of its quieting effect upon the nervous functions and consequent increased yield, but urges that care be taken not to sing "Old Hundred" to a Hallelujah cow.

Who can get the most milk from a cow? Why, the man who comes the nearest to being a calf. The one who is able to touch the deepest responsive chord in the nervous susceptibilities of the mother, so that she will, if necessary, waste herself to outgive.

Explain by any other theory why it is that some men can get more and better milk from a cow than others, under like conditions and treatment, and you may find a solution outside that herein indicated. Until you do, it must remain that mental relations are established

between man and animal. Will it be possible for you during the coming months to maintain the full standard of production with your dairy herds if the caretaker be one whose natural desires are for the round, symmetrical quarters of the beefy type? If it be necessary that there be a full appreciation of the importance of kindness at every step in the care of cows, is it not equally so that mental influence be positive in the line of largest production? To my mind, this seems clear and certain. You from your experience may feel inclined to modify these statements, but the underlying fact demands recognition.

Men stand amazed at the heavy production of animals in certain herds, fed not for records but for business, and fail to recognize that the open doorway is along the path here indicated. Success in any department of business rests upon appreciation, energy, aptitude, enthusiasm and devotion. Are we to rank the departments of agriculture or of stock husbandry as business, and therefore subject to the same general laws, or must we seek elsewhere for the successful computation?

Secretary Winslow, of the National Ayrshire Breeders' Association, discarded in 1896 every cow which failed to make a record of 6,500 pounds, and in 1897 of 7,000 pounds of milk. Would this increase have been possible had he been lacking a definite conception of merit along the line of such heavy production, or had the necessary agencies between himself and his animals not been in full sympathy with him?

I. K. Felch made a record of 200 eggs per hen from one family of his Light Brahmas. Was this accidental or intentional? If the latter, why may we not claim that the positive will of that positive veteran in the poultry business was as great a factor as the food given?

UTILITY THE PRESENT STANDARD.

We are rapidly passing out of the realms where arbitrary fancy markings hold sway and the swing of the pendulum is towards the standard of utility. We shall lose something of breed characteristics, uniformity of delicate markings, and, in the dairy type, that beautiful symmetry of parts which has filled the eye of the expert for the past twenty-five years. Instead we are coming to read the stamp of individuality in our herds and the seal of merit in the family subdivisions. As one can to-day select at a glance from any of the well-established breeds of poultry birds bred by different men, such as

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Felch, Williams or Comeys, so are we coming to select Jerseys, Ayrshires, Guernseys and Holsteins because of peculiar family characteristics reflecting the conception of the owner, stamped by breeding and mental control, and the value of either will be proportionate to the ability to perform at the pail or churn and transmit these breed and family traits to offspring. The same distinguishing characteristics will show themselves in all breeds of sheep and swine, and surely to this must our horse-breeding be brought if it is ever to secure and maintain the same degree of uniformity in type. When the day comes and this standard of utility controls the actions of our breeders, large and small, the flocks and herds will multiply rapidly.

He who reaches for a herd every one of which will yield five hundred pounds of butter yearly, will more rapidly bring harmony in structure and increase in output than he whose conception is on a lower level. For this reason more time needs be given to the study and appreciation of structural parts and their relation. In this study one's ideal takes more definite form, becomes more real, and through this environment the cow yields to the wish of her owner. It is impossible for improvement save through our ideals; and to fix them clearly and distinctly in mind, so that consciously and unconsciously they will exert their influence, requires a large appreciation of the fundamentals expressed in structure. Study variations in form, not in general, but detail, and with an eye single to purpose. Note the effect upon temperament, and finally production. Search for the machine constructed throughout to perform the largest possible service with the least waste of energy, and on that build mental activity by judicious development of mental powers. Cows are machines; like clay in the hands of the potter, they are to be moulded and fashioned; but over and above this there lies the fact that they are intelligent beings, and that production depends greatly upon the measure of education.

Nature stands waiting to reveal her secrets. All down the ages has she been knocking at the door of man's intelligence, asking admittance. In the roar of the thunder and flash of the lightning she has voiced her power, until man arose to the conception of the fact that she was bidding him harness with silken cords the giant forces and use them for his advancement. So through individual animals she has been bidding us enter and occupy the broader field of production, come up higher into the larger conception of life, its uses and purposes; and as men have here and there answered the call, nature has linked arms with them for results before im-

possible. Accidents were these, but they whispered possibilities to the aspiring breeder as he sought to fix the channel of their production and make it strong for future generations. Good business to-day demands a clearer insight into the gospel of cow structure, that, first of all, men may come to see more clearly, have a better appreciation of what they now have, and open the door to larger returns from individuals. There must be an uplift of thought and purpose as to what is possible, as well as a sharper insight into the fundamental truth at the core. Out of all this will flow results, and conditions will be controlled.

Centuries ago Michael Angelo wrought his ideals upon the old cathedrals of Rome until his head grew back upon his shoulders; yet to-day his conceptions are the admiration of the world, and thousands bow in reverence before them. He wrought upon cold marble with chisel and mallet, he painted world pictures with pigment and oil, but he made every touch pregnant with life and inspiration. We are building upon living structures, our tools are living tissues pulsating with purpose. Consciously or unconsciously our ideals are taking form, rising before us as monuments to our skill and insight into life's great lesson, or the unmistakable evidence of our failure to grasp the true mission of living and find the reflex influence of noble endeavor.

Goethe says: "You must either soar or stoop," &c.

I will now take up the cows we have on the stage, but I would not have you take what I say as true simply because I believe in the importance of these things. I want to ask you to take what I say and test it, and if there is merit let it govern future conduct.

One cow we have here has what is almost a typical St. Lambert head, rather coarse in the makeup as compared with some, perhaps, yet it is well shaped. I believe the successful dairyman will find there is more in the shape of the head than in any other part of the cow's anatomy. We want the proper conformation of the head as we want a proper conformation of other parts, but after all we come back to the head, and particularly the eye. We want good width between the horns, crowning the center with plenty of room between the eyes and good distance from pole of horn to eye, room for brain development. Lips should be neither thick nor thin, for a thin lip means a waspy disposition, and that applies everywhere. A thick lip means sluggishness and heaviness of disposition. Let there be moderate thickness, yet closing firmly together, face straight, and a well-cut, clean jowl. With these, we have the head of the dairy

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cow, much as we see it in this cow. The nostrils should be thin, open large, assuring great capacity. The eye should be large, full and lustrous. You want an eye you can hang your hat on, an eye you can see to the bottom of, for this tells of individuality. I cannot emphasize the importance of this too much. The neck should be thin, and not of the bull type. Milk comes from the udder, but the seat of milk production is the brain. We must have the udder and the brain or we have no dairy cow, and wherever we find the structure of the animal pointing to a beefy nature we will find during the twelve months that the beefy tendency will control production. Wherever you find the thick withers or brisket, the round rib or full quarter, you will find lessened production sometime during each twelve months. We must bear in mind that we have not yet reached perfection, and there yet remains much to be changed. We must measure by ideals, and take into account the desirable features, and not magnify the possible effects of minor things. The neck should never cushion at the shoulders, which should be flat-boned, thin and open, and the cow should be broad across the loins, for this last means motherhood. She must be strong to carry, and with this we want a high pelvic arch and thin quarters. She should have much the same conformation, in many respects, as the trotting horse. The hocks should not turn out or in, but be set wide apart to give breadth for the udder, and the udder should extend as far up behind as possible. It should be of the general type of the Ayrshire, for we are getting away from the long, pendent udder, which is a drag to the cow, swings too much as she walks, and wastes too much nerve force. Everything and anything that interferes with progress is to be removed.

The udder should also extend as far forward as possible. Breed for this. Pay more attention to the rudimentaries of the male; see that they are set well apart, as this indicates that there will be more room for the udder and better-shaped udders in the offspring. Breed from cows where the udder extends well forward. See that the udder is well shaped, so that if cut into four parts each part will be equal to any one of the others. The udder which extends well forward and upwards, and is well attached, has room for greatest circulation. There is reason in all this. Plenty of circulation for the milk and for the blood are both important in the dairy cow. We want the long, springy rib, the openings between the ribs, in some cases, almost as wide as the width of the ribs themselves. This is the cow

we select. She must have a large barrel, wedging every way from the point where the abdomen is largest.

The ear of this animal is coarse and lacks what we want, the good color inside, for a butter cow. Then we want a good barrel, plenty of width. With such a cow as I have described we can get a large quantity of milk, other things being equal. Of course, we have seen animals which were fine looking, perfect pictures, and which were poor producers. Let us admit, however, that somewhere there is just the right form to breed to; that there is a certain ideal in the cow we should desire to attain, and we will make no mistake if we try to breed up to this ideal animal. Just as the manufacturers are spending time and money in studying the best forms of machinery for economical use, the forms of machinery best adapted to economical production per head, or per piece, or per number, or per yard, so must the breeder of cows study the same problem, with a view to increasing the production without adding to the cost. That is the secret, gentlemen, of success in dairying.

With the second cow here we have a finer head, but not so good an animal. I ask the privilege of making a few criticisms here. This cow, while a finer-looking animal, takes on flesh too readily. She has round withers, the flesh cushions on the neck and shoulders, the brisket is thicker, and she has a general meaty tendency. She is narrow between the ribs, and in her hind quarters the same. Take in the contour from head to tail, and in selecting a dairy cow the high pelvic arch and the high withers are to be taken into account as two strong signs of milk-producing capacity—as evidences of the profitable cow. This cow is buttoned up too closely; she is deficient in her fore udder, and deficient in her barrel. I like a large barrel, for a cow making a large amount of milk must eat enormously of the necessary food. The milk comes from the food consumed, and in order to make a large quantity there must be large consumption of coarse foods, as well as of concentrated. She must have the room to store, and we therefore want a large abdomen for this storage. It must be filled out sideways, as well as in depth, and be full and strong. I do not think escutcheon is as important as some of the other points mentioned, although it has often been considered as one of the most important. I always notice it, of course, but I question whether it really counts for as much as it is sometimes thought. Sometimes we see cows of the best form with the escutcheon very light, and yet they are large producers.

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Mr. Goodrich—I have studied that question also, and I have come to the conclusion that it is no indication at all.

Dr. Twitchell—I do not rate it of much importance.

Mr. Gillingham—You have made no allusion to the length of the bone in the tail.

Dr. Twitchell—I had examined the bone in this cow, and made no allusion to it because I thought it had been cut off. [Laughter.] The point desired is that the bone should reach about to the lower point of the hock.

Mr. Evans—How would you buy a cow to secure quality in the milk?

Dr. Twitchell—That might be difficult to explain, except on the line of good producers we have been talking of. There is this difference in the two cows we have here: so far as the tail is concerned, each has the same number of bones in the vertebræ, but there is a difference in the total length of the bones altogether. With a good dairy cow the end of the bone should be about the center of the hock. The point is this, that as you lengthen the body it is less compact; the spaces between the bones are larger. In one case you have lengthened the body out and opened these intermediate spaces, and this is important, as it is the channel which carries the nerve force from the brain to the udder. This is one reason why you cannot have a successful dairy cow in one which is closely constructed.

It is easier to tell how to select a good dairy than it is to do it. Some things you can select, but there are others one must get by study and experience, and observation.

In regard to the question of quality in the milk. The skin is a good indicator, but you must make a distinction between meaty tissue, fatty tissue—you want a strong, flexible skin, but not fatty. If fatty, it tells the story you don't want told. The yellowness of the ear indicates quality in the milk, the horns, the general shape of the head. I believe there is much to be determined by the conformation of the head—in fact, that is the supreme test of the intelligence of the animal—and quality in the milk is a question of the individuality of the cow.

Mr. Goodrich—Would you venture an opinion as to which of the two cows you have here is the larger milker?

Dr. Twitchell—I might make a mistake in doing so, but would not hesitate to say I think the first cow gives the better milk.

Mr. Evans—Do you consider that head, of the first cow, a St. Lambert type?

Dr. Twitchell—Yes, in general, but I do not think it could be considered perfect.

Mr. Cook—Do you place any stress on the curl in the center of the back?

Dr. Twitchell—I am not paying any attention to the curl of the hair. I want the withers to rise high—the case-knife back, the pelvic arch to be pronounced, the signs of maternity strong and the feeding capacity great, for these are necessary.

Mr. Cook—Would you breed to a cow that was a success as a milk producer if she were defective in structure?

Dr. Twitchell—I think the business end might detract my attention from the defects in structure. [Laughter.]

Mr. Cook—How about business in future?

Dr. Twitchell—I would look more to the male for a remedy in the structure, and I do not think there is enough attention paid to this. I would take the cow that was a good producer, and I would breed out her objectionable features through the male.

Mr. Rogers—Is such a cow accidental?

Dr. Twitchell—Not necessarily. Sometimes good results may be obtained from these exceptions, but not as a rule. Some conditions may be controlled, many cannot. By persistent breeding along proper lines many of these objectionable conditions may be eliminated, while others cannot.

Mr. Evans—How about selecting a cow that is a persistent milker?

Dr. Twitchell—I have known cows to start out well, and dry up in seven months. I would look first at the general conformation of the cow, to see if there were any beefy tendencies in her makeup. Study her character, her food, her udder development, the shape of the head and the eye, as indications of persistent purpose in milking.

The Secretary—Is it not a matter of education?

Dr. Twitchell—Of education and experience. I would milk heifers with their first calves, and fix the habit of persistent milking. After they have had the second calf let them have a year's rest, for we want them to grow, but milk them persistently with their first calf, because you want to plant in their minds the idea of continued milking, and that is the idea we want to dominate them during their years of production.

A Member—I am satisfied with the question of production, but how about the price? We have so many people coming into the business and selling milk for a few days, and cutting prices so that a man cannot make an honest living in the business. We have an

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overproduction already, and my cows average nine and one-quarter quarts the year round ; so I don't want more milk, but more money for my milk.

Dr. Twitchell—Your cows are giving you then about 3,500 quarts a year, which would be about 7,000 pounds. That is a very large average production. What do you get for your milk ?

A Member—Six cents a quart retail.

Dr. Twitchell—And yet you complain about prices. You are like an old farmer I have in mind. He used to complain that it was not worth while to raise apples, and said when he got \$5 a barrel he only made a fair, living profit. [Laughter.] You get six cents a quart retail, and it costs you one and one-half to two cents a quart to deliver it. It seems to me that is doing pretty well. I presume at the wholesale price you would get one and one-half to two cents a quart as the minimum.

Mr. Matlack—We are getting an average of two cents a quart wholesale.

Dr. Twitchell—That, at 3,500 quarts, is \$70 per cow per annum. Now, there is a section in my own State where the farmers are selling their milk at two and one-quarter cents by the year, and they are building up their farms and making money besides, so I cannot see that our friend has much room for complaint as to prices.

A Member—Do they get their feed for nothing ?

Dr. Twitchell—Certainly not. They feed largely on grain from the West, and grow hay. However, the question of the cost of production is one that hardly belongs to the question of structure of the cow. [Laughter.]

Mr. Fitzga—Have you known cows which made white butter ?

Dr. Twitchell—Yes, sir.

Mr. Fitzga—How can you discover this before you buy the cow ?

Dr. Twitchell—Not always easy to do ; see that they show the yellow tinge in the udder, teats, skin and ear. I would not worry much about white butter from the cow that had these points.

Mr. Fitzga—But suppose you have the yellow skin and the white butter ?

Dr. Twitchell—Then, perhaps, it is a question as to what she is eating. That is a question which will come up later in the session, however, and does not come within my subject.

Mr. Fitzga—Will the individuality of the cow have anything to do with this ?

Dr. Twitchell—I would not like to say that. To a certain extent

it may show in the quality. I should first look for a solution in some other direction. See to it that the cows are given the chance to do and be their best.

Mr. Lippincott—In our section it has been the custom to dehorn the cows, and now some of the institute workers are claiming that this affects the nerve-forces of the animals. Will this be likely to have the effect in future of producing stock without nerve-force if we breed to these animals?

Dr. Twitchell—If this is done early in life, I do not see how it would be likely to affect them in after-years. Perhaps if the horns were allowed to grow and were removed in later years it might injure.

Mr. Lippincott—From the shock?

Dr. Twitchell—I cannot say. There is a question I wish to call your attention to, and it is one for which I am indebted to Governor Hoard, and a question which bears on production. It is that of the navel, important, it seems to me, in considering the question of vitality of the animal. Since Mr. Hoard called my attention to this some seven or eight years ago I have followed it closely, and I believe this is a point sadly neglected. What is our standard of vitality? Find the one with strong abdominal walls, a firm, muscular ingathering at the navel, and you have evidence of vitality in the story of circulation during pre-natal existence; find one with thin, drawn abdominal walls and you are likely to find the weak constitution.

There must be significance attaching to every part and a relation between each, and it is for the successful dairyman to search diligently and find both.

Mr. Evans—Is it advisable to try to breed on better udders?

Dr. Twitchell—It is advisable to try and improve in every way. You will find good cows sadly deficient in some one point, perhaps in several, but no one will claim that they are good because of the deficiencies, but in spite of them their inherent powers in other lines saved them. Again, you have seen cows of almost ideal type, beautiful in structure, which were ciphers in the business field. They lacked the power and influence of a strong individuality, and these outward signs are all to be studied with sole reference to their external and internal relations.

If the udder is deficient use a male whose dam and granddam, if possible, are exceptionally strong. Look well to his type. See to it that his rudimentaries are well apart, entirely free from the scrotum, and if there be a baggy-like condition of the tissues so much the better. In no other way will improvement come.

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Are we critical enough in examining our parent stock, as individuals and as representatives of types?

Mr. Evans—I have been at it for twenty years and I am discouraged.

Dr. Twitchell—I do not know how critical you may be on these points. Find out whether your animal is an accident, or whether a representative of a line of ancestors. I have in mind a herd of Jerseys which is $87\frac{1}{2}$ per cent. pure bred, and yet it is being watched with the utmost faithfulness along these lines. This percentage is unusually large, yet close attention is being given to both sides of the parent stock, and certain points are bred for which it is desired to perpetuate. I know of no other way to get this result. It is not wise to take the animals that are fine to look at without attention to the question of ancestors.

A Member—How about the udder chord, running from the hip to the udder?

Dr. Twitchell—It has more prominence in some animals than in others, but I do not think it has anything to do with the formation of milk. It is for carrying purposes only.

One point has been referred to previously—the measuring of the worth of the cow—the quality of her milk. How should we do this? It can be determined to a large degree by the structure of the udder. When the udder is in the shape of a bag, and nothing more, you get poor milk, and if it is of a meaty structure you will not necessarily get good quality, but there is a condition of the udder which can be discerned by the trained hand—a soft, firm resistance—sponge-like in its type, but not spongy in feeling. This may be taken as one of the indications of quality in milk, and is an important point to be watched and tested.

Mr. Fithian—Would you recommend a preparation to keep the horns from growing?

Mr. Fitzga—Is it injurious for cows having plenty of light and air in the stables to be allowed to run out for exercise in cold weather?

Dr. Twitchell—I will try to answer the question in regard to the preparation to prevent the horns from growing first. The use of acids to destroy the horns as they are starting cannot be a positive injury to the animal; but if you are breeding pure-bred stock you cannot afford to do it. Breeders of pure breeds will always insist on retaining the horns. There is something of far more importance with regard to the calf than the horns. You determine during the first three months or six months what its future is to be. If by the

time it is six months old you allow it to develop into a round, sleek animal, you will prevent that heifer from becoming a successful dairy cow. In fact, your work with the successful dairy cow should begin generations before. They should be fed with special reference to their ultimate purpose. You want to grow a strong, vigorous, bony frame. This is an important question, far more than some of the other questions which have arisen.

In regard to exercise. I am living in a climate where from November to May we are obliged to house our cattle in comfortable barns, and one of the causes, without doubt, of the increase in tuberculosis has been this close confinement, without attention to proper air and ventilation. In many cases, although we have increased the herds and individual production, we have not increased the air space allotted to them. A cow making 300 pounds of butter requires more oxygen than one making 150 pounds.

We want more sunlight and pure air in our barns, and then we will have less trouble with disease. This has been an important lesson to many dairymen, and it is one of the steps absolutely necessary to a healthy dairy. We must lift the walls and increase the air space, give them more sunlight, and then you will give them health. The question of exercise may be debatable, but reason seems to teach that they are better off on a pleasant day out of doors in a sheltered yard. On the other hand, I have in mind a man who has been a successful dairyman who has not had his cows out of doors for several winters. He keeps them tied, and has running water in front of them. I cannot say if it will be as well for them in the future as if they were allowed to run out on nice days, but such is the practice. Turning the cows out in the barnyard to eat the cornstalks, as I have seen on my way here, is not conducive to heavy milk production. Between the extreme lies the mean of good judgment, to be used by each individual according to his needs.

On these charts here I have represented some of the different types of animals. I have already referred to the beefy type in vogue in the West for beef purposes. I have another here with a record of 10,300 pounds of milk; another making twenty-one pounds of butter in seven days. I use these to show what to my mind is an exceptional type of the dairy cow. Note the prominence of the withers, the thinness of the neck, the expression of the face, the shape of the head, the full barrel, the high pelvic arch, and the quarters. A superior type of the dairy cow.

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The beefy type was selected for the ranches of the West. Here is one with a record of 9,600 pounds of milk. One of these animals, while lacking in the barrel, shows exceptionally strong in the back, in the withers and in the pelvic arch and quarters. When you make your selection of cows for a dairy herd get those which show they are persistent milkers, rather than good-lookers, no matter what the breed. If you get such a herd together, whether ten or one hundred cows, if they are persistent milkers, you will find they are all of the same general type. Individuals may differ, but you have the dairy type, and the cow of large production is of the type shown you here. In seeking for this form of cow you are settling the question of milk production in New Jersey for market. It is not a question of breeds, for that is secondary. Certain breeds, of course, are better than others for certain purposes, but we are talking now of the dairy cow for large production of milk. So, too, in certain breeds, some animals are much better than others. Select the form of cow built best for the business she is to do, and seek first of all for one with great vitality and strong individuality.

Mr. Fitzga—Have you ever had any experience as to relative cost of production of a fourteen-pound Holstein and a fourteen-pound Jersey cow?

Dr. Twitchell—No, sir.

Mr. Fitzga—I mean as to the cost of the food required?

Dr. Twitchell—I have had no experience in that line, and cannot answer it.

Mr. Fitzga—Which of the two would you take?

Dr. Twitchell—I would take the Jersey, of course, for they are my fancy, and this plays an important part in determining profit.

Mr. Fithian—I understand a test made in Pennsylvania recently showed that the Jersey cow beat.

Dr. Twitchell—There have been many tests made on that line, but none of them were very satisfactory.

Mr. Evans—What is the breed of the ranch-cow you have spoken of there?

Dr. Twitchell—The foundation is the Shorthorn. It is a pretty good foundation blood, too. The other I have referred to is a thoroughbred Guernsey cow.

Let your fancy decide which breed you will select, but cling fast to your judgment in measuring individuals, and labor earnestly for that appreciation of cow structure and cow possibilities which will

ultimately lead to a herd every one of which may produce you four thousand quarts yearly. Doing this, the future of New Jersey farming will be solved, and the farm homes will have added attractions for the clear-brained, bright-eyed, intelligent young men seeking avenues for profitable employment.

FEED AND CARE OF DAIRY STOCK FOR
GREATEST PROFIT.

BY G. P. GOODRICH, FORT ATKINSON, WIS.

(175)

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FEED AND CARE OF DAIRY STOCK FOR GREATEST PROFIT.

Mr. President, Ladies and Gentlemen—I come before you, not as an orator, not as a theorist, nor yet as a scientist, but as a plain farmer who has always had a great liking for the dairy cow, who has studied her to the best of his ability and according to his opportunities, ever since his boyhood, and who has utilized the experience of others as far as possible. Not only this, but as one who has studied the experiments of others, and who has called to his aid the work of the chemist.

I shall talk to you without any written preparation, and I would like to go over the subject, just touching on the different points, and when I get through would like to have such questions asked as may have been called up during my talk. I may omit some things I would like to speak of, and they will be more likely to come up in this way. If in passing, some question occurs to you, note it down, or carry it in your mind until the close of my talk, and I will try my best to answer it.

Dr. Twitchell has told us in his fine manner how a dairy cow looks. She has been produced through long years of selection in breeding, and by the environment by which she was surrounded, and by her food and the care she received. The cow, no matter how well-bred she may be, would certainly be unprofitable unless she was properly fed and cared for. Now comes my subject: The feeding must commence *right* at the beginning—with the calf. We must have a definite purpose in view. With the waste she must build up the dairy cow; she must be able to consume the largest possible quantities of milk-producing food and turn it into milk, as well as the necessary food to repair the waste due to the process.

That is the animal we want, and we must begin feeding with the calf in order to develop such an animal. Now, the kind of foods that will produce milk in large quantities is just the kind required to

make the calf grow rapidly, and the young animal must, on no account, take on too much fat. We must constantly look to this question of keeping the animal from fattening, or we may have a beefy animal. A heifer calf from the very best breed of dairy cow would not be of any value as a dairy cow if it were allowed to run with its mother and have all the milk until six months old. It would form the beef habit, and its nature would be utterly changed in this respect. Therefore, we must bring it up on something that is not fattening, and that is skim milk. That is my way of raising a calf. We let the calf have its mother's milk until from two to ten days old, and if the milk is rich it is diluted at that. Experience has taught us that the calf should not have all the milk it wants, especially if very rich in butter fats, as it will make the calf scour. After a week or so we feed with skim-milk gruel, a preparation of skim milk and oil meal, until about two weeks old, when we feed all skimmed milk. We take the skimmed milk and put in a little oil meal, dissolved in hot water. We use a tablespoonful a day, half in the morning and half at night. As we increase the quantity of the skimmed milk we increase the oil meal allowance, until it has two tablespoonfuls a day of oil meal. Flaxseed meal is also good, but less should be fed of it. We take a cake of ground flaxseed in six times its own weight of water, and this makes a gruel or jelly. First we give a spoonful of this, and then increase to two spoonfuls each day.

We keep on feeding the skimmed milk until the calf is six or eight months old, when the pasture is usually fit for the cows. The calves on my farm are nearly all dropped in the fall, and this brings them up to the time the pasture is ready for them in the spring. We want the calf to commence to eat coarse food as soon as its stomach will bear it, in order that we may develop its capacity for coarse food. Keep clover hay before it all the time, and we begin early to feed them a little oats and bran. A calf will begin eating oats even younger than you would think. The simplest way to get them to do this is to begin when they are about two weeks old. Take a few oats in your hand and hold out to the calf. It will stick out its nose, and you can daub a few of the oats on its nose. It licks its nose and gets an oat or two in its mouth, and it will munch a long while, maybe, on one oat. The next day it may get two or three grains in its mouth, and finally you develop an appetite with the calf for oats, and the rest is easy.

Care must be taken not to get the calf too fat. Let her commence

the business of her life when she is two years old. It will be dangerous for her to go over until three years old, because she would be out in good pasture, and will begin to lay on fat, and this has been the ruination of many a good cow. I have heard Prof. Roberts express that idea very nicely. He said if you feed a heifer and get her too fat when she comes in, and you ask her to give you a good lot of milk, she will not do it. You taught her to make tallow, and it will stick to her all through her life. I have the best of reasons for making this assertion.

When she comes in we give her what coarse food she wants, but feed very little grain or concentrated food. Begin this food gradually, and get up to her proper ration in three or four weeks. Feed her for the greatest possible profit—and that is my subject. A cow should be fed to her full capacity; she should be fed all she can eat and digest and turn into milk. That is her full capacity, and that is feeding for profit, as it is understood by our best dairymen to-day. It takes a certain amount of food to sustain life, something near two-thirds of a full ration, or of all she can consume. This is a large proportion, but if she is fed only enough to sustain life she can produce nothing, or if she does give anything it must be given at the expense of her carcass. The proper amount of food is the amount she eats to sustain life in addition to the amount she consumes for the production of milk. Figure it out in this way: Suppose the amount of food necessary to support her costs six cents, or represents six cents in value, and this is two-thirds of the proper amount. It would then cost ten cents in value for her ration. Suppose she produces a pound of butter a day on this ration, at a cost of six cents for food for support and four cents for food for production. The butter has cost us ten cents per pound in food. Now suppose we try to be economical, or be stingy, if you please, and we cut her ration down to eight cents per day. Here we still have six cents for food for support and two cents for food for production, and the cow produces but half a pound of butter per day, which has cost us eight cents, or sixteen cents per pound, as against ten cents with her full ration. Follow this up a little further and cut her food to seven cents a day, and she produces but one-quarter pound of butter, which has cost us seven cents, or twenty-eight cents per pound.

Feed her to her full capacity, as I have said, but it will not do to feed her all the concentrated food she will eat, for by so doing you prevent her from eating sufficient coarse fodder. This has ruined many good cows. We will suppose you feed her large quantities of

concentrated food because you want her to make a good record. You are now getting on dangerous ground, unless you feed plenty of coarse fodder, for her stomach is made for coarse fodder, and she will suffer unless she is supplied with the proper quantity. Therefore feed two-thirds of her capacity with coarse fodder and one-third of concentrated food, then there is no danger, for she is fed according to her wants. If she eats ten pounds of grain food and twenty pounds of coarse fodder she is all right. If you increase the grain ration to fifteen pounds she should eat thirty pounds of coarse fodder, and she is all right ; but if she does not eat the full two-thirds of coarse fodder she is all wrong, and many of the best cows have been ruined in this way. Nearly all these cows that have made the wonderful records have never repeated them since. Of all those cows with their wonderful record of 900, 1,000 and 1,100 pounds of butter, none of them have since been able to repeat the production. I have not been able to find a single cow of the prize-winners at the World's Fair that has since repeated the record made there. They were overfed with concentrated foods to make these enormous productions, and only one, Mary May, has ever approached the former record, and she has given 10,000 pounds of milk per annum since that test. She was bought by Mr. Hood, as some of you know, together with Brown Bessie. I asked Mr. Young, who has charge of the Hood Farms, about this cow, what she was doing, and he sent me her record since the World's Fair. The next year afterwards she produced only 5,000 pounds, the next year 7,000 pounds, and last year nearly 10,000 pounds. She is the only cow of the lot that has recovered, so you can see it does not pay to break down the dairy cow to get a big record for one year.

The man who wishes to be successful in feeding the dairy cow must get acquainted with this subject thoroughly. He must watch his cows and know how they feed. The man who is in a hurry, who rushes in and dashes in a lot of feed, without satisfying himself that the feed is consumed by the animal, can never succeed, because he don't like cows. You must watch your cows, and you must not feed them all alike by any means. You must not feed enough food for any of it to be wasted ; feed no more than the animal can use. She must not be allowed to mouth it over after she is satisfied, and waste that much, for that won't pay either. She must be fed just what she will consume, in proper proportions, no more and no less. Neither does the size of the cow cut any figure in her milk production or in the method of feeding. This is equally so with men, for some small men can eat more than men who are much larger.

We want to feed a balanced ration. I take it that here in New Jersey you are all well posted, as I have reason to believe, and it may be that my talk on that line will be all wasted. What do we mean by a well-balanced ration? We mean this: those rations which are composed of certain foods which chemists tell us contain certain elements of food in them. We want a ration with the proper proportion of protein—and that is the muscle-forming element, the element which forms meat, and not fat—protein and carbohydrates.

Experimenters have found that the best proportion between these two food elements, to make the cows give the most milk, is to have one pound of digestible protein to about five and one half-pounds of carbohydrates. This is a nutritive ration. A thousand-pound cow—a cow requiring about the average amount of food—should have about two to two and one-half pounds of digestible protein to twelve or fourteen pounds of carbohydrates. This is about the amount and the proportion required to give the best results. With the great difference of opinion among practical feeders, it is hard to say just what is the best kind of food required to form this ration. A man asked the other day what kind of ration was best calculated to give the best results in milk. I said I could not tell until I knew just what coarse fodder he had. I illustrated it in this way: A farmer a few year ago was experimenting, trying to find out the best food for milk production. He had finally found just what he wanted, and his cows were doing splendidly. Another farmer had also experimented with different foods, but rather in a different direction, and he got a good ration, but the two were entirely different. One day the two met, and one of them said that he had found out what was the best ration. The other asked what it was, and he answered so-and-so. The other said he knew better than that. The first had fed corn meal with his coarse fodder, but the other said when he fed corn meal it dried his cows up. Then along came a chemist, and he soon saw what was the trouble. He asked what had been fed with the corn meal—what is the coarse fodder fed with it? He replied, alfalfa and pea vine and buckwheat middlings and bran, with the addition of corn meal, or corn-meal middlings. It was explained to them that there were over two and one-half pounds of protein in the pea-vine fodder and in the clover hay, while his corn meal gave the carbohydrates. What was the matter with the other man? He was feeding timothy hay and corn fodder, and he could not use corn meal. Each one of them had a well-balanced ration as it stood, but one man could not feed corn meal, and the other could because his

coarse fodder provided the proper proportions. The corn fodder was not sufficiently rich in protein to support life, while the corn meal contained practically eight per cent., when but seven per cent. was required to support life. If you will look into this for yourselves it will clear up many obstacles which appear to be so difficult to overcome. We want the chemists to help us, that we may know what is in our foods. They can tell what is in the foods, although the old cow is worth more than the chemist in this line. [Laughter.] The cow and the fodder will solve the question. We must submit it to her, and it must be palatable or she will not eat it, and she cannot use it otherwise. It must also be healthful or it will kill her, and there is where the old farmer comes in, and he is worth something yet.

We want every man to watch his cows. I do not think I made this as clear as I would like. There are several things to watch. See that the food is eaten up cleanly, for we do not want a lot of it breathed on and rooted over until next feeding time. Not by any means. If she does not eat her food cleanly take it away from her right away. Keep her with a good appetite, and if she leaves her food her appetite is not good. They used to say if a boy was run away from the table before he had enough he would always be hungry, and you want to keep your cows with a keen edge on their appetites. That is the way I was raised, and I have not gotten over it yet. [Laughter.] Watch if she digests her food properly. Watch her, and see if she puts it in the milk pail or on her back.

Feed her a variety of food. Many cow-owners never think anything about this. They think if she has all the hay she can eat she ought to be satisfied and should not complain. Think of it yourselves. With winter two hundred days long and nothing but hay, hay, hay. And that three times a day. Just take it to yourselves. Bread is pretty good stuff, but suppose your wife should take a notion you did not need anything else, and give you bread, bread, bread, three times a day with little of anything else, what would you do? I know what I would do. I would sue for a divorce. [Laughter.] But with the cows we see this done right along. I visited a neighbor's farm—he was a man trying to be a good dairy farmer, with several head of cows that cost him \$200 apiece. In December, this was, and his cows were knee-deep in cornstalks. He incidentally said he had fed nothing so far but cornstalks this winter. He wanted to get them fed out before the snow got deep, he said, and after that he expected to feed his cows good timothy hay. He said

this was his practice, and yet, somehow, he said, he could not get the results the other fellows were telling about getting out of their cows. I do not see how he could. He fed grain, but it was corn, and nothing else. I told him it seemed to me his way was not the best way to feed his cows. I said, suppose you feed your family that way. Suppose a man were to say to his family in the fall, "Our cellar is full of potatoes, and they may freeze. We will live on potatoes all through the fall, and then when they are gone we can kill a beef, and this will be fresh all winter. Then next spring we will live on bread." What would you think of such a man as that? The man wants a variety of food, and cows like a variety just as much. They not only want it, but they will hunt for it. I was talking at an institute about clover, when someone said it was not good for pasture. He said his cows would leave the clover and go and eat the June grass and the wire grass close to the ground. Another man said he had a pasture of June grass and prairie grass, except a small patch of clover in the middle, and they ate the clover and not much of the other grass. There is the point; they like variety. The cow knows enough to select the food she wants. Give her a chance, and nature will tell her to take the food necessary to meet the demands nature makes of her.

Now, on the question of ensilage. If a cow is to do her best she must have succulent food. There is no better food than good succulent Jersey grass. Give her a pasture where there is a variety. You can cut that grass and make it into hay, and it will not be so good for producing milk. What is the matter with it? You have dried out some water. Maybe that is all, but you can take all the water this side of Europe and it won't make it into grass again. You cannot make it as it was before. We know that green corn fodder in the fall, when pretty well matured, is one of the best foods for producing milk—far better than dried corn fodder. As soon as the cows are put on the dried fodder they will drop right off in their milk. There is nothing gone from it, apparently, but the water. Nevertheless the succulence is gone, and you can't put it back. Take a nice, ripe, succulent Jersey peach; you can dry that peach if you want to, or the housewife can take the peach and can it with all its succulence, so it is almost as good as before. We can preserve the green corn or the green clover, or other green forage, and this comes as near being like fresh food as the canned peach is like the fresh peach. By putting it into an air-tight receptacle, such as a silo, we make ensilage, which is the nearest approach to this preserving method. It is also

the most economical feed you can have. I don't know exactly how you are fixed for silos here, but I live in a country of silos, where they commenced building them twenty years ago. In one township there are one hundred and forty silos, and every man who has none is looking forward to the time when he can build one. Those who have them are building more and bigger silos. It is the cheapest way to preserve green fodder, and do it with the least labor. There is less waste, and it will produce more milk. Many of our cows come in in the fall, and with ensilage and other things, with a cow fresh October 1st, we will say, she will give milk all winter, and keep right on up to within a few weeks before she is due to come in, when the flies and drouth come—and this is what dries up the cows. If a man cannot have a silo the next best thing is to have roots. I don't know how they would do here, but in some parts of the country they raise them and the cows do well on them. But they are more expensive than the ensilage, and we think the ensilage is better.

You can have your cows bred right, and have them fed right, and even then you may fail to make a profit. If you fail to care for your cows properly, and have all the other things you need, you will not make a success. Your breeding and feed will be lost if you do not use proper care. A cow to produce milk must be kept comfortable. You must have comfort, comfort, comfort, in and around your barns. Never let this get out of your mind. She must be as comfortable and as happy as it is possible to make her, and I believe she is happy when she is well fed and treated right. She must have a good bed to lie on. It always makes me feel badly to go into a stable and see the cows lying on the bare floor. She should not be exposed to cold storms, or anything that makes her uncomfortable. If she is exposed she shrinks in the quantity of milk, and you can never get that loss back. She will never give as much during that year as if she had not been exposed. I will illustrate that point in this way: I let one of my boys run the place. I live there, but he thought he was running it, although, of course, I have something to say. He thought he was running it because the proceeds went into his pocket. We had twenty fresh cows in October, some in September, and we kept them in at nights, not allowing them to lie out at all. From the time I have been keeping cows I have never allowed them to lie out on the ground when it was cold enough to freeze. They were turned out in the morning when it was warm, and one morning after they were turned out it began to rain, a regular cold, disagreeable October rain. I said to my son I did not think it a very good day for the cows to be out.

He said he knew it, but did not think it would rain very long. He knew better, because I had taught him, and he knew those cows ought to be in shelter. He thought the weather was breaking away, and every little while he would look out to see if the weather was getting any more favorable. It kept on raining all day. I said nothing more, for I knew he would learn his lesson, and he did. What was the consequence? Those twenty cows had been giving each twenty-eight pounds per day, as regularly as could be. They had been doing fairly well, but from the exposure they dropped right down to twenty-five pounds, and he could not get it back. It could not be gotten back by feeding, never. He finally got the production back to twenty-six pounds, and that was the best he could do. That lesson appealed right to that boy, and he has always remembered it. He was losing three pounds of butter a day, at thirty cents a pound. This is the result, and who knows how long it lasts? Suppose they were allowed to be out in another storm, and there would be a further drop, is it any wonder the owner would say that dairying did not pay?

I want to say something about exciting your dairy cows. Messrs. George C. Hill & Son have the finest herd of cows in the State of Wisconsin. Their standard is 400 pounds of butter per cow per year. Some time ago a number of us went there to see the herd. One of our party wore a fur coat, and walked in front of the cows. They were just as gentle as could be, but one of them was frightened at this fur coat; she jumped back, and made considerable of a hurrah. Just that one thing caused a shrinkage, and Mr. Hill said that it was considerable, and that that fur coat cost him \$100. You cannot afford to frighten cows in that way, for you will find that it upsets them completely and robs you of your profit. Another thing. You may breed her right, feed her right and care for her right, and even then you may slip. You may have a man to milk your cows who will knock the whole thing in the head. Some men cannot be good milkers, for they cannot get hold of the affections of the cow. You may think this is a cranky notion, but it is so. I am not going to give any instructions as to how you shall milk—whether you shall first milk the two back teats, or the two front ones, or whether you shall strip, or how it shall be done. Do it as you prefer, but do it the quickest way you can and in the gentlest. In starting to milk your heifer, start in the right way, and start her as you would have her continue. Remember they have their feelings, and if you have a cow with considerable brain power and nervous force it is

easy to spoil her from the start. Sometimes people are bothered by heifers holding their milk, but did you ever know her to hold her milk from her calf? Take the place of the calf in the affections of the cow and you are all right. I have managed in this way, and generally succeed. We have the heifer handled gently (of course, everybody does that). She is in a box-stall, and she is all excited, for she is always excited about her calf. I said to my wife, "That cow is proud of her calf, and wants to say, 'Isn't it a daisy?'" [Laughter.] But my wife said, "No; that is not what she means. She says, 'Don't hurt my baby.'" I guess my wife is right. Now, give her half a pail of warm water, and talk to her nicely and gently, and she soon gets over her fright. Then slip the calf outside the box-stall, separate them before it has sucked, and the cow hardly knows it. She can caress it, and while she is caressing it the milking is going on. She don't miss it and gets confused, and don't know whether it is her calf or the other calf taking her milk. [Laughter.] Do that every time, and you can soon remove the calf and she will not mourn for it at all. I had a little trouble a year ago in this line. I was doing the best I knew how, and I had a grade cow, a splendid cow, we called "Brownie." I was not quite careful enough and she was a little bit high strung, and we got the calf away too abruptly, and I could not get her milk. The next time it was no better, and something had to be done, so I brought the calf back and let it take the milk. We went into partnership, the other calf and I. [Laughter.] I finally got the cow in shape by working in this way with the calf, but although I knew she was a splendid cow, she did not give down as she should and, of course, dried up sooner than she should. I then went to giving her grain, and that attracted her attention and she did better. Do not feed while milking, because the cow should pay attention to giving milk, and not to eating, but in this case I tried the feed with the milk. After awhile she did better, and finally I hired a German boy, and from the very first she fell in love with that boy. He was not a handsome boy either [laughter], but from the very first she gave her milk down for him, and while that boy worked for us, for two years, she was the best cow we had. She gave us two pounds of butter a day for months. Finally the German boy left us and went away two or three hundred miles to the city, and we could not do as well with Brownie as he had done. After a time he got homesick and came back to us. He wanted to see that cow [laughter], and he rushed right out to the barn, and she began to moo as soon as she saw him,

and she licked him, while the tears ran down his face. He stayed with us another year, and during that time I never had a better cow. I tell you, gentlemen, there is a wonderful sight in this milking business. The reason I have said so much about this is that I want you to think about it.

Some years ago I was riding along one summer day in Nebraska, almost at sundown, and passing by a sod house, when I noticed at a distance of sixty to eighty rods, perhaps, 500 cattle grazing on a little ridge. As we went by a girl about sixteen years of age came out with a tin pail. She was barefooted, but neat and tidy. She looked off towards the cattle and called, "Come, Sukey, come, Sukey." We took out a map and pretended to be looking for something, and watched, although I knew my friend had one eye on the girl. [Laughter.] Then, in answer to her call, a Jersey cow stuck up her head and walked towards the girl, and as she came down she began to moo as she would if she had a calf. She came up to the girl and licked her, and the girl called her "good Sukey," then the cow fixed herself to be milked, and we could hear the first "ting, ting," and "brr, brr," as the milk struck the bottom of the pail, and then the steady sound of the milk as it fell in the pail. When she got through she spoke to the cow and petted her, and then the cow mooed, and went away. Don't you know that cow was doing the best she could to show her appreciation? I said to the young man, "There is a dairy maid for you," and now that same girl and young man are living together in the same house, and own the finest and best herd of cows I know of. [Laughter and applause.]

My time has about expired, gentlemen, and I will be glad to hear any questions you may wish to ask me.

A Member—I understand you do not approve of feeding while milking. I think it is the custom with most people to do this.

Mr. Goodrich—Do you mean grain feed?

A Member—All the feed.

Mr. Goodrich—I do not think it is the best way. The cow is constantly looking around, and don't stand so well. If you have proper hold of the affections of your cow she wants to be giving all her attention to giving milk.

A Member—How long should a cow go dry?

Mr. Evans—Why go dry at all?

Mr. Goodrich—They ought to. They will pay you more money if they go dry.

Mr. Evans—It is a very bad habit.

Mr. Goodrich—All right ; you must have your own ideas, and I will have mine. I would prefer they go dry for at least six weeks. Occasionally there is a cow rather difficult to dry up, while others go dry long enough.

Mr. Evans—We don't want to increase that.

Mr. Goodrich—I prefer to have my cows go dry for about six weeks before coming in, although some men say they have cows that cannot be dried up. Such cows are possible, but not very plentiful. They are very rare, indeed. Cows in their natural state, before being improved by man, gave milk only for their young. We have improved on this, but we have not been able to breed that all out yet, and there is a time when nature asserts herself. If you have a cow you cannot dry up, watch her about eight weeks, say, before she is due to be fresh, and you will find a time when the milk seems to be held back. Nature is trying to help her. Then is the time to begin, and don't milk all the milk out. Keep on stripping for a day or two, and she will soon be dry, but if you keep on milking her you will get past the time when your cow can be dried up.

Mr. Fithian—The milk is not good to use at such times.

Mr. Goodrich—It is not fit to use for human food.

Mr. Fithian—Would you advise having a cow calve every year?

Mr. Goodrich—I do.

Mr. Fithian—When you are drying your cows do you take the feed away from them?

Mr. Goodrich—I do. We feed constantly in proportion to what they produce. When they go dry we take away most of the grain food.

Mr. Fithian—If you want to sell a cow to the butcher how do you dry her up?

Mr. Goodrich—I feed her along according to the milk she gives to pay for her feed. I do not attempt to make beef out of an old dairy cow, but sell her for just what she will bring, and the bologna man gets her, and scrapes the meat off her bones, and sends her to Trenton, we will say, and if you want to eat her you can have her. [Laughter.]

Mr. Gillingham—You spoke of removing the calf at once. Would you do that in every case?

Mr. Goodrich—I do that in every case. I prefer this way for several reasons. One reason is the quicker you take the calf away the less affection the cow has for it. Another reason is that with

Jersey cows we have very rich milk, as a rule, and if the calf is allowed the milk for any length of time it will scour. If you take the calf away you can still give it her milk diluted, if you think best.

Mr. Fithian—We have a better way ; we buy a Holstein cow and let the calf suck her.

Mr. Goodrich—If I was going to make veal of the calf, or had calves to raise for beef, this is what I should do, but even Holstein milk will not do for a calf six or eight months old. In the course of, perhaps, six months it would get some fat out of the Holstein cow.

Mr. Fithian—What method do you have for feeding the calf ?

Mr. Goodrich—I learn it to drink, and the younger it is the easier it learns.

Mr. Cook—How about a 4.6 Holstein dairy for milk ?

Mr. Goodrich—That is good milk, and there are Holsteins that give good milk. The cow I mentioned here to-day as making four pounds—many folks would not believe it, but I saw it myself. I went out at midnight and took samples of the milk, and her milk showed 4.6.

Mr. Fithian—It is the cow that gives the greatest quantity of milk ?

Mr. Goodrich—That is the point, exactly.

Mr. Evans—Would you feed calves with rich Jersey milk, diluted with water ?

Mr. Goodrich—That is the way we do.

Mr. Evans—We use half water.

Mr. Goodrich—We put in water, but not that much.

Mr. Evans—Is there any difference in the amount of solids in the milk ?

Mr. Goodrich—That brings up the question of whether the food affects the character of the milk. I have investigated that question thoroughly in relation to the butter fats, and I have come firmly to the conclusion that we cannot change the percentage of butter fats by changing the food. I was formerly of the other opinion, and was once indiscreet enough to make that statement in public, and I wish I hadn't. It was ten years ago, and I said it so positively. I said these German experimenters might be hanged ; I would not believe it, and they have remembered it and throw it up to me. I went home determined to prove that I was right, and I thought when I had everything right I would have them come down. Well, I worked at it, and worked at it, and I proved I was wrong.

I want to give you a little experience. Milk does change sometimes, whether you change the feed or not. I had been feeding my cows pretty well on grain, ground oats, and corn meal and bran, one-third of each. I had a talk with Prof. Wall, at Madison, the chemist who works up these feeding problems. He thought my feeding was a little too carbonaceous, and he asked me if I would make a change and write to him and let him know how it came out. He suggested I should use two pounds of cotton-seed meal and take out the oats and corn. I did so, and the product went up two pounds of butter a day. The increase in milk was the same. Just before that we had been testing cows. My son was doing the work ; he had graduated from the Dairy School, and we made a composite test once a month of each cow. We took samples of eight milkings about the middle of the month. Two or three weeks after we changed to the cotton-seed meal it came time for another test. My son was reading the scale, and I had hold of the old record for comparison. The first showed 3.8, and the cow at the previous test showed 4.4. We thought that the cotton-seed meal was knocking out the butter fats, even if we did get more milk. Here came another with 5, and the previous record was 4.6. There was a gain, and in this case you would have said the cotton-seed meal made richer milk. Some of them were higher, while some were lower in their tests, but the average was the same. Now, if anyone asks me about cotton-seed meal as affecting the butter fats I must tell him I don't know. If anyone asks me what kind of feed will increase the cow's milk I can answer. If you ask what kind of feed will increase the milk and the butter fat someone will say corn meal, or another will say bran ; some one thing and some the other. There is nothing in it. It is too much guesswork.

HUMAN FOODS AND DRINKS.

BY PROF. H. W. WILEY,

Chemist United States Department of Agriculture.

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HUMAN FOODS AND DRINKS.

I never go to a farmers' meeting without learning a great deal, and I have listened with the greatest pleasure and profit to the address of the gentleman who has just preceded me. Among other things I have learned not only about the feeding of cattle, but something about classification. I have often wondered in what order of beings the chemists might be found—in what order they live, move, and have their being—but I have never been able to make it out. I find that first in the scale comes the man who owns the herd of cows—although the speaker was too modest to say so. After that comes the German boy who gained the affections of the cow, then comes the cow, and fourthly comes the chemist. I do not feel much hurt by that classification after all, for I am not much of a chemist, but there are gentlemen here who are widely known as such.

Your President really made my address in introducing me, for the importance of human food is something which is not often considered in a farmers' meeting. You have heard to-day how important it is in feeding the dairy cow to commence right, and if you want a good cow you must begin right—with the feeding of the calf. I never realized so much as to-day how important that is. I supposed a calf could take as much food as it wanted, no matter how fat it got. The calf for the milk cow must be fed and trained from the beginning, and I have often insisted on this very point in regard to the feeding of the human being, and a man should be fed for his profession from the time of his birth. If you deem it as important that the calf should be fed for a definite object, how much greater the necessity for saying that a human being should be! In point of fact there are very few professions among men where they are fitted for their professions, and few of them are fed for their professions except the prize-fighters. Now, is that not a shame? We do not, as a rule, consider prize-fighting a very honorable profession, although the most profitable in the world. I spent eight of the best years of my life, from seventeen to twenty-five, trying to gain a little knowledge

so as to become a kind of chemist, and I am a poor man to-day. If I had been fed for a prize-fighter I could possibly make \$50,000 in a night, as was the case in New York one night recently. The man who won that fight was fed for it for months, and he won it because of his superior strength, and muscle, and skill that came from his feeding. Every man should be fed for his business, and if he is to be President of this State Board of Agriculture, one of the highest of functions, he should be fed as your President has been.

There is one thing can be said of this State Board of Agriculture—you are all well-fed men. Some years ago people thought I was jesting when I said I thought a man should be fed for his profession—for the ministry, for law, for any professional life—and it seems to me that the question of human food, while not so important, perhaps, as the food of the dairy cow, and of pigs, and so on, it might still engage the attention of chemists, and so I come before you to say a word in behalf of human food and feeding.

To me the most unique figure in the great French Revolution was not Robespierre, nor Mirabeau, nor Carnot, nor Bonaparte, the man who changed the figure of the world, but Danton, the Democrat, of great brain and of pure heart. A little over one hundred years ago the French people cut off his head, in "gratitude" for his services, and twenty years ago the French Republic, recognizing his services, built upon the site of the house where he had lived a magnificent monument to his memory, and on the base of this monument are inscribed certain lines from his addresses before the convention. The most striking of these inscriptions may be seen in passing along the Boulevard St. Germain, as follows: "After bread the most important need is education." It seems to me that is the basis of all philosophy of every kind. First, bread—and this does not mean the kind of bread which, if fed every day exclusively, would cause a man to seek for a divorce, as my predecessor has said here. We mean human food. The first thing you must do with mankind is to feed it. I remember once hearing of a discussion among women as to the best method of keeping husbands at home, and there were a number of plans offered for adoption. Finally one woman said she knew how. How? She replied, "Feed the brutes." That is the secret of domestic felicity.

I have never had the pleasure of obtaining a divorce myself, but I believe most of the divorces come from poor food and from poor cooking, and I do not believe any man is inhuman enough to leave a home where he gets good food and good care. What has my friend

said about cattle? He has said they must be well fed and well cared for. If this is true, as it undoubtedly is, is it not as important that the family should receive as much care as a herd of dairy cows? Every word that has been said with reference to the feeding and care of the dairy cows is equally applicable to the family—in my mind far more important.

Let us give as much attention to the family as we give to our herds of dairy cows, not only in the food you furnish them, but in the preparation of that food. We hear one hundred lectures on the subject of the feeding of cattle and pigs where we hear one lecture about the feeding of the human family. In our books it is the same thing, and I think the time has come when, without detracting anything from the splendid achievements which have been accomplished in the line of cattle-feeding—the time has come when more attention should be given to the question of feeding mankind properly. Let us, in the light of the glory of these achievements, try and find something for the relief of suffering humanity.

My object in talking to you is to endeavor to secure some beneficial results in the line of legislation that will prevent the adulteration of our foods. I wish to say a few words in regard to the relations of pure food to human health. One of my friends here has said there should be a law to prevent the use of preservatives in milk. Another has said he could not sell his milk without using it, as the people would not have it. They wanted milk that would not turn sour. He further said he was compelled to use it, or lose his business. Let us look into this for a moment and see what they are. Is it proper to use these adulterants or these preservatives? What causes the decay in food which these preservatives are to counteract? When we were boys we called it decay, and now bacteriologists tell us all decay is not due to the oxygen, but due to the activity of certain organisms which are found in the milk and in all things intended for food. If you can paralyze their activity you prevent the decay.

The souring of milk, then, is due to the activity of these organisms in it, and if you kill these organisms, or paralyze them for the time being, you keep your milk "sweet." That is the theory, but what is the effect? What is digestion in the body? Simply fermentation, and nothing else, and if you stop the action of these organisms you stop digestion. The matter which you put in your milk is used to prevent the milk from souring, and in reality it kills these organisms and prevents decay, as well as preventing digestion from taking place when the milk is taken into the human body. In

the preservation of foods this must be done without killing these organisms by means of chemicals, for if this is done it unfits your food for human use in preventing digestion. While the milk is sweet it is digestible, but it should not be used for food after these preservatives are used, although I will admit that some of them are less objectionable than others. The only proper remedy is nature's own, and that is the destruction of these organisms by heat. When killed in this way they are not injurious when taken into the body, because there is nothing to arrest fermentation, and the digestion of the food is not impaired.

I am not one of those radical men, Mr. Chairman and gentlemen, who wish to cram their own views down the throats of others, and every man can have his own views on this subject. I am not in favor of any law which may be called despotic, for I believe in giving every man the largest possible measure of human liberty. I am opposed to every form of legislation which says "Thou shalt not eat or drink," or which does not permit you to eat or drink what you please, yet I do not think the law should permit an innocent person to eat things or drink things which he does not know anything about. All legislation should rest on the principle of honesty.

Every article of food or drink, every condiment exposed for sale should be sold for just what it is. If I want it, or you want it, that is my business, or your business. I want to know whether or not it is milk, and whether with or without preservatives. If it is fresh from the cow it is as I want it, but if it has preservatives in it I want to know it, and all about it. If I go to market and want butter, I ask for it, and under the law butter means but one thing. I don't mean the product of goat's milk, or mare's milk, nor the fat of the cow, but I want the butter fats from her udder—from the cow's udder, and nothing else. If you want oleomargarine, and in many cases it is preferable to butter; for instance, in camping out in the forest, or on shipboard, or in a lumber camp, or under similar circumstances, we want something that will last better than butter. Then I would ask for oleomargarine, and I would not want the law to tell me I shan't buy it, as it does in some States. I don't believe in that kind of legislation. Many dairymen are opposed to me on this account, as they ask for prohibition. Oleomargarine will keep longer, under certain circumstances, than butter, and the man who wants it on this account should be able to buy it, but it should be sold for what it is, and not as anything else. The man who sells it for anything else should go to jail. [Applause.] I say the whole

question of pure food legislation should be an enactment of a law that will compel men to be honest in what they are offering for sale. You don't need any other kind of law in New Jersey than this—that every article of food offered for sale should be offered for just what it is, and for nothing else. We have before Congress at the present time bills pending which have been indorsed by organizations of farmers, boards of health, and business organizations all over the country. We have organized a Pure Food Congress, and after a great deal of solicitation we prevailed upon your Secretary, Mr. Dye, to accept the office of Secretary of this Congress. We had with us many illustrious representatives from the State of New Jersey, as well as from other States throughout the Union. That Congress formulated a bill at its last meeting which was introduced in the National Congress by Mr. Brosius in the Senate, and by Mr. Faulkner in the House.

Let me say a word here of the necessity of this legislation. Two or three weeks ago I was visiting the State of Indiana, attending some of the Farmers' Institutes there, and while waiting at one place for a train, I noticed a shipment being made of some packages of butter put up in a very curious way. I saw that it had been packed in barrels, and asked the shipper if it was intended for the Eastern markets, and he said, "No." I asked him where he had bought it, and he said he had "Bought it in the country." He has huckster wagons going around through the country all the time and trading in the different kinds of butter as he finds it—and you know how many different kinds of butter can be had from different sections—all kinds of butter were bought in this way, and all packed into barrels promiscuously. I asked him if the butter was intended for the Eastern markets, and he said "No; he was shipping it to Elgin, Illinois." [Laughter.] There it was repacked and shipped out as the finest "Elgin" butter. What a fraud to perpetrate on the community, and what an injury to dairying such a proceeding is! The law cannot prevent bad butter from being shipped into Indiana, because it has no control over it. Neither can the National Congress at present say anything about this proceeding. You can make any kind of food you like and send it here, and Congress cannot say no, because you are a sovereign State. This is all under your own State control. But Congress can say this—that a man who makes this adulterated food in Pennsylvania, for instance, cannot send it into New Jersey and sell it for anything but what it is. Under the Constitution the Congress of the United States has absolute control over

interstate commerce. This is what the proposed law can do. It can prevent these articles of fraud from being shipped from one State to another under any guise except that which tells exactly what the article is. It can regulate the traffic in these foods between the several States, and it can control the importation of such foods from abroad. Let me give you an illustration. As you know, Germany has placed certain unjust restrictions upon the trade in certain agricultural products shipped from the United States. Meats and other articles of food are prohibited which we know to be perfectly wholesome, and the American government has remonstrated repeatedly with the German government in regard to these restrictions. The Germans claim that American meats, especially pork, produce trichinosis. They are accustomed there to eat hams raw, because they prefer them that way, and if the trichina exists in the hams it is likely to produce unpleasant results when eaten raw. Our government sent an attache of the Embassy over there with express instructions to investigate the matter thoroughly, and see, if possible, whether there was any basis for these allegations on the part of the Germans. This representative took the trouble to go to the spot wherever complaint was made, and he investigated the matter carefully and found that in every case where trichinosis had occurred it came from their own hams, without exception. There was not a case caused by American pork, and we are convinced that these restrictions are unjust. The German government has refused to listen to the representations made by our government, and there is nothing to do but retaliate. I have been instructed to secure samples of their products coming to this country, with a view to finding which are adulterated, and which we can exclude from our borders. That is the only way we can bring them to their senses. I went to New York specially to get German wines. I went to one of the largest importers there, and said I wanted foreign claret, and he told me he had plenty of it. He showed me his casks, and told me he would bottle it for me. He asked me what label I wanted on it. He was willing to accommodate me in that line. [Laughter.] He drew Rhine wines, Tokay, clarets, all out of the same cask, the only difference being in the labels. Is that honesty? Is it fair? So we find that we must protect ourselves from these frauds brought here from other countries. We should do this, and we should see that these misbranded foods are not brought into our markets to force down the prices of the genuine articles.

I do not intend to take your time to dwell on the details of this

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bill I have referred to, except to say that that convention, with representatives from over thirty States, agreed upon this bill, and it is a wise and conservative measure. It does not savor of despotism, and is not prohibitive. It simply requires that people shall be honest in what they offer to their neighbors. This bill is now before the Senate Committee on Agriculture, and the House Committee on Inter-State Commerce, and the representatives of the Pure Food Congress have been before them. The committees have been ready to report the measure favorably, but what has happened? They were on the point of reporting the bill when a gentleman appeared before them in the interest of whiskey, which had never seen a distillery, and he asked to be heard. He said if this bill became a law they must stop selling their goods, and they did not want the bill passed in its present shape. I don't suppose there is a man in this room who drinks whiskey, or that you have any personal interest in the matter, but suppose that somewhere in New Jersey men may be found who do, but if this bill were to become a law, and such a man were to buy a bottle of whiskey, he wants to know that he is buying whiskey, and he would be protected so he would know what he was buying. It may be wanted for an invalid for medicinal purposes, and he is interested in knowing that what he is buying is pure whiskey, or what is sold as such. I am not the man to say my neighbor may in such a matter, but I do want to see that he gets the genuine article. This man came from Brooklyn, and he was honest about it, for he said his people did not make whiskey. They took alcohol and burnt sugar and essences and mixed them up, and in this way they made a five-year-old whiskey in two hours' time. This prevents the sale of whiskey which has been stored in casks for five years, but it is cheaper, and these people don't want the bill to pass. He then asks that the report be postponed for a time to give him an opportunity to file his objections in writing. Then he brings in another bill and has it introduced as a substitute, prepared by this firm in Brooklyn, or their representative, and asks that Congress accept this bill in place of the other. That one thing has delayed the reporting of the Pure Food bill so long I fear this Congress will not have time to act on it before the close of the session. It is a crime against humanity, against the representative people who came to Washington in the interest of this bill, to ask them to accept this substitute. By this action they are enabled to postpone the reporting of the bill, thus securing further time for the continuation of their business. If you will allow each manufacturer, or the repre-

sentative of each particular line of goods, to amend the law to suit his particular ideas, we would not know what we have. The person who sat down at a table would be in the condition of the poet, who said :

We sat at a table delightfully spread,
And teeming with good things to eat,
And daintily fingered the cream-tinted bread,
Just needing to make it complete
A film of the butter so yellow and sweet,
Well suited to make every minute
A dream of delight, and yet while we eat
We cannot help asking "what's in it?"
O, maybe this bread contains alum and chalk,
Or sawdust chopped up very fine,
Or gypsum in powder, about which they talk,
Terra alba just out of the mine.
And our faith in its butter is apt to be weak,
For we haven't a good place to pin it,
Annatto's so yellow and beef fat so sleek,
O, I wish I could know what is in it.

Ah! be certain you know what is in it,
'Tis a question in place every minute.
Oh! how happy I'd be could I only see,
With certainty all that is in it.

The pepper perhaps contains cocoanut shells,
And the mustard is cotton-seed meal.
The coffee, in sooth, of baked chicory smells,
And the terrapin tastes like roast veal.
The wine which you drink never heard of a grape,
But of tannin and coal tar is made,
And you could not be certain, except by their shape,
That the eggs by a chicken were laid.
And the salad which bears such an innocent look
And whispers of fields that are green,
Is covered with germs, each armed with a hook
To grapple with liver and spleen.
No matter how tired and hungry and dry ;
The banquet how fine ; don't begin it
Till you think of the past and the future and sigh,
O, I wonder, I wonder what is in it.

Ah! be certain you know what is in it,
'Tis a question in place every minute.
Oh! how happy I'd be could I only see
With certainty all that is in it.

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And the preacher who prates of the glory that waits
On the saints, and asks "Have you seen it?"
And tells you how hot it will be for the sot
And the sinner, at last, does he mean it?
The political boss who asks for your vote
And promises not to forget it,
When landed at last in a place of some note,
Don't you think you'll surely regret it?
And the maid of your choice with the heavenly voice,
Whom you've loved for a month, if not longer,
Perhaps has said "Yes," and it's time to rejoice
And foster the faith that grows stronger.
But that true heart so dear, O, you tremble with fear
And with doubt when you struggle to win it.
And now that it's yours, I beg do not jeer,
When I ask "Are you certain what's in it?"

Ah! be certain you know what is in it,
'Tis a question in place every minute.
Oh! how happy I'd be could I only see
With certainty all that is in it.

[Laughter and applause.]

Mr. President and gentlemen, I come before you with simply this plea—that you should strengthen public opinion on this great subject. Use your influence with your legislators, and create such a feeling that there can be no doubt in the minds of your lawgivers in the Congress of the United States that this bill should become a law, and that no further interference should be allowed by these counterfeiters. There is no better plan than this, and we should not allow these men, who can make a five-year-old whiskey in a couple of hours, to come in and interfere with the passage of this bill. The chemist, although ranking after the cow, in the order of existence, has been able to discover, by his researches, what these processes are which go on in the aging of whiskey, and he can tell you what they are. They can tell you of the ripening organisms existing in the oak wood process, which is due to the oxidation of those alcohols called fusel oil. When kept in casks four or five years these alcohols disappear and ethers take their place and give to the whiskey its pleasant flavor, while the adulterated or artificial whiskeys are dangerous to life. The chemists make these, and are devoting their time to making these or similar extracts all over the country. Over 80,000,000 gallons of the whiskey consumed in this country is counterfeit, and this proposed law says if a man wants to drink it he can, but he must know what he is buying when he buys it. It says the manu-

facturer of these bogus goods must brand them for just what they are, and not sell them as the genuine article. Travel over this great country, and eat at its hotels, as I have done, and you can speak with great unction on this question. Our foods are all adulterated, to a great extent, and when to this is added the poor cooking one often finds it is little wonder that girls do not find husbands. [Laughter.] I am a bachelor yet, but perhaps some girl may win me by being a good cook and asking me.

But, Mr. President and gentlemen, join with me in securing this legislation for pure food, and then send your girls to the State Agricultural College and teach them to be good cooks, and you will make of New Jersey the happiest State in the Union.

THE FUTURE OF FRUIT-GROWING.

BY S. D. WILLARD, GENEVA, N. Y.

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THE FUTURE OF FRUIT-GROWING.

Uncertainty is inscribed on everything in which mankind are engaged, nor are the conditions contributing to this state of things growing less. Year by year sharp competition demands effort not before anticipated to meet requirements of the times in which we live. Society, religion and politics are each imperative in their demands upon the individual that must be responded to alike by the mechanic, merchant and farmer in their various surroundings, the outgrowth of conditions over which they have no control. Hence we find the expense of living on the increase, with no corresponding revenue to liquidate obligations unknown to former generations. Such are the problems that confront the agriculturist of 1899 while he is seeking to secure from the soil a sufficiency for family support and the education of those whose fitness for the future depends upon his efforts.

The elements of plant-life essential to the production of crops adapted to soil and climate that existed so abundantly years since have been so exhausted, or unbalanced by constant cropping, that the attainment of satisfactory results is found only by the use of commercial fertilizers and the adoption of extraordinary means and methods for everything grown. On the other hand, the virgin soil of the far West, with increasing cheap transportation and modern appliances for producing and securing the same products at a greatly reduced cost, is affording competition so sharp as to leave but little margin to the Eastern farmer on anything grown, and produces a spirit of unrest when facing the present and anticipating the future. It should be understood that I speak from my own standpoint as a New York farmer, and possibly may not express the sentiment as viewed from those of this State, and yet, I imagine, conditions are much the same, and while the minority may be satisfied, the masses of those whose competency is acquired from soil-tillage have found the income so reduced as to require the most rigid economy to make receipts meet current expenses.

Forty years since, grain-growing and stock-raising, each by themselves affording profitable returns, were so harmoniously blended that hand-in-hand they worked together and enriched the farm, which, with its increasing fertility, made the farmer the most prosperous individual to be found. Lands advanced in value until well-located farms reached and passed the hundred-dollar mark per acre, while \$150 was frequently refused on tracts comprising an area of two hundred to three hundred acres.

Within the last ten years these same lands have been in the market begging for purchasers at \$50 to \$60 per acre.

It has been ascertained that remote sections can, with the appliances at hand, produce everything required to support the human family, including butter, cheese and meats, and place them in the hands of the consumer at prices that defy competition from the high-priced lands of the East. Loans of Eastern capital required by their development have been returned, mortgages have been lifted, and the price of their lands has been advanced until nearly on a par with those thousands of miles near tide-water.

State and Federal legislation have been liberal in appropriations for the dissemination of required information on methods best calculated to further our interests. Experiment stations and Farmers' Institutes have been potent factors in increasing production at reduced cost. In short, little has been left undone to further the interests of the producer, and yet the farm presents but little that is attractive to the ambitious, wide-awake young man desirous of accumulating a fortune in his profession. Such are practically the surroundings of the farmer engaged in producing the ordinary farm crops of to-day. Soil, climate and proximity to the best markets of the world, however, have placed us in a position to grow with success, products beyond the reach of Western competition. An increasing demand at home and abroad for our fruits, justifies a general planting of any and all varieties adapted to soil and location that are required to meet the wants of a rapidly-growing population. Nor will this ever grow less.

Commercial fruit-growing is in its infancy, with an outlook so full of encouragement to the intelligent, industrious grower as to warrant additions of wide areas in planting whatever is required to meet market demands. The individual himself must determine the line of work in which he shall engage to gather the greatest profit. Soil, location and climatic conditions are factors whose potency cannot be ignored. In my own experience, while the plum has been my favorite fruit, the pear, cherry, peach, quince, apricot and apple, as

well as some of the small fruits, have each received more or less attention, and have usually given fair returns upon the investment and labor.

The apple, king of all fruits, has been most neglected, and herein has been made a great mistake. With my present knowledge and experience, could I be placed back a quarter of a century, the apple should be made the leading industry, and other fruits secondary. This idea has been the outgrowth of observations made in various apple-growing regions through which I have been permitted to travel in recent years.

The plantings of forty and fifty years since are going to decay, with little apparent effort to repair the loss with others, while the growing demand at home and abroad for good, first-class apples is increasing annually, so that the requirements to-day are far beyond the supply, and, with the exception of now and then a phenomenal year in which the apple-growing region of the entire United States makes a crop, this will, to a greater or less extent, continue to be the case. One well read up on this subject tells us that, as a rule, only about one-third of the region where this fruit may be grown commercially makes a crop in any one season; further, that not more than one-sixteenth of the trees planted ever live to become productive. If this be true, and I am inclined to think it is so, practically there is but little probability of overproduction, as a large portion of the crop will be annually wanted to supply those sections that never have grown their own fruit, as well as the demands of the evaporators and canning-houses, whose consumption is measured only by their ability to obtain them at reasonable prices. The future of the industry is largely in the hands of the grower. Intelligence as to varieties wanted in the markets, as well as those adapted to location, must not be lost sight of. Production is the basis of profit. Annual crops are more to be desired than those that are overburdened once in two or three years and barren during the other years; and a variety possessed of weak, sickly foliage should never be found in the commercial orchard. Persistent spraying may save a crop. Where this feature is disregarded, neglect to observe this principle at the beginning, has been the cause of discouragement and ultimate failure of one-half of the apple orchards planted.

The future grower of apples should plant for a purpose, and that purpose should be either for family use or for the markets, selecting varieties with this distinct end in view. For the first, quality should be the consideration, while for commercial purposes it may be neces-

sary to consult market demands and productiveness. While generally understood that the demand for good American apples abroad is rapidly on the increase, but few realize the enormous quantity of this fruit that finds its way annually into evaporators and canning establishments. In a single county the past year in my own State it is estimated that nearly three hundred carloads were the product of evaporators, while in 1896, the phenomenal year for apple-growing, it was stated that fifteen hundred carloads were shipped from the same county, while at the same time the quantity consumed by canning factories amounted to hundreds of thousands of bushels.

In reading an English report received a few days since, giving in detail the prices of this fruit as sold in the month of December, I noticed the quotations of Canadian apples were considerably higher on the same varieties than on shipments from America. Not because of the inferiority of our fruit, but the outcome of neglect in selecting, handling and packing—suggesting the importance of more care along these lines in the handling of all fruits.

A few days since, an excellent apple-grower whose success has been marked, called my attention to a quantity of Baldwin apples ready for shipment, packed in bushel boxes and wrapped in paraffine paper at time of packing. In the same cellar was the same fruit, in other respects handled alike except packed in boxes without the paper wrapping. In the one case not an imperfect specimen could be found, with the fruit in fresh, crisp condition, such as is rarely seen. In the other, the ripening process was much farther advanced, with now and then an evidence of decay. It may be that sooner or later this method of handling will be adopted in preparing for market many of our choice fruits. The future of fruit-growing, where the most profitable returns are anticipated, will demand more intensity of care in its preparation for market, while the slipshod, careless methods now prevailing to a lamentable extent will not be in evidence.

The fruit crop of 1898 will for years be remembered as one of the lightest and poorest grown in the Empire State, particularly where reference is made to the apple, and yet notable instances can be quoted of those whose sagacity so promoted such soil production and culture in previous years as to insure crops rarely equaled in quantity and quality. It has been my privilege since winter set in, to meet a few of such individuals scattered in various counties. One of them reports a crop from twelve acres selling at \$4,600; another from ten acres, at \$2,500; another (acreage not reported), at \$6,400, while the fourth, on about twelve acres, gives gross receipts of about

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\$15,000. If the system of the intense culture is an economic measure as applied to ordinary farm crops, it is of double value when considered in connection with the growing of all fruit products. Many old and valueless apple orchards have been renovated and made very productive by the observance of suggestions thus made. Illustration pertinent could be multiplied without limit, and the future of fruit-growing will greatly depend upon the same application of business-like principles as are required in the wise conduct of other industries. The apple has been used as an illustration of principles that will apply with equal force to everything grown, and must continue to be one of our staple fruit products, while its culture has been greatly neglected and its value apparently not appreciated. But I would not wish to be understood, however, as advocating its planting to the exclusion of other fruits that in locations may be of more value. What I would advise is the selection of a few sorts of known value, and maintaining in first-class condition upon every farm a small apple orchard, even though more generally engaged in other lines. If those whose prophetic vision in commercial affairs are correct, as a nation we are just entering upon an era of prosperity such as the world has never seen, with the probability that profitable employment will be given to labor as never before. Stimulating an increase of manufacturing and production in every department of industry, the population thus employed must be supplied with such fruits as are required to meet the demands of increasing intelligence. Are the fruit-growing interests in a position to respond to the requisition that will thus be made upon them, and get their full measure of prosperity out of that which is to follow? For myself, I share fully the sentiments of others as to the encouraging outlook for the future, which must mean enhanced values for everything pertaining to soil culture.

The universal depression that has destroyed confidence, pervading all industrial pursuits and made popular the sentiments of the pessimist, will be superseded by a period of expansion and high prices that even the most optimistic cannot anticipate. Indulging in such ideas, and with a desire to be found in company with those on whose banners is inscribed success, I have continued to increase my boundaries in a moderate way of all such fruits as past experience has shown were adapted to the soil and climate, with the firm conviction that the future would bring satisfactory results, and in this I believe I have been wise.

It should be remembered that through the hard times of the past

few years, when reductions in values have continued until profits have been eliminated, the prices of choice fruits have been better maintained than that of most other soil productions, hence we argue in favor of increasing interest in an industry that we believe should commend itself more generally to those engaged in soil tillage. In studying the agriculture of our country, we think we see in the near future increasing evidence that the educated farmer is coming to the front, and to be given a position of such prominence socially and politically as to make him a power in state and national councils. The professional fruit-grower whose success will be measured by the highest order of intelligent industry that can be applied to his business, in giving to the human family fruit products, the consumption of which will aid in the development of better men and women, must keep abreast of the times and in close touch with all interests with which he should be conversant, and possessed of an honesty of purpose beyond question. For such there is yet room at the top.

Mr. Horace Roberts—When you store apples do you put anything on them to destroy the fungous growth?

Mr. Willard—No, sir; nothing.

Mr. Beans—I would like to ask the speaker about exporting apples. We have in our part of the State what may be called the valley lands. Some years ago I met an apple-buyer who told me he never bought apples from valley lands. Ours is what is called the tertiary soil, while some of the soils of the State are the azoic. Apples are sometimes brought down from Warren county and stored in our section of the State. Would you think, from what you know of the conditions there, it would be advisable to plant apples for export in our portion of the State?

Mr. Willard—No apples grown have as good keeping and shipping qualities as those grown on high land. I think it is the universal testimony of those having the most experience, that apples grown on the highlands are much better adapted for shipping and export than the lowland apples.

Mr. Rogers—I recently had a talk with the Chairman of the Committee of the Apple Growers Association, and he told me that the apples grown on the highlands were preferable and that those grown in the valleys, when shipped a few hundred miles, shrunk so much the barrels were loose, and it was necessary to sell them in the home markets on this account.

Mr. Willard—That is true. If any of you wish to take a trip to the

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highlands of Maine or New Hampshire you will find there that it is necessary to take a crowbar to make a hole for the tree, and I have never seen finer apples than are grown there. So in Massachusetts, the highlands of the State produce the finest fruit.

I want to say a word about keeping apples. I put up the apples that were exhibited at the Chicago Fair myself, and tried various methods, some in cork dust, and some one way and some another, but I found those put up like the apples I have here kept best of all. No apples opened in as fine condition as these. I think we might learn some things of utility even for home use.

I have never seen a New York Baldwin in the condition of this apple to-day, and these were packed immediately after picking, and kept in a dry cellar in baskets.

You will also observe how this paraffine paper has held the color of the apple, better than usual, I think.

I thank you, gentlemen, for your attention. [Applause.]

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EVOLUTION OF FRUIT PRODUCTION AND
MARKETING.

BY J. H. HALE, SOUTH GLASTONBURY, CONN.

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EVOLUTION OF FRUIT PRODUCTION AND MARKETING.

Mr. President and Brother Farmers—Your Secretary asked me to come here and talk to you on the subject of evolution in fruit production and its marketing, and as I became interested in the subject, looking at it from various points of view, I found there was more of it than I had thought. I got somewhat in the condition of the Irish lady in court, who was badgered by the lawyer in his examination. He finally said to her: "Now, madam, I want a decided answer; I want a definite statement from you as to the stairs in that house; I want to know how they run." "Well," said the Irish lady, "if you want to know how they run, when I am downstairs they run up, and when I am upstairs they run down." So it is with the evolution of fruit production, for it runs both ways, and we are apt to get mixed up on the question.

Many of our fruits are natives of this country, and the early settlers found the berries growing wild in great profusion, and our catalogue-makers of to-day are no more profuse in their writings than were the statements written to the old country by staid old Roger Williams about the wonderful production of wild fruits and berries found on their arrival in this country. He said the strawberries grew in great abundance, and enough could be gathered to fill a ship within a few miles compass.

The early settlers of the New World had no idea of fruit production beyond what these berries would provide in the way of drink, and no particular effort was made to grow berries and fruits for anything but for wine and cider. Few families grew more than a small number of vines, until about 1625, when, in Virginia, a law was passed that every householder should plant a certain number of vines and keep them pruned and growing according to well-defined methods, and a few years later a bounty was offered for the production of grapes. This was prior to 1630, and this bounty was in force in the colony of Virginia. They began to talk very early of the

climatic conditions of the new country, and argued that there should be no difficulty experienced in producing the same fruits as were grown successfully in France, as this country was in about the same latitude as France. We have all found out since that the question of latitude has nothing to do with fruit production. In the State of California, for instance, in the northern part, far north of us in latitude, oranges are grown and ripen fully two months sooner than the same fruit will ripen in the southern part of the same State. There are local conditions to be met with in California and in other States, which are not to be measured by either latitude or longitude.

The early settlers brought scions and seeds of fruits and plants with them to this country; these were cultivated in great profusion for the purpose of wine-making, as I have previously stated, but no extensive effort was made looking to the production of fruits for other purposes during the early settlements. Along about 1840 certain small nurseries began the distribution of trees through this country. One of these men shipped a number of trees to a gentleman in Massachusetts, sold to him at twenty-five cents apiece, measured by the coin of to-day, and the following year the purchaser wrote the nurseryman that the worms and insects were bothering him, and he did not know what to do with them. We do not have all the trouble to-day, for even in the earlier planting of fruit the planters were afflicted in the same way.

They were not troubled with the marketing, however, as their fruits were all for the purpose of wine and cider-making. Governor Wolcott, one of the old Governors of the Colony, was boasting of this production. While making a trip to Europe he was making his brags that his family had made five hundred hogsheads of cider. We Connecticut people are not putting that much cider in our cellars now, and I do not think there is that much made even in the whole of Hartford county.

Apple orchards in 1670 did not average more than twenty-five trees each. Mr. Willard has referred to the immense number of trees that are planted, and the small number which come to maturity. In 1890 there was a special census made of the horticultural interests of the United States. This was the first ever made, and the records went away back to the early history of our government. There were few commercial nurseries previous to 1800, but there was one at that time which grew the then enormous number of 27,000 trees. It was a great thing for those days. As a comparison, I wish to give you a few figures taken from the census of 1890. There was a showing of

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240,000,000 of apple trees in the nurseries, according to that census. There were 3,000,000 apricots, 49,000,000 peach trees, 37,000,000 pears, 68,000,000 plums, besides other miscellaneous trees ; there were also 159,000,000 grapevines, 371,000,000 strawberries, 105,000,000 blackberries, 49,000,000 currants and 41,000,000 gooseberries. This was nine years ago. These numbers practically represent a two-years' supply, but even then the number is enormous, and if they were all planted and cultivated, as some members of this society cultivate their orchards, the country would soon be overstocked with fruits ; but through carelessness in the nursery in digging, through the reckless handling of the transportation companies, through neglect on the part of those receiving them, and through careless planting, fully 50 per cent. of this number are dead before they are planted, and during the next three years 50 per cent. of the remainder are killed, through careless culture and reckless handling in other ways. It is the opinion of commercial growers that the loss will amount to something like 90 per cent. of the total output of the nurseries, and yet the balance represents a large increase in acreage of our orchards and fruit farms.

In the State of California the orange industry has been one of phenomenal growth. In 1890, according to statistics, the output amounted to about 1,000,000 boxes, and this year they are expecting about 10,000,000 boxes. This is all in ten years, and with all the young trees being planted this production will reach 15,000,000 to 20,000,000 boxes in the course of a few years, a supply far in excess of the present needs of the country, at present prices. This shows what a tremendous production we have reached in comparison with a comparatively recent period. Of course, there were some sales of fruit, in a moderate way, up to about the beginning of the present century, but this was all confined to a moderate family supply of a few staple fruits. Nearly every farmer had apples, and a few varieties of other small fruits, but the commercial growth of fruits is the product, almost entirely, of the present century, and the greater proportion, comparatively, of the last few years. New Jersey, owing to its close proximity to the Philadelphia and New York markets, the two great commercial centers of the country, was one of the first States in the production of fruits for market. Your warm, light soil, and other favorable conditions, producing fruit of fine color, aided largely in stimulating the production of these fruits, and your State as such was far ahead of others in this industry. It is only within a few years, comparatively, that fruit has become

one of the necessities as a food ; from twenty-five to thirty years ago fruits were considered a luxury. The methods of picking and packing, shipping and handling, were not understood or appreciated then as they are beginning to be appreciated now, and I can well remember in my boyhood being interested in fruit culture, and of the talk of dishonest commission men. Looking back now I can well understand that much of the dishonesty attributed to the commission man was really the ignorance of the grower. A lady once told me about her Uncle William having such a splendid lot of peaches, but that the commission men had robbed him, and he got nothing for them. I knew Uncle William very well. He was as good a man as ever lived ; a thoroughgoing old blunderbuss, with no idea of what was needed in the way of picking or packing his fruits ; he gathered them from the trees and let them stand about all day, and the next day he sorted them and hauled them down to the market or loaded them into the car, and it was twenty-four to forty-eight hours after they were picked before he got them started to market. Of course, he did not get much return. It could hardly be expected, for his fruit did not reach the market in marketable shape.

With the commission man, with the fruits arriving in all sorts of packages, and in all sorts of conditions, it is often found necessary to repack them, in order that a sale may be found for them at all, and in order that he may make some return to the farmer. Packed in packages with all the large peaches on the outside and on top, and the middle of the packages filled with small and inferior fruit, makes a dishonest package, and one not calculated to make the buyer wish for a second package of the same kind.

With the development of the many varieties of fruit, and with the development of a taste for fruit culture, there has been a wonderful improvement in the marketing of fruit, and in the methods to be employed in marketing it. Putting the product in better packages has increased the demand with wonderful rapidity.

Recently in looking over the reports of the Pomological Society, I was interested to note what has been done by your State towards the advancement of fruit culture, with apples, peaches, plums, blackberries, strawberries, and the other fruits.

In considering the fruits which are highly recommended for commercial growers, we must not forget some of those which, while not in the catalogues, are of great value to the family, for the family must not be forgotten in providing your list of profitable trees and plants.

Your Horticultural Society has done much for the development of

fruit culture in your State. So, also, your Experiment Station at New Brunswick. The same may be said of the work of your State Board of Agriculture, for your reports are widely disseminated, and go into the remote country farmers' homes and help them to attain better methods of culture and better varieties of products. All these have had much to do with the work, and it is a result you can well be proud of.

A word as to the nursery agent. This nursery agent has been discussed over and over again; he has traveled all over the land, has robbed the farmers by selling them some wonderful thing at a fancy price—robbing the farmers of hundreds and thousands of dollars, palming off on him old varieties at unheard-of prices. With all this he has been a missionary of the good work. He went to the farmers back in the country, and by showing his beautiful colored plates, he sold some wonderful apple trees at \$1.50 each, and some wonderful grapevines at perhaps two or three dollars apiece, and some wonderful pear trees at an equally high price. And then when the trees came his wonderful apple turned out to be a Baldwin, perhaps, and his pear was a Bartlett, and his grapes were Concords, and his other fruits all turned out some of the older varieties—the whole thing, so far as he was concerned, was a deliberate swindle, but he induced that farmer to plant something that he would never have planted had he not been misled by these wondrous yarns. He deserves a blessing for this, for he has proved a blessing in disguise. He has been the means of encouraging the growth of these fruits in places where they would probably never have been grown without his representations.

The horticultural press has told us much of the results obtained by successful growers, but it has told us but little of the failures. We learn by the failures as well as by the successes of life, and we learn much in unexpected ways. And that reminds me of a question asked here about reliable nurserymen at Geneva. There are many of them at Geneva, but there are many who advertise from Geneva who do not own a tree or a vine; they have a post-office box there, and have their mail sent to them there. When they make their sales they go to Geneva and buy the stock and ship from there, but beyond that they have no interest in it. I understand the best men there are not sending out agents at all, but the dealers buy from the growers and ship from there.

There is much in the manner of packing fruits. The tasteful display of fruit by the market men is doing much to stimulate its sale

in our cities. But the successful grower and the man who handles fruit must put it on the market in the most attractive manner possible. In Boston they are maintaining a Horticultural Society, and they have as members many of the most influential people, and the dealers are also members. Good fruits are exhibited weekly, and the people are educated up to what is the difference between good and poor fruit. The dealers know what good fruit is, and it is offered on the market in the choicest manner, thus stimulating the buying of it at good prices.

Boston and Philadelphia, I think, are about the same in population, and yet Boston will sell in a single day twice as much fine fruit, at an advance of from 20 to 40 per cent., over Philadelphia, very largely because of the greater taste displayed on the market stands. This has much to do with it. We want a general toning up along this line, and the result will be more than satisfactory in the increased returns received. Our foreign friends, the Italians and the Greeks, who are handling largely of our fruits, teach us how best to show up fruit offered for sale.

People are buying fine fruit as they have never bought before. It is now a substantial article of diet found in almost every home in the land. The working man's wife, going to market with one or two dollars for her supplies, has on her list fruit of some kind, in place of some of the coarser products of the farm. Mr. Willard hinted at that when he said the refinement of the people was helping the sale of fruit. As people grow more cultivated and refined in mind they become greater lovers of the finer things of earth. There is an increasing demand also for fruit of higher quality. The tendency, as you know, is for lower and lower prices, and we must not consider that we have any more than reached the bottom at the present time. The old high prices are gone forever. The demand is for more beautiful fruit, of better quality, and at lower prices, and the man who can meet that demand is the one who can get the best returns. It is the duty of the fruit-grower of the present day to take advantage of the past, even its mistakes, and do better work in the future. Study the methods of others; if a man has failed to produce fruits at a profit look at his method and see if you can discover wherein he has failed. If he has succeeded, see wherein he has made his success. Gather a point or two from the failures on the one hand, and from the successes on the other. It is a splendid study—and fruit-growing is a constant study—for the purpose of improving methods, to give better ideas how to grow, better varieties to plant,

and last, but not least, better men in the business. I believe that the fruit-growing of the future will and must be in the hands of the man who loves his business, and no man who does not find it a pleasure should spend much time on it. Life's work should be a pleasure, for life is short and precious, and you should do that which you believe you can do better than anything else. But the man who is continually jumping from one business to another, because the one offers a better reward in dollars and cents, rarely gets high in the world in his profession or in his bank account. [Applause.] The man who does what he loves to do—the successful physician, lawyer, banker or mechanic—is the man who loves his business and who believes in it. The lawyer who wants to win his case, the physician who works to make a cure, the mechanic who develops the full powers of the machine—these are the men who come to their reward of dollars and cents. So with the farmer who wants to see his plants grow and thrive and produce the best—he is the man who is looking after his trees and plants constantly; the man who prunes a little here or a little there, because he loves the business, is the man who will get the most dollars out of fruit-growing.

We have our agricultural and our horticultural societies, our colleges and our experiment stations to help us to better results, to urge us on to better ideas and methods, and these helps are driving towards the front those men who are most ready to take advantage of the opportunities offered.

The question of orchard culture has been touched upon as one of the important things in connection with successful fruit culture. If you don't intend to give your orchards the cultivation they need, to keep the soil stirred during the growing-months, then don't plant an orchard. A gentleman told me some time since that he had planted an orchard of about one hundred peach trees, and, as he did not think they would amount to very much anyhow, he had seeded the orchard down to grass. I said to him, "Your orchard has gone to grass." He might as well have saved the cost of the trees, for they would amount to nothing from the standpoint of a profitable orchard. You must cultivate for the food of the plant and for moisture. Of course, the fertilizer men will not agree with me in this, for they say, "Buy fertilizer and put it on your orchards." But the soil is stocked with plant-food, and this can be made available by cultivation and by stirring the soil. A wonderful amount of moisture is also required for the growth of trees and plants. If I were to choose between this culture of orchards for three or four months during the

growth of the fruit and a ton or ton and a half of fertilizer to the acre free of cost without it, I would take the culture every time; and yet I am as much a buyer of fertilizer as any fruit-grower in America.

Then I would give the ground some covering in the fall for the winter. I am not particularly a believer in fall plowing, but would plow in the fall if I had to rather than not plow at all. I would seed down with some kind of green covering to protect the rootlets from quick freezing and thawing. This also retains the plant-food which might otherwise escape. I cannot say what will answer best on your particular piece of land. It may be clover or vetches, but something should be sown for a covering after the summer cultivation is over. If you will thin out your trees by close pruning, as Mr. Willard has recommended, then plant apple orchards fifteen by fifteen feet apart. I am now getting ready to plant a large orchard in this way, fifteen by fifteen feet, but the very day they begin to crowd each other they must be thinned out, making them thirty by thirty feet apart. It is purely a question of getting double the crop during the early years of the orchard, owing to the greater number of trees, and no damage is done until they begin to crowd each other, when they must be thinned without delay. There are precious few men in the country with nerve enough to take them out at the right time. They think they will let it go another year and get a bigger return, and thus the thinning out is delayed, and the result is not as satisfactory as if thinned at the proper time. It is the same with black-cap raspberries. This is a profitable crop with us, and we get some of the finest berries from them one year after planting. I make the most money out of them by planting them three feet by three feet. You say that is too close. Of course it is, but I do it, and make money at it. We prune them back hard, to about one foot, for they make a wondrous growth, and each little bush gives from a pint to a quart of magnificent berries. Then out comes every other plant, and they stand six feet by six feet. The advantage of this method is that I get a double crop the second year after planting. The trouble would be with many growers they would think they could do the same thing the next year and get more of a crop, but there would be the mistake. The distance between plants depends, as you see, upon the man. If a man is a believer in close planting, and knows how to carry out his belief, by thinning out at the proper time, he is all right, but he should not advise the other fellow lest he make a mistake. A good distance apart gives the

plants more chance to thrive, for they must have the necessary moisture. If too close the ground cannot be stirred properly, and this contributes to moisture. So with my apple orchard. I can run them fifteen or sixteen feet apart. They begin bearing at seven or eight years, and I get seven or eight good crops from the trees, and have twice as many trees.

The question of tree-pruning is of the utmost importance. It must begin when the trees are planted, and must be continued judiciously every year. The pruning is a weakening process, and therefore stimulates fruitfulness. Anything that tends to injure the plant stimulates fruitfulness. Nature seems to do this to reproduce her species. If you have a fine, vigorous tree that does not bear, let the team run into it and rub part of the bark off, and I will guarantee that tree will begin to bear. But better than this is pruning at the proper time. Prune it in the middle of the summer and it will surely fruit the following season. Or take away the nitrogenous manures which have probably been stimulating it to too much woody growth. Pruning shocks the tree if done in the middle of the summer, causing the development of fruit-buds, whereas if trimmed when in a dormant condition this has a tendency to stimulate the woody growth of the tree. This question of pruning is very important in the development of the fruit tree, but, after all, very much depends upon the man back of it all.

Keep good foliage on your trees and plants. If there is any one thing more important than another in the production of fine fruit it is that of fine, healthy foliage. I have had my neighbors say, in speaking of their raspberries, that the leaves were all off in September, and they would certainly winter well. Did you ever dig raspberry plants after a bad winter-killing?

The old, vigorous canes were dead clear to the ground, and the only living plants were the small shoots—the suckers—and these were alive to the very top. I often think, in connection with our plant-spraying for diseases, that the most important thing after all is, perhaps, the keeping alive of the foliage, for unless you can keep perfect foliage you can never hope for perfect fruit. This is the one essential thing of all others—maintain the foliage. We have been spraying to control the various insects that injure our fruits, we have used the Bordeaux mixture to kill certain things we saw, but we have done more than that, for we have killed off the fungous growth that was killing the foliage, and if we don't get the other things we destroy the fungus. You must learn that until you get perfect foliage you

will never get perfect fruit. Of course, you can stimulate by means of a fertilizer, but you can over-stimulate. You can get so much foliage on your strawberries, for example, that they will be soft. You want enough fertilizer to stimulate the foliage, but not enough to make too much. I would not use stable manure on strawberries to any great extent. I would use the stable manure on some other crop, and use fertilizer on my fruits, unless some varieties lacked in vigor of foliage, when I would use the stable manure to a limited extent.

Next to the question of the importance of the foliage of the plants is that of thinning the fruit. If we care for our plants as I have indicated, if we attend properly to their feeding and cultivation, their pruning and foliage, there will necessarily, at most times, be more fruit than can be developed to perfection, and then comes the question of thinning out. Mr. Willard spoke about thinning out the apples to five or six inches apart. The man who did that ten years ago would have been called a lunatic. But the man who wants to make money with his fruit to-day must do this. It is cheaper to pay a boy for climbing the tree and picking off the little apples and throw them to the ground than to pay a man for picking them next fall and then send them to market and get nothing for them. The fruit on your trees must be thinned carefully and thoroughly, but whether you can thin your small fruits is a question. I know of some growers of black-caps who do this work with the shears; of course, they must grow a smaller acreage, but they get berries of great size and beauty. They have not as large a crop, but they market the crop for fancy prices, and this is the important thing after all—the net results. It can be done on trees. I have 100,000 trees in Georgia, and I do it, and it pays me. If you can thin one tree why not all, it takes more men, of course, but it pays well to do it. I have 40,000 to 50,000 trees in Connecticut also, and I thin the fruit on all my trees. When to thin them is a local question with each variety.

The picking and gathering of fruit is another important point—to know the proper time and stage of development to gather the fruit, according to your market. Your small fruits should be picked in the cool of the day, and at once be put in a cool place, and not picked when wet with dew. Of course if you are close to a local market get out early and pick them with the dew on them, and have it at the market early in the morning. If you are obliged to ship, it must not be shipped wet, for it will get mussy, and will not keep. When your tree fruits are picked pack at once and get it away from the light and air; this

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is important in fruit-handling. When you first grew berries in New Jersey you packed them in tight boxes, which held about a quart, and then it was thought the fruit must have more air, and you began getting these open-work boxes or baskets, on account of the ventilation they gave. Pick your berries when dry and keep them as cool as you can. I had a man tell me he had such a nice airy packing shed, right on top of the hill, where the breeze was blowing constantly. I told him it would blow the life right out of the berries—you don't want the wind blowing on them. If they are wet they must have air enough to dry the moisture from them, but then shut them up and keep the air from them. Put a blanket over them if necessary. Our Italian friend knows this, and if he has berries to carry over until next day he will turn the boxes upside down, and the nicest berries in the package are those which were in the bottom, away from the air. That is the point. But don't say I told you to do away with all ventilation. You want a package as light as possible in weight, as attractive as possible in color—the neatest-looking package you can get. A second-hand package, a soiled package, one made of unattractive wood, should be discarded if you want the best prices.

Don't grow second-grade fruit if you can help it. We farmers have been jealous of the manufacturers who have succeeded along a certain line, yet they have done so by rejecting everything that was damaged. Their products go before certain inspectors before packing, and everything that is not up to a certain standard is put aside as a second or a third, and they are sold as such. Only the best are put up and labeled with the brand of the manufacturer. The seconds he sells for what he can get. Suppose he finds in the course of time that he is making 60 or 70 or 80 per cent. of seconds, or of damaged or inferior goods, what does he do? He calls his heads of departments together and asks what is the matter. "We are turning out 80 per cent. of inferior goods, and this will ruin me and you will be without a job. What can be done? This must be stopped. Is it in the material or in the machine, or what is it? We must ferret this out right away." And then his men go to work to eliminate to the slightest possible degree the percentage of damaged goods, that they may not work a loss to the manufacturer. We fruit-producers must do the same thing if we would succeed. I say to you fruit-growers here in New Jersey that it is of the utmost importance, if you would work at a profit, that you should eliminate the percentage of damaged or inferior

goods you are producing, and I believe that not less than 60 per cent. of the total fruit production of the country is not up to the standard of first-class fruit. We can eliminate this very largely if we will, and the men who are doing it are the men who are succeeding to-day. Do not send fruit of inferior grade to market. Have your small fruits graded by the pickers, as it is hardly possible to assort afterwards, and see that all your fruits are up to an established standard. Sell these as first-class goods, and if you market the seconds, market them as seconds. As to the manner of selling, this is a local question. If you are close to the small towns sell direct to the consumer, but endeavor to have the man who handles your product in touch with you. If a local dealer, get him to come out and see how you grow and handle your fruit. Get him to understand the fruit from the plant to the package, and get him to believe in it, for then he will make the customers believe in it, too. If you are obliged to ship to a commission man, get him acquainted with your product; go and see him and get acquainted with what is doing in the markets. Borrow money to do this if necessary. Establish confidence between yourself and your dealer, and then do nothing to shake that confidence. Just how you will do this will depend upon yourself. Advertise in some way, for it pays—I tell you, it pays. I do not say this boastfully, but since coming to Trenton I have met a dozen different men, and these men have spoken to me of my business—“Well, I see you had a nice crop of peaches in Georgia; I had some of your peaches in Newark;” or, “I had some of them in Trenton.” How do they know they were Hale’s peaches? My name was on the basket. Every basket and crate was labeled with a little label on the end—tooting my horn. It is all right to toot your horn if you have the wind back of it. The crates carrying these baskets are two feet long, and are made of slats. One layer of baskets is put in the crate so the label shows through to the outside, and the other layer is packed so the label shows on the other side, and then the crate has a label, too, and you can’t turn the crate any way but that the label will show somewhere. On the inside of the package or basket we put a little story-book, and this tells about the orchard and the varieties of trees, and so on. Of course, where the peaches were sold by the piece, these books went to waste, but many of them are sold by the basket, and when the purchaser ate the peaches and got to the bottom of the basket, he found the little “horn.” [Laughter.] If the peaches were poor, the buyer knew enough to dodge them next time, but if good, he wanted them again,

and was willing to pay more for them. I paid \$800 for those little story-books, which were used in 70,000 crates of the finest peaches, and they brought fifty cents more per crate than the other fellows got. It meant several dollars, and it paid.

Every grower of fine fruit should aim to get acquainted in a business way with his customers. I have a friend who grows superb berries, and in every box he puts a ticket giving his name and the variety of fruit, and in the largest type he says, "Price always five cents above the market price." With berries selling at eight or ten cents ordinarily, he gets five cents more, and that means a big profit. Can he sell them? Certainly. He sells more than any other grower in the county, and gets his price. Then, too, his berries are so fine and large he gets them picked for one-half cent less a quart than others, and he makes it pay both ways.

In the fruit-growing of the future there must be a cutting down of the acreage of the majority of the growers. They must grow larger and better fruit, of greater beauty and higher quality, and the grower who gets the closest in touch with the consumer will get the highest price. Another thing will be the production on a tremendous scale by a few growers, by companies, with certain lines of fruits, in certain localities suited to them. The small growers might do better by co-operation, perhaps, as to methods of packing and selling and transportation, and it will bring more money to pay some specialist to place your products on the market in more desirable shape.

As to cold storage, I have little faith in this, as generally practiced. The dealer has more than he can sell, and then chucks the surplus into cold storage. If cold storage is essential, then to be successful the fruit must be in storage within fifteen or twenty minutes, if possible, after it is picked. You must get it there just as quickly as possible if it is to be of any benefit to you. If you are going to let it stand twenty-four hours before putting it into the cold storage it will not benefit you.

I have not said anything of the home supply. It is one of the most important things of all. Every farm home should have the greatest possible variety of fruit. You do not take interest enough to do this now, perhaps, but think it over, and you will see how important it is. Plant your grounds with beautiful trees and make home surroundings beautiful, your lawn attractive with beautiful flowers, and the inside of your homes attractive as well. There is nothing better than this, my friends.

Mr. Horace Roberts—I would like to ask Mr. Hale about the keeping of fruit. In Burlington county we put the fruit in large rooms, leaving them open at night and closing them in the daytime. Would it keep better if dipped in a weak solution of sulphate of copper, or if it were stored in pits and covered with carbonic acid gas, opening and emptying a pit as wanted? The cold-storage plant is too expensive for small growers to undertake.

Mr. Hale—I cannot answer that question as well as a scientific man might. I have known of this being practiced, and believe it holds the decay in check. As to the question of expense of a cold-storage plant, I do not think we should consider expense so closely in every case. I cannot say whether the pit method would be advisable. I think the cellar opened at night and closed in the day would be better than the pits; but why not co-operate with a cold-storage plant?

Mr. Gillingham—Would you use stable manure as a mulch for strawberry beds?

Mr. Hale—That would depend upon the growth of the plants the year previous, and the condition of the foliage. If the foliage were weak I would mulch with stable manure to stimulate the growth in the spring, but if the foliage were strong I would not have it for anything—it would make too much foliage. Ordinarily, coarse hay, straw, pine needles or leaves would be better.

Mr. Goble—How about nitrate of soda?

Mr. Hale—I have heard of people who were going to get rich by using this in the spring. It may work on certain varieties all right, perhaps. I had some of the Clyde strawberries a few years ago from the originator. It made a tremendous growth up to the last year. It then set so many fruit stalks there was not enough foliage to cover the fruit, and much of the fruit was scalded. I used nitrate of soda on one patch and stable manure on another small patch, and had foliage enough. This was all right on this particular variety, but I would not use it except to increase the foliage.

A Member—What is your method of planting peaches, and how do you prune them?

Mr. Hale—I will tell you, but don't do as I do. I plant them 13 by 13 feet apart. It is too close, of course, but I do it, and it pays me. I prune to a single stem when first planted, then the next year I allow three or four branches to grow, and in the following spring prune back to half or two-thirds of the growth. If they are crowding we prune during the summer. The idea is to have a broad, low

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head, evenly distributed. When they come to bearing age we prune when the buds begin to show in April. If abundant we trim for form, but if many of the buds are dead we trim for fruit.

A Member—You say you plant 13 by 13 feet ; do you allow them to remain like that until they mature ?

Mr. Hale—Yes, sir. It is all wrong, I know. It is too close, but I do it.

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REPORT OF NEW JERSEY STATE GRANGE.

BY EDMUND BRADDOCK, MASTER.

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REPORT OF NEW JERSEY STATE GRANGE.

We report a steady and healthy growth of the order in the State.

We believe it is gaining in strength and influence by careful, thoughtful, conscientious work, and we urge this thought upon the attention of all, that as an organization, with the greatest of opportunities and possibilities for doing good, educating, training, bringing out and lifting to a higher plane of thought and action the agricultural classes of our country, we cannot afford to ignore it.

The Grange is educating our farmers to co-operate in business affairs that should accrue to their financial advantage and make trade arrangements for the purchase of farm machinery, fertilizers and various supplies on the co-operative plan.

This co-operation has been very practically applied in our mutual fire insurance with a saving of over fifty per cent., by eliminating the unnecessary cost of operation and confining the business to a good class of risks.

We are still in favor of the free delivery of mails in the rural districts, and report favorably on the experiments already made in that line, and will use every possible effort to make it more general.

We are opposed to all fraudulent products affecting our interests, and the National Legislative Committee is working hard for pure foods and drugs.

The committee appointed by the State Grange to visit the State Agricultural College and Experiment Station reported having a very satisfactory visit, and that systematically and scientifically it was quite successful.

The committee wishes to congratulate the farmers of New Jersey in having such an efficient corps of Professors.

The bulletins of information that are continually being sent out to our farmers are doing a world of good, and we desire that the very friendly and cordial relations existing between these institutions and the State Grange shall be continued.

The Farmers' Institutes are very popular throughout the State, and the members of the order will continue to lend material aid and endeavor to make it pleasant and agreeable for those who are conducting them.

A number of Granges in the State are holding Silver Anniversaries, thus showing they have been well tried, and have come to stay.

I can assure you that this State Board has the best wishes of every Patron in the State in its endeavor to promote the welfare and prosperity of agriculture. And the annual reports of this body are more and more sought after and read with increasing interest, embodying as they do the sentiment and practical experiences of the very best talent in our country on subjects pertaining to agriculture and horticulture.

OFFICERS OF THE STATE GRANGE OF NEW JERSEY,

PATRONS OF HUSBANDRY, 1899.

—♦—
OFFICERS.

MasterEDMUND BRADDOCK.....Medford, Burlington county.
OverseerGEO. W. F. GAUNT.....Mullica Hill, Gloucester county.
LecturerGEO. L. GILLINGHAM...Moorestown, Burlington county.
Steward.....WINFIELD S. BONHAM..Shiloh, Cumberland county.
Assistant Steward.....HARRISON QUINBYParsippany, Morris county.
Chaplain.....JOHN M. TAGGART.....Williamstown, Gloucester county.
Treasurer.....CHARLES COLLINS.....Moorestown, Burlington county.
SecretaryM. D. DICKINSON.....Woodstown, Salem county.
Gate Keeper.....E. E. HOLCOMBE Mount Airy, Hunterdon county.
Pomona.....MARY D. BODINE.....Locktown, Hunterdon county.
Flora.....ELLA H. BROWN.....Swedesboro, Gloucester county.
Ceres.....ANNA E. FLITCRAFT...Woodstown, Salem county.
Lady Assistant Steward..MARIAH T. BURT.....Cohansey, Salem county.

EXECUTIVE COMMITTEE.

EDMUND BRADDOCK..... Medford, Burlington county.
GEORGE E. DE CAMP.....Roseland, Essex county.
JOSEPH S. GLASPEY..Bridgeton, Cumberland county.
JAMES H. BAIRD.....Marlboro, Monmouth county.
THOMAS BORTON.....Mullica Hill, Gloucester county.
M. D. DICKINSON.....Woodstown, Salem county.

STATE GRANGE MEETS FIRST WEDNESDAY IN DECEMBER, 1899.

POMONA GRANGES.

MASTERS AND SECRETARIES, WITH ADDRESSES.

1. Burlington—Master.....S. T. COLES.....Moorestown, Burlington county.
Secretary.GEO. L. GILLINGHAM...Moorestown, Burlington county.
3. Hunterdon—Master.....WM. DUBON.....Pittstown, Hunterdon county.
Secretary..BESSIE D. SKED.....Rocktown, Hunterdon county.
6. Salem—Master.....SAMUEL MICKLE.....Friesburg, Salem county.
SecretaryPHEBE PERRY.....Friesburg, Salem county.
8. Gloucester—Master.....AARON W. BORTON.....Mullica Hill, Gloucester county.
Secretary.ANNIE C. BRADSHAW...Mickleton, Gloucester county.
9. Centre Dist.—Master....A. E. HEDDEN.....Verona, Essex county.
Secretary..ALEXANDER WEBB... ..Hanover, Morris county.
10. Warren—Master.....N. WARNE.....Broadway, Warren county.
Secretary C. T. HEITSMAN.....Broadway, Warren county.

COUNTY DEPUTIES

Burlington.....	GEORGE W. JESSUP.....	Moorestown, Burlington county.
Camden.....	AMOS EBERT.....	Ashland, Camden county.
Cumberland.....	L. F. GLASPEY	Shiloh, Cumberland county.
Essex.....	W. W. DE CAMP.....	Roseland, Essex county.
Gloucester	GEORGE H. HORNER....	Mullica Hill, Gloucester county.
Hunterdon.....	WM. DUBON.....	Pittstown, Hunterdon county.
Mercer.....	THEODORE CUBBERLY..	Hamilton Square, Mercer county.
Monmouth	S. B. WELLS.....	Bradevelt, Monmouth county.
Morris	D. A. HOPPING.....	Hanover, Morris county.
Salem.....	CLARK FLITCRAFT.....	Woodstown, Salem county.
Somerset, Bergen, Pas- saic and Middlesex... }	J. B. ROGERS.....	1195 Broad St., Newark.
Sussex.....	JOHN De KAY.....	Papakating, Sussex county.
Union	J. B. WARD	Lyons Farms, Union county.
Warren.....	NICODEMUS WARNE	Broadway, Warren county.

SUBORDINATE GRANGES.

GRANGES.	MASTERS.	P. O. ADDRESS.	SECRETARIES.	P. O. ADDRESS.	LECTURERS.	P. O. ADDRESS.
5 Swedesboro.....	Charles B. Steward	Swedesboro, Gloucester co	E. C. Warrington.....	Swedesboro, Gloucester co	Ella H. Brown.....	Swedesboro, Gloucester co.
3 Moorestown.....	Rich'd A. Warrick.	Hartford, Burlington co.....	Carrie B. Zelle.....	Stanwick, Burlington co	Leon H. Collins.....	Merchantville, Camden co.
9 Woodstown.....	Linwood Borton.....	Woodstown, Salem co.....	Carrie R. Atkinson.....	Woodstown, Salem co	Aldona Dickeson.....	Woodstown, Salem co.
1 Vineland.....	Charles Chalmers.....	Vineland, Cumberland co.....	Ann Chalmers.....	Vineland, Cumberland co.....	George A. Mitchell.....	Vineland, Cumberland co.
2 Ringoes.....	Geo. T. Dalrymple.....	Ringoes, Hunterdon co.....	Bessie D. Sked.....	Rocktown, Hunterdon co.....	Richard Sked.....	Rocktown, Hunterdon co.
1 Edgewood.....	N. S. Wright.....	Burlington, Burlington co.....	Edmund Cook.....	Burlington, Burlington co.....	.....	.....
5 Hopewell.....	L. F. Glaspey.....	Shiloh, Cumberland co.....	Wilson S. Davis.....	Shiloh, Cumberland co.....	J. B. Hoffman.....	Shiloh, Cumberland co.
6 Cumberland.....	Henry Bacon.....	Greenwich, Cumberland co.....	Maurice Goodwin.....	Greenwich, Cumberland co.....	A. T. Goodwin.....	Greenwich, Cumberland co
0 Fenwick.....	Edward F. Brown.....	Canton, Salem co.....	W. W. Patrick.....	Hancock's Bridge, Salem co.....	Mary Freas.....	Quinton, Salem co.
5 Harrisonville.....	C. E. Kirby.....	Harrisonville, Gloucester co.....	Belle Kirby.....	Harrisonville, Gloucester co.....	Gertrude Harbison.....	Harrisonville, Gloucester co
2 Bridgeport.....	B. F. Rulon.....	Swedesboro, Gloucester co.....	Wm. A. Shivers.....	Swedesboro, Gloucester co.....	Hannah A. Sithens.....	Swedesboro, Gloucester co.
5 Medford.....	Aaron Engle, Jr.....	Lumberton, Burlington co.....	Mary A. Braddock.....	Medford, Burlington co.....	W. Gillingham.....	Medford, Burlington co.
8 Haddon.....	George M. Ward.....	.....	R. Levis Shivers.....	Camden, Box 93, Camden co.....	Amos Ebert.....	Ashland, Camden co.
9 Mantua.....	Hiram S. Leap.....	Wenonah, Gloucester co.....	Mabel Eachus.....	Mantua, Gloucester co.....	Mary A. Stratton.....	Mt. Royal, Gloucester co.
4 Hope.....	A. J. Miller.....	Bridgeton, Cumberland co.....	P. L. Wheaton.....	Bridgeton, Cumberland co.....	Jos. Atkinson.....	Bridgeton, Cumberland co.
9 Rancocas.....	Joseph Lundy.....	Rancocas, Burlington co.....	J. Barclay Hilyard.....	Rancocas, Burlington co.....	Hannah F. Haines.....	Mt. Holly, Burlington co.
0 *Pemberton.....	George W. Lundy.....	Mt. Holly, Burlington co.....	H. R. Lippincott.....	Pemberton, Burlington co.....	John Forsyth.....	Pemberton, Burlington co.
1 Mullica Hill.....	A. C. Gardiner.....	Mullica Hill, Gloucester co.....	Blanche Somers.....	Jefferson, Gloucester co.....	Anna G. Gaunt.....	Jefferson, Gloucester co.
7 *Centre Grove.....	Wm. H. Taylor.....	Millville, Cumberland co.....	J. D. Zimmermann.....	Millville, Cumberland co.....	Jacob Zimmermann.....	Millville, Cumberland co.
8 Columbus.....	Franklin S. Zelle.....	Jacksonville, Burlington co.....	Ethel W. Zelle.....	Jacksonville, Burlington co.....	Lizzie B Zelle.....	Jeffersonville, Burlin't'n co
0 Courses Land'g.....	Joseph Webber.....	Sharptown, Salem co.....	Henry Gardiner.....	Sharptown, Salem co.....	E. Atkinson.....	Woodstown, Salem co.
1 Crosswicks.....	A. Satterthwait.....	Crosswicks, Burlington co.....	Elizab'th A. Rogers.....	Crosswicks, Burlington co.....	.....	.....
4 Pennington.....	John Flemming.....	Pennington, Mercer co.....	Ira Stout.....	Pennington, Mercer co.....	S. B. Ketcham.....	Pennington, Mercer co.
7 *Mercer.....	N. Stout Voorhees.....	Glenmore, Mercer co.....	W. I. Phillips.....	Hopewell, Mercer co.....	Ralph Ege.....	Hopewell, Mercer co.
8 Wantage.....	Pierson Fuller.....	Deckertown, Sussex co.....	Mrs. Brice Roy.....	Deckertown, Sussex co.....	R. M. Lolley.....	Beaver Run, Sussex co.
9 *Hamilton.....	A. E. Nutt.....	Hamilton Square, Mercer co.....	Thos. Q. Taylor.....	Hamilton Square, Mercer co.....	A. S. Appleget.....	Cranbury, Middlesex co.
1 Friesburg.....	C. F. Dickinson.....	Cohansey, Salem co.....	H. M. Loveland.....	Cohansey, Salem co.....	Attie Loveland.....	Cohansey, Salem co.

* Failed to report officers for 1899.

SUBORDINATE GRANGES—Continued.

GRANGES.	MASTERS.	P. O. ADDRESS	SECRETARIES.	P. O. ADDRESS.	LECTURERS.	P. O. ADDRESS.
Williamstown.....	John R. Downer.....	Downer, Gloucester co.....	James M. Tweed.....	Williamstown, Gloucester co.....	John M. Taggart.....	Williamst'n, Gloucester co.
Locktown.....	W. W. Bodine.....	Locktown, Hunterdon co.....	G. J. Fisher.....	Locktown, Hunterdon co.....	M. Heath.....	Locktown, Hunterdon co.
Blackwood.....	E. W. Fields.....	Blackwood, Camden co.....	C. C. Stevenson.....	Blackwood, Camden co.....	Emma Trefz.....	Blackwood, Camden co.
Monmouth.....	John Statesir.....	Colts Neck, Monmouth co.....	D. A. Vanderveer.....	Freehold, Monmouth co.....	James H. Baird.....	Marlboro, Monmouth co
Liberty.....	H. W. Polhemus.....	Bradevelt, Monmouth co.....	S. B. Wells.....	Bradevelt, Monmouth co.....	D. B. D. Smock.....	Wickatunk, Monmouth co.
Sergeantsville.....	Lewis Case.....	Sergeantsville, Hunterdon co.....	Kensel C. Reading.....	Rosemont, Hunterdon co.....	N. B. Rittenhouse.....	Sergeantsville, Hunt'd'n co
Livingston.....	A. W. Harrison.....	Livingston, Essex co.....	Pell T. Collins.....	Livingston, Essex co.....	J. H. M. Cook.....	Caldwell, Essex co.
Morris.....	D. A. Hopping.....	Hanover, Morris co.....	H. E. Young.....	Afton, Morris co.....	Charles E. Bryer.....	
Kingwood.....	A. G. Hawk.....	Baptistown, Hunterdon co.....	T. W. Sutton.....	Barbertown, Hunterdon co.....	H. Rittenhouse.....	
*Caldwell.....	S. E. Harrison.....	Caldwell, Essex co.....	F. C. Gobel.....	Verona, Essex co.....		
Roseland.....	H. F. Harrison.....	Caldwell, Essex co.....	Emma E. De Camp.....	Roseland, Essex co.....	Hattie A. Harrison.....	Roseland, Essex co.
Enterprise.....	Harrison Quinby.....	Parsippany, Morris co.....	H. M. Ball.....	Boonton, Morris co.....	Julia Ball.....	Boonton, Morris co.
Warren.....	N. Warne.....	Broadway, Warren co.....	C. F. Heltsman.....	Broadway, Warren co.....	J. C. Weller.....	Broadway, Warren co.
Mickleton.....	Wm. C. Casperson.....	Gibbstown, Gloucester co.....	Annie R. Cooper.....	Mickleton, Gloucester co.....	Susan M. Smith.....	Mickleton, Gloucester co.
Lyons Farms.....	Alex. Tuneson.....	Lyons Farms, Union co.....	D. H. Doremus.....	Lyons Farms, Union co.....	J. B. Rogers.....	1195 Broad st., N'w'k, E co.
Pohatcong.....	Henry W. Pursee.....	Shimers, Warren co.....	W. S. Melick.....	Springtown, Warren co.....	D. C. Donnelly.....	Springtown, Warren co.
*Musconetcong.....	A. Apgar.....	Junction, Warren co.....	Lizzie Williamson.....	Valley, Warren co.....	J. T. Smith.....	Valley, Warren co.
Hurffville.....	B. F. James.....	Hurffville, Gloucester co.....	C. J. Davenport.....	Hurffville, Gloucester co.....	Emma Atkinson.....	Hurffville, Gloucester co.
Rocksburg.....	John H. Young.....	Rocksburg, Warren co.....	Warren Herman.....	Belvidere, Warren co.....	Irwin Miller.....	Harmony, Warren co.
Washington.....	Daniel Fitts.....	Washington, Warren co.....	Mary Lewis.....	Washington, Warren co.....	Samuel Bowman.....	Washington, Warren co.
Mansfield.....	R. A. Osmun.....	Stevensburg, Warren co.....	E. J. Vosler.....	Port Colden, Warren co.....	Jacob Miller.....	Anderson, Warren co.
Oak Grove.....	D. M. Burd.....	Pittstown, Hunterdon co.....	W. A. C. Robinson.....	Quakertown, Hunterdon co.....	F. J. Tomlinson.....	Pittstown, Hunterdon co.
Spring Mills.....	M. W. Angell.....	Holland, Hunterdon co.....	Mary E. Woolf.....	Milford, Hunterdon co.....	Samuel Fry.....	Warren P. Mills, Hunt'n co
Stewartsville.....	H. A. Godfrey.....	Stewartsville, Warren co.....	J. C. Boyar.....	Stewartsville, Warren co.....	Mrs. H. A. Godfrey.....	Stewartsville, Warren co.
Aura.....	John Tonkin.....	Aura, Gloucester co.....	Phebe W. Guest.....	Aura, Gloucester co.....	Jos. W. Guest.....	Aura, Gloucester co.
Cross Keys.....	Edward B. Gaunt.....	Cross Keys, Gloucester co.....	Joseph H. Evans.....	Cross Keys, Gloucester co.....	Ella Evans.....	Cross Keys, Gloucester co.

* Failed to report officers for 1899.

STATISTICAL TABLES—FARM CROPS.

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**TABLE SHOWING THE ACREAGE,
PRODUCTION AND VALUE IN NEW JERSEY OF THE CROPS
NAMED FOR THE YEAR 1898, TAKEN FROM THE
UNITED STATES DEPARTMENT OF AGRICULTURE REPORT, MADE
JANUARY 1st, 1899.**

CORN.			
Acreage.	Yield Per Acre.	Total Production.	Total Value.
252,293.....	36 bushels.	9,334,841	\$3,733,936
WHEAT.			
124,616.....	17 bushels.	2,163,318	1,582,872
OATS.			
88,137.....	19 bushels.	1,923,485	596,280
RYE.			
68,782.....	15 bushels.	1,066,121	533,060
BUCKWHEAT.			
10,635.....	21 bushels.	223,335	120,601
WHITE POTATOES.			
46,558.....	75 bushels.	3,491,850	2,130,828
HAY.			
404,321.....	1½ tons.	574,136 tons.	5,511,706
Total value of crops named for the year.....			\$14,208,483
Total number of—			
Horses		79,180	
Mules.....		7,269	
Milch cows.....		214,674	
Other cattle.....		41,558	
Sheep.....		41,299	
Swine.....		151,120	

STATISTICAL TABLE OF FARM CROPS AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	CORN.			WHEAT.			RYE.			OATS.		
	Product compared with last year—per cent.	Average yield per acre—bushels.	Average price.	Product compared with last year—per cent.	Average yield per acre—bushels.	Average price.	Product compared with last year—per cent.	Average yield per acre—bushels.	Average price.	Product compared with last year—per cent.	Average yield per acre—bushels.	Average price.
Atlantic	120	28	\$0 45	100	20	\$1 10	100	20	\$0 75	90	25	\$0 30
Bergen	160	40	40	100	22	70	125	20	50	80	20	30
Burlington	100	40	40	50	15	70	80	12	40	75	10	32
Camden												
Cape May	91	25	45									
Cumberland	105	40	40	95	20	75				90	30	35
Essex												
Gloucester	90	40	37	60	12	70	95	12	50	100	30	25
Hunterdon	105	30	40	103	17	70	100	19	45	40	15	25
Mercer	112	40	36	77	17	70	88	15	39	82	22	23
Middlesex	125	40	38	70	18	72	90	15	45	30	15	30
Monmouth	100	56	45	100	25	75	100	18	45			
Ocean	100	42	60	75	12 $\frac{1}{2}$	75	60	8	60	50		
Salem	99	40	35	80	18	80	95	22	60	70	25	29
Somerset	115	82	30	70	12	68	75	14	48	50	25	26
Sussex	100	45	45	100	18	75	90	20	60	40	15	37
Union	180	30	40	100	15	1 00	100	18	50	90	18	30
Warren	125	82		100	12		100	20		40	30	

STATISTICAL TABLE OF FARM CROPS AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	BUCKWHEAT.			HAY.			WHITE POTATOES.			SWEET POTATOES.		
	Product compared with last year—per cent.	Average yield per acre—bushels.	Average price.	Product compared with last year—per cent.	Average yield per acre—tons.	Average price per ton.	Product compared with last year—per cent.	Average yield per acre—barrels.	Average price per barrel.	Product compared with last year—per cent.	Average yield per acre—barrels.	Average price per barrel.
Atlantic.....	100	20	\$0 50	125	1 $\frac{1}{2}$	\$10 00	50	30	\$2 10	110	70	\$1 50
Bergen.....	162	32	45	100	1 $\frac{1}{2}$	12 00	80	35	2 50			
Burlington.....				90	1 $\frac{1}{2}$	9 00	100	20	2 00	120	70	1 30
Camden.....												
Cape May.....				100	1 $\frac{1}{4}$	10 00	40	12	1 50	100	50	1 00
Cumberland.....				100	1 $\frac{1}{2}$	8 00	60	16				
Essex.....												
Gloucester.....				80	1 $\frac{1}{2}$	11 00	90	35	1 75	150	60	1 50
Hunterdon.....			40	100	1 $\frac{1}{4}$	7 00		25	2 50			
Mercer.....				91	1 $\frac{1}{2}$	7 50	43	30	1 60			
Middlesex.....				100	1 $\frac{1}{4}$	9 50	60	25	1 50			
Monmouth.....				100	2	10 00	50	40	1 50	75	37	2 00
Ocean.....	103	20		105	1 $\frac{1}{2}$	14 00	78	20	2 00	85	35	2 25
Salem.....	100	35	50	90	1 $\frac{1}{2}$	9 25	45	15	1 68	100	60	1 12 $\frac{1}{2}$
Somerset.....					1 $\frac{1}{2}$	7 00		25	1 60			
Sussex.....	80	25		105	2		105	12				
Union.....				110	1 $\frac{1}{4}$	13 00	90	18	2 10			
Warren.....	100	35		100		9 00	80		1 50	100		

STATISTICAL TABLE OF FARM CROPS AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	* APPLES.			PEARS.			PEACHES.			GRAPES.		
	Product compared with last year—per cent.	Average yield per acre—barrels.	Average price.	Product compared with last year—per cent.	Average yield per acre—barrels.	Average price.	Product compared with last year—per cent.	Average yield per acre—baskets.	Average price.	Product compared with last year—per cent.	Average yield per acre—pounds.	Average price.
Atlantic	25	10	\$2 50	125	25	\$3 00	85	150	\$0 60	25	600	\$0 02
Bergen	30		3 00	85		2 50						
Burlington	60	15	2 50	100	75	2 25	10	20	50	90		1½
Camden												
Cape May	25		2 00	75		2 50	25		1 00	50	1,000	1½
Cumberland												
Essex												
Gloucester	20	8	2 50	100	40	2 00				40		
Hunterdon	20						15	†250,000	50			
Mercer	42	10	1 75	63	20	1 50	33	50	65	53		3
Middlesex	50		3 00									
Monmouth	20		1 50	20		2 00	25		1 00	25	2,000	1½
Ocean	25		3 00	100		5 00						
Salem	20	30	1 12½	150		4 50	75	200	1 00	40	4,000	1½
Somerset												
Sussex	10			100			33	75		20		
Union	25	10	3 00	100	10	2 25	10	20	1 00	90		
Warren	50		1 40	100		1 75				50		

* Crop light throughout the State. † Entire crop of county.

STATISTICAL TABLE OF FARM CROPS AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	STRAWBERRIES.			RASPBERRIES.			BLACKBERRIES.			WATERMELONS.		
	Product compared with last year—per cent.	Average yield per acre—quarts.	Average price.	Product compared with last year—per cent.	Average yield per acre—quarts.	Average price.	Product compared with last year—per cent.	Average yield per acre—quarts.	Average price.	Product compared with last year—per cent.	Average yield per acre—hundreds.	Average price.
Atlantic	70	1,500	\$0 04	80	1,000	\$0 10	90	1,000	\$0 04			
Bergen			5			5			5			
Burlington	100		5	100		6	25		6	125	800	\$10 00
Camden												
Cape May	60	1,800	5							110		8 00
Cumberland												
Essex												
Gloucester	100		7	100		8	100		5	115		
Hunterdon												
Mercer	55		5	80		7	90		6	100		8 00
Middlesex												
Monmouth	75	3,750	4	25	250	5	25	375	5	100		8 00
Ocean	100	2,000	8	50	600	10	50	1,000	10	25	200	1 50
Salem	100	2,000	4	50	1,000	5	100	2,000	5	100	1,000	9 00
Somerset												
Sussex	100			100			100					
Union	100	1,800	4									
Warren	75		7	25		8				100	800	

STATISTICAL TABLE OF FARM CROPS AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	CITRON MELONS.			CUCUMBERS.			CABBAGES.			TOMATOES.		
	Product compared with last year—per cent.	Average yield per acre.	Average price per basket.	Product compared with last year—per cent.	Average yield per acre.	Average price per basket.	Product compared with last year—per cent.	Average yield per acre.	Average price.	Product compared with last year—per cent.	Average yield per acre—tons.	Average price per basket.
Atlantic							125	2,800	\$1 12	70	2	\$0 40
Bergen	150	400	\$0 25	100		\$0 25	60			75	9	25
Burlington				60		20	60			100	6	20
Camden												
Cape May												
Cumberland												
Essex												
Gloucester	115	250	30	100			75	3,000	2 00	110	5	25
Hunterdon							20		5 00	80		* 6 50
Mercer	100		25	80		20	25		3 00	55	5	* 6 20
Middlesex												
Monmouth				100		50	10		3 00	50		* 6 50
Ocean									5 00			20
Salem	100	500	17½	75	300	20	50	3,000	4 25	65	5	25
Somerset												
Sussex				100			100			100		
Union							100	1,100	2 50	1 20		20
Warren							50	400		50		

* Per ton at the cannery.

STATISTICAL TABLE OF FARM STOCK AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	HORSES.		MULES.		COWS.	
	Total number compared with December 1st, 1897— per cent.	Average price between 3 and 7 years old.	Total number compared with December 1st, 1897— per cent.	Average price between 3 and 7 years old.	Total number compared with December 1st, 1897— per cent.	Average price between 3 and 7 years old.
Atlantic	100	\$65 00	100	\$70 00	100	\$35 00
Bergen	100		100		100	
Burlington	100	80 00	100	100 00	125	40 00
Camden						
Cape May						
Cumberland						
Essex						
Gloucester	100	70 00	100	70 00	109	45 00
Hunterdon	100	85 00			100	45 00
Mercer	96	66 00	87	80 00	98	35 00
Middlesex	100	75 00			95	45 00
Monmouth	100	75 00	100	75 00	100	40 00
Ocean	110	125 00	100	65 00	80	35 00
Salem	105	60 00	105	75 00	103	40 00
Somerset	100	80 00	100	100 00	120	45 00
Sussex	100				97	
Union	100	60 00	100		100	55 00
Warren		50 00				

FARM CROPS.

STATISTICAL TABLE OF FARM STOCK AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES	VEAL CALVES.		SHEEP.		LAMBS.		SWINE.		TURKEYS.		CHICKENS.		WINTER WHEAT.		WINTER RYE.	
	Total number compared with December 1st, 1897—per cent.	Average price per pound for season—cents.	Total number compared with December 1st, 1897—per cent.	Average price per head for store sheep.	Total number compared with December 1st, 1897—per cent.	Average price per head for spring lambs.	Total number compared with December 1st, 1897—per cent.	Average price per pound December—cents.	Total number compared with December 1st, 1897—per cent.	Average price per pound November and December—cents.	Total number compared with December 1st, 1897—per cent.	Average price per pound November and December—cents.	Area sown compared with last year—per cent.	Average condition December 1st.	Area sown compared with last year—per cent.	Average condition December 1st.
Atlantic.....	100	\$0 06½					100	\$0 06	100	\$0 2	100	\$0 10	100	90	100	90
Bergen.....	100															
Burlington.....	110	5½	100	\$3 50			100	4½	100	15	100	13	105	110	102	102
Camden.....																
Cape May.....																
Cumberland.....																
Essex.....																
Gloucester.....	100	5	105	4 00	105	4 50	90	5	75	16	100	13	105	100	100	70
Hunterdon.....		5½					100	4	90	18	100	8	100	100	100	100
Mercer.....	98	5	100	4 75	100	5 00	90	5	80	13	100	10	110	100	80	100
Middlesex.....							100	5	75	15	100	10	100	85	110	100
Monmouth.....	100	5½	100	4 50	100	4 50	100	4½	100	12	100	10	100	100	100	100
Ocean.....		6					75	6½	80	12	90	10	75	100	65	100
Salem.....	102	5½	100		100		95	5	75	15½	100	13	100	100	90	110
Somerset.....	110	5½	100	4 75	100	4 00	110	4½	80	12	120	9	100	95	100	90
Sussex.....													100	100	100	97
Union.....	100	6					100						100	100	100	100
Warren.....			110			4 00			50	14	105	8	105	105	100	100

REPORTS OF COUNTY BOARDS OF
AGRICULTURE.

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ATLANTIC COUNTY.

OFFICERS FOR THE YEAR 1899.

<i>President</i>	PHILIP BERGMANN	Egg Harbor City.
<i>Vice President</i>	HARRY TAYLOR.....	Hammonton.
<i>Secretary</i>	VALENTINE P. HOFMANN.....	Egg Harbor City.
<i>Treasurer</i>	FREDERICK FIEDLER	Egg Harbor City.

DELEGATES TO STATE BOARD.

V. P. HOFMANN (two years)..	.....	Egg Harbor City.
L. H. PARKHURST (one year)	.....	Hammonton.

BOARD OF DIRECTORS.

JACOB HOLMAN, Hammonton Fruit Growers' Union.
JESSE R. ABBOTT, Hammonton Fruit Growers' Association, P. O. Pleasant Mills, N. J.
CHARLES KRAUS, Atlantic County Agricultural and Horticultural Association, P. O.
Egg Harbor City, N. J.
HENRY PFEIFFER, Germania Fruit Growers' Union, P. O. Cologne, N. J.
ABNER PRICE, Director-at-Large, P. O. Bakersville, N. J.

REPORT.

BY V. P. HOFMANN.

The annual meeting, combined with a Farmers' Institute, was held at Hammonton December 22d, 1898, which was well attended.

"How I Grow Potatoes," by T. B. Terry, Esq., of Ohio, was practically explained, and received much commendation.

Geo. May Powell, Esq., of the National Forestry Association, made an address on "Forestry, Its Relation to Supplies of Pure Air and Water, and to the Public Health."

"Experiences in Fruit-Growing the Past Season, Pro and Con," was opened by L. H. Parkhurst, of Hammonton, N. J. He stated that he had a fair season as to crops, but low prices and consequently hardly any profit; if difference between cost of production and receipts could be regulated it would be better.

On strawberries he applied a home-made fertilizer at a cost of \$25.50 per ton, equal to some on the market sold at \$36 ; applied 900 pounds to the acre. On 4 acres harvested 9,000 quarts, netted 2 4-10 cents per quart.

On raspberries he could not overcome the fungus, but improved somewhat on last year's standing ; soil is deficient in potash ; applied 700 pounds of fertilizer per acre, containing 4 2-7 per cent. nitrogen, 5 per cent. phosphate, and 14 2-10 per cent. potash. Harvested 23,000 pints, netting 5 1-10 cents per quart.

On blackberries he applied a fertilizer containing 2½ per cent. ammonia, 7½ per cent. potash and 8 per cent. phosphate, at the rate of 500 pounds per acre. On 40 acres he harvested 34,000 quarts of berries, which returned about \$620, out of which he paid \$500 for picking, leaving him a net return of \$120.

Pears he did not manure on account of the blight ; harvested 250 barrels at an average price of \$3.50 ; Kieffer pears brought \$2.50 per barrel.

Peaches he succeeded in growing on a large scale ; started with great expectations ; first peaches brought \$2 per basket, until the Western rushed in. Harvested about 8,000 baskets on 21 acres, of which about 2,000 went to ruin on account of rotting ; net result 40 cents per basket.

He had 2 acres with grapes, yielding 5,000 pounds at 1½ cents. Cranberries a better crop than in previous years.

Mr. Edwin Adams, of Hammonton, spoke on "Future Prospects." The present indications of the past and last three years would be that someone would have to go out of fruit culture, as he is looking for a reaction. We find acreage is increasing in great Western States where small-fruit culture was unknown five years ago, and where they are taking it up. North Carolina blackberries and Georgia peaches will prove a great competitor, as they would come in next year with a double acreage. On a crop of 10 acres of blackberries the net returns were \$500. Costs : picking, \$230 ; crating, &c., \$60 ; fertilizer, \$30 ; total, \$410 ; balance, \$90, or \$9 per acre—still better than growing corn. We are therefore forced to reduce expenses of production and marketing.

The next subjects were "Experience in the Use of Commercial Fertilizers," by George W. Jessup, of Cinnaminson, N. J.

"Poultry Management for Profit," by Mrs. F. H. Valentine, of Cranford, N. J.

"Insect Enemies to Plants and Trees," by Prof. John B. Smith, State Entomologist, New Brunswick, N. J.

ATLANTIC COUNTY.

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GENERAL REMARKS.

The year 1898 in many respects was quite unfavorable to the farming community.

A wet early season and the prevalent low prices for all farm commodities proved disastrous to the farmers, and the consequent setback will take several good seasons to overcome.

Early white potatoes suffered from the incessant rains ; in consequence there was a poor crop, and the tubers badly rotted and were generally unfit for the table.

All the small berries suffered from the same cause, the low prices obtained in many cases not even paying for the picking. What a widespread effect these low prices may have may be judged from the fact that in Hammonton and vicinity alone there are about 2,700 acres planted with blackberries, 900 strawberries, 800 raspberries, 400 grapes, 200 peaches, 300 cranberries. Besides these are large acreages in Galloway, Mullica, Hamilton and Egg Harbor townships.

Another year's experience has not tended to increase the ranks of fruit-sprayers, the general results of the past season proving nugatory.

There are no creameries in this county ; a number of farmers are engaged in the dairy business, keeping from 5 to 8 cows each. They find a ready market for the milk at prices ranging from 6 to 8 cents per quart.

At present there is but one cannery in the county, that of Mrs. Charles Kraus, at Egg Harbor City, who has put up only a small quantity for individual orders.

There is not one farmer engaged in market-gardening exclusively, but there are many farmers in Hammonton, Mullica and Galloway townships engaged in small-fruit culture exclusively.

There are two nurseries in Hammonton, those of Wm. F. Bassett and J. H. Ransom, and of Henry Pfeiffer, at Cologne, N. J.

The price of good farm lands with buildings averages from \$30 to \$100 per acre, according to locality.

A general increase in the keeping of swine is reported.

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BERGEN COUNTY.

OFFICERS FOR 1899.

<i>President</i>	H. W. COLLINGWOOD.....	Westwood.
<i>Vice President</i>	ABRAM C. HOLDRUM.....	Westwood.
<i>Secretary</i>	MALCOM H. ANGELL.....	Etna.
<i>Treasurer</i>	DANIEL I. DEMAREST.....	Oradell.

BOARD OF DIRECTORS.

SAMUEL R. DEMAREST, JR.	Hackensack.
MARTIN J. MEYERS.....	Woodcliff.
JOHN HECK.....	Westwood.
JOHN C VAN SAUN.....	Maywood.
JOHN H. ACKERMAN.....	Englewood.
ALBERT J. BOGART.....	River Edge.
D. A. PELL.....	Saddle River.
JOHN H. RILEY.....	Hillsdale.

DELEGATES TO STATE BOARD.

SAMUEL R. DEMAREST, JR. (two years).....	Hackensack.
ABRAM C. HOLDRUM (one year).....	Westwood.

DELEGATES TO STATE HORTICULTURAL SOCIETY.

JOHN H. ACKERMAN.....	Englewood.
JOHN HECK.....	Westwood.

REPORT.

BY THE SECRETARY.

The growth of the organization has been slow, but we are now in a more flourishing condition. Our Board has held three meetings, two of which were during very stormy weather, and the attendance was much less than we anticipated if the circumstances had been more favorable.

The programme prepared by State Secretary Dye for the Farmers' Institute at Leonia was one of more than ordinary interest, and, but for the inclemency of the weather, the institute would have been attended by many farmers who have not heretofore had the benefit of this splendid method of teaching agriculture. The hall was about half filled with intelligent farmers, who declared the meeting to be a very satisfactory one.

Generally speaking, the season of 1898 has been a profitable one for the farmers of this county. The inordinate rainfall early in the season interfered with the planting of early sweet corn for the New York and Paterson markets. It was not an unusual spectacle to see farmers planting sweet corn during rains.

An ample hay crop was assured by the early wet season and most of this crop was secured in good condition. The killing frosts not coming as early as usual in the fall gave opportunity to secure all crops. Some fields of corn planted in July, although retarded by rain, in most instances gave good returns at a time when competition was not strong and prices were good.

Mr. Collingwood, the President of our Board, continues his experiments at Hope Farm and has now expressed his intention to invite the Board to meet at his place in May of next year to observe the results of his efforts.

BURLINGTON COUNTY.

OFFICERS FOR 1899.

PresidentJOHN WARRICKHartford.
Vice PresidentEDWIN DUDLEY.....Medford.
Secretary and Treasurer..HENRY I. BUDD Mount Holly.

DIRECTORS.

EMMOR ROBERTS, Burlington County Agricultural Society, P. O. Fellowship.
JOSHUA HOLLINSHED, Mount Laurel Farmers' Club, P. O. Moorestown.
BENJAMIN F. BISHOP, Cooperstown Farmers' Club, P. O. Rancocas.
ISAIAH BALLINGER, Medford Grange, P. O. Medford.
ROBERT TAYLOR, Columbus Grange, P. O. Columbus
JOSEPH HENDBRICKSON, Crosswicks Grange, P. O. Crosswicks.
HENRY R. LIPPINCOTT, Pemberton Grange, P. O. Pemberton.
GEORGE B. HANCOCK, Rancocas Grange, P. O. Moorestown.
ISAAC COLLINS, Moorestown Grange, P. O. Moorestown.
NELSON P. CREELEY, Edgewood Grange, P. O. Burlington.
GEORGE WILDES, Director-at-Large, P. O. New Egypt.
JOHN E. DARNELL (two years), Delegate to State Board of Agriculture, P. O.
Mount Laurel.
THOMAS J. BEANS (one year), Delegate to State Board of Agriculture, P. O.
Moorestown.

REPORT.

Our annual meeting was held on Saturday, December 10th, 1898. The Court House was crowded to overflowing with many of our best farmers from all portions of the county. There seemed to be unusual interest manifested, and many instructive facts were elicited. The following subjects were considered :

“Production and Consumption of Cranberries,” Edmund Braddock, Medford.

“Potato-Growing,” T. B. Terry, Esq., Ohio.

“Points Essential to Success in Farming,” S. B. Ketcham, Pennington, N. J.

“ Farming Compares Favorably with Other Occupations when the Same Care and Business Tact are Used,” N. P. Creeley, Burlington.

“ Defects in Dairymen and Dairying,” George Abbott, Moorestown.

“ What are Agricultural Values Based on in Marketing?” J. B. Rogers, Newark.

“ Late Experiments in Sorghum Culture, Showing High Percentage of Sugar,” by Dr. Neale, Delaware Experiment Station.

At the last meeting the committee to investigate the subject of beet culture for sugar, to encourage their growing and to have their sugar value tested, made an unfavorable report. Most of the specimens raised in the different parts of the county that were forwarded to the Agricultural Department at Washington, were returned with a low percentage of sugar. Experiments made by Prof. Neale, at the Delaware Experiment Station, proved that the beets grown in Eastern localities do not compare with sorghum in the amount of sugar content. The beet sugar analyzed from 8 to 12 per cent., and the sorghum from 18 to 22 per cent., so our farmers decided to drop the sugar-beet experiment and cultivate sorghum with the selected seeds grown by the Delaware Experiment Station.

There were many valuable papers read on subjects that are vital to the success of the farmer, but the limited amount of space available in your annual report will not warrant the County Board in furnishing you even free extracts from them.

If you desire such, we can give you quite copious notes of their proceedings.

REPORT.

BY THE SECRETARY

For the year ending December, 1898, the average condition of farmers has not materially improved. Early crops brought good prices on account of shortness of Southern supply, and these crops were generally of full yield. Fair average prices have been obtained for the leading vegetables, potatoes and tomatoes, owing to the small supply. The prices of cereals have been low and the yield poor, although the foreign demand is great.

The season has been favorable to the growth of straw, hay and grass, giving size to stalk ; but too much moisture at time of polliniz-

ation prevented fertilization of grain, consequently short heads and poorly filled. The same moist condition affected nearly all kinds of tree and vine fruit, leaving the majority of orchards entirely bare of product, although full of bloom. All kinds of fruit have dropped and decayed badly, and the wet May developed apple leaf blight.

Wheat.—Wheat has been a poor crop; grains badly shriveled and much damaged in the mows by the depredations of the angoumois miller. The demand is small from the local millers, the price ranging from 60 to 80 cents per bushel—too low for any profit in its production.

Rye.—Rye has been a better crop, but was in some sections badly damaged by hail before cutting. Price low, but relatively better than wheat. Many fields injured by lice.

Hay.—Hay has been a good crop except on old sods. There was plenty of good weather to gather it without damage. The price is very low, selling from \$8 to \$10 per ton.

Oats.—Oats a complete failure; came up poorly, then rust claimed the straw as soon as growth commenced, and remained with it until the finish, making a stunted growth poorly filled that was scarcely worth cutting.

Corn.—Where started on high ground, it grew the whole season without check; on low lands it was costly to start on account of the excessive flooding of the fields during May, but when the rain was over the corn that was planted in the wet, started and grew rapidly. That which was planted late after the rain ceased had a difficult time to start on account of the depredations of birds and insects, the following drought baking the ground and making a hard seed-bed difficult to mellow.

The season seemed to be extraordinarily favorable to the growth of weeds; in cornfields they required constant fighting with and more than usual farming to keep them down. Later on the hailstorms cut and shredded many fields of corn and no doubt shortened their yield. August 9th, heavy rains and windstorms prostrated and thinned many promising fields. At husking-time more than the usual number of stalks were devoid of ears, owing to moisture preventing fertilization. The ears are mostly large and well developed, showing good growing conditions. It is being gathered in good condition, but much late husking on account of scarcity of labor.

Pasture.—There has been a very fine growth of young grass for pasture after mowing. Much of the second growth has been cut for

hay ; many young grassfields had to be mowed to destroy the unusual growth of weeds.

Growing Winter Grain.—The conditions for seeding winter grain have been unusually good, sufficient rains to moisten the ground so that the seeding could be accomplished without great expense, yet many fields have been sown too late. The prolonged mild weather is giving the early-sown a very fine top. There seems to be a large area seeded ; perhaps the farmers think there will be good prices for it on account of the continued foreign demand.

Milk.—The price of milk has been very low through most of the season. The price is better now. The yeld has not been excessively great. There was very little of it that did not find a ready market, but the dealers seemed to be able to keep the price below profitable remuneration. There cannot have been overproduction, for the supply is now below the demand, and creameries are offering increased prices for butter fat. There is no condition that is so sadly in need of organization as that of the producers of milk. They seem to be at the mercy of the dealers, who refuse to pay a profitable price unless the supply is excessively below the demand.

Apples.—The yield of apples has been in the majority of orchards nothing ; a very few early apples, but no late ones. The same condition exists all over the United States, only worse with us. A few orchards in our section had large crops, but the number was less than a dozen ; consequently, the prices were well maintained, and to those having them they have been somewhat of the character of a gold mine. The orchards were heavily covered with bloom, but the excessive moisture at this time prevented pollinization. Heavy winds in August blew off much fruit.

Pears.—Keiffer is about the only variety that has produced any fruit. On a few orchards this crop has been very large ; on the majority of orchards scarcely half a yield. They have sold all the way from \$1.50 to \$3 per barrel. They seem to be about the only native fruit that graces the city stands. The shipments to other portions of our country have not been as large as usual, there being a large demand for them at home.

Peaches.—Peaches almost a total failure ; crop poor and bitter ; most all premature. Prices have been good. Most of the trees that have been bearing heavily in past seasons proved to be dead when the spring opened.

Grapes.—Grapes promised a full crop but badly rotted, and very

few found a market. The supply of New York grapes, although large, has scarcely filled the void, and they were generally poor in keeping quality.

Cranberries.—Cranberries have been in our county a very large crop. The yield has been over 100 per cent. It is estimated that this county has produced about 200,000 bushels. Many thousand bushels are being daily shipped. In California, Texas, Colorado and many portions of the West good prices are being realized on account of the scarcity of apples and other fruit, and on account of the crop not being so large as reported on Cape Cod, Massachusetts, in the West and other places. They have sold and are selling from \$3.75 and \$5 to \$6.50 per barrel. There have been many failures among cranberry-growers, but the large commercial growers are mostly successful.

Cherries.—Cherries, about half a crop; prices realized, good. The early sweet cherries failed on account of rot; the later sour cherries produced fairly well and sold for good prices.

Currants.—Currants were a good crop and sold well.

Plums.—Plums, a poor crop and rotted badly.

Blackberries, Raspberries and Strawberries promised very large crops, but the dry weather of June reduced their yield, yet they brought very unprofitable prices. We report miserable returns from the sale of all these fruits.

We cannot complain of the want of progress in the quantity of insects and fungous diseases. Blight has been more moderate in its ravages this year than usual, but is making much headway. The San José scale is gradually developing in the majority of our orchards and will require steady battles to check its growth. Where spraying has not been practiced it will be a necessity for fruit-growers to procure machines and at least sprinkle their trees with kerosene oil or soap emulsions; in fact, it will be a necessity to continually spray for all kinds of insects and fungous diseases, for there does not seem at present to be any perfect fruit where spraying is not practiced. Lice have not been so prevalent as in former years. They have been mostly absent from vines.

Potato and tomato vines have been subjected to fungous diseases and the yield very much lessened by their ravages. In fact, most all fields of these crops seem to have a peculiar fungus upon their foliage. Wet weather very much injured the early blossoms of tomato and melon vines, and caused their early yield to be small.

Tomatoes.—Tomatoes have averaged about half a crop, on account

of the destruction of the first blossoms. The late growing-season enabled them to partially redeem themselves, producing enough fruit to supply the canneries. Good prices were realized for very early ones, poor prices for the middle crops.

Melons.—Melons have been plentiful, at times glutting the market, the prices realized fair; heavy rains and hot sunshine injured them to a certain degree.

Pickles.—The early pickle crop was good, but the season was very short, prices realized very good, and early cucumbers brought their growers very remunerative prices.

Asparagus.—Asparagus has been in great demand this year by the canneries. The quality has been very poor and the yield way below—almost half. It looks as if we shall have to plow up our asparagus fields if the blight is not stopped.

Cabbage.—Cabbage has been very badly infested with a worm which promised to destroy the crop; but the worm early entering into the pupa state, a large portion of the heads recovered their vitality and made a very creditable crop, which is bringing good prices.

Early Market Corn was a good crop and brought very remunerative prices; the later crops brought only fair prices.

Sweet Potatoes.—Sweet potato crop has been unusually large and early sold for good prices, but later on the prices became very low on account of the market being overstocked.

White Potatoes.—White potatoes were about half a crop, but has been large in other parts of the United States. The yield was about 50 per cent. of a crop, and there are a few large yields recorded, which were quite a mine for the fortunate owners. There has been no rot.

Peas and Beans have produced handsomely, the quality superb and prices good.

Pork.—There is an increased desire to grow pork, but the price has been low, from $4\frac{1}{2}$ to $5\frac{1}{2}$ cents per pound. The hog cholera is bad in some sections.

Poultry.—Poultry has been raised in the usual quantities, and is selling for very fair prices.

Eggs.—Eggs have been unusually scarce and high. Egg production is becoming the most profitable part of farming.

Diseases.—Roup and gape are on the increase among chickens.

Cholera still claims many victims among hogs.

Angoumois Miller is infesting many mows of wheat, badly eating and destroying the grain.

BURLINGTON COUNTY.

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STATEMENT OF THOMAS J. BEANS.

DEAR SIR—The “Angoumois Grain Moth” (*Galechia cerealalba*) has caused much loss to farmers in our county. I have some facts in relation to its invasion of our State that may be useful. Of course, all know of its presence in the South for a long period and of its spread northward later. It was at work in Pennsylvania, in a district above Philadelphia (around Frankford and Holmesburg), several years before it crossed to Burlington county, on the banks of the Delaware river, below the mouth of Rancocas, in 1890 and 1891, which lies immediately opposite the infested Pennsylvania district. In reply to my letter of inquiry, Edwin Montanye, of Frankford, Pa., writes January 15th, 1892: “It was in our grain last year so bad that we could only use it for feed. It was also in the rye just as bad. Our wheat is not so bad this year as last.” His description of its method of procedure corresponds with our experience. Though it had been at work in that locality several years before the date of the letter, 1892, I did not learn of its presence twelve or fifteen miles further up the State in force until this year, when there is much complaint. But even there it has not fully occupied the territory. We found in some barns, fifteen miles from there, no evidence of its work. But in that State, as in ours, it has the present year spread more widely and been much more destructive than ever before. When it first crossed over to our county, it did not spread over area more than four or five miles from the river. In reply to my letter informing Secretary Dye of its depredations in our county, he writes April 20th, 1892: “The insect you refer to is new to me, and I am deeply interested in what you say concerning its depredations. From the fact that it has crossed the river, it is evident it will spread, and I should be very sorry to have it go over our State,” &c. Though it has been with us so long, it has not spread so rapidly or been so destructive as this year. Wheat with us that was threshed late, or is unthreshed, can hardly be sold for flouring. I think the grain plant-louse (*Siphonophora avanae*) has not been given due credit for the harm it did to the wheat and rye crops when grain was in milk. More than half the grain was left a shriveled frame, so that the heads stood erect and not bent as usual. The barn or rice weevil (*Calandra arygæ*) has also done much harm. A peculiarity of the season is the November snowfall, 15.5 inches. Since 1863 there have not been two Novembers with as much as five inches of snow.

CLIMATIC HISTORY OF BURLINGTON COUNTY, N. J., 1898.

Near Moorestown Lat, 40°; Long, 74° 54'; elevation above tide, 71 feet.

	TEMPERATURE.			Rain and melted snow—inches.	Snow—inches.	Number of days 0.01 inch or more of rain fell.	NUMBER OF DAYS WHICH WERE		
	Maximum—degrees.	Minimum—degrees.	Mean—degrees.				Cloudy.	Partly cloudy.	Clear.
January	64	9	33.8	4.76	11.25	14	15	13	3
February	63	1	34.9	3.46	Trace	6	9	9	10
March	74	21	47.4	3.40	2	10	22	5	4
April.....	78	21	49	3.69	4	11	18	6	6
May.....	89	36	60.2	6.60	.....	15	19	5	7
June	94	48	71.2	1.86	.....	7	10	11	9
July... ..	100	51	76.8	4.01	.....	10	13	12	6
August	93	54	75.6	5.04	.....	13	15	10	6
September.....	97	44	70	1.66	.....	6	10	5	15
October	85	30	57.6	5.42	.....	10	12	7	12
November.....	68	23	43.6	8.98	15 5	13	16	7	7
December	64	10	34.4	4	1.25	9	13	6	12
Year.....	100	10	54.5	52.88	34	124	172	96	97

BURLINGTON COUNTY CLIMATIC REPORT, 1898.

The latest freeze (32°) on April 9th (on 28th rain, hail and snow, with 34°); the earliest, October 17th (34°), making length of season for out-of-door growth of tender vegetation, 191 days. Tomatoes and sugar corn, &c., were sent to market from field until October 28th (30°). The rainfall (52.88 inches) was 4.88 inches more than the average for the past 35 years, and all springs and wells have abundant supply of water. All vegetation unusually forward in March. Peach and Keiffer pear blossoms on April 4th, but later the month was cooler than average, and May had light frosts on 9th and 10th (36°) that did not destroy, but checked growth, while heavy rains packed the soil and hindered cultivation. A dry June followed, and at its close vegetable growth was backward. But the warmth and moisture of July stimulated remarkable growth of corn and all vine crops, and thenceforward climatic conditions were so unusually favorable that vines were more vigorous than for many years. Insects that for several past years had so harmed the melon and cantaloupe crops did not this season find in

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their healthy juices congenial food. Perhaps Burlington county never sent a greater quantity of these crops to market, nor has been favored with those of as high quality since 1876. A brief but very timely dry period in June harmed irrevocably the white potato crop.

Climatic conditions were very favorable in autumn for preparation of soil and germination and growth of grain and grass seeds. The storing of corn and fodder was interrupted by the most remarkable snowfall in November on record in our county—in all, 15.5 inches. During the thirty-five years of record there has fallen of snow in November : In 1871, 0.25 inch ; in 1872, 1.25 inches ; in 1873, 0.25 inch ; in 1880, 5.75 inches ; in 1882, 5.5 inches ; in 1888, 0.5 inch ; in 1892, 2.10 inches ; in 1896, 4.5 inches—all other seasons being without snow measurable in that month. There were many beautiful days in December, permitting the gathering of the corn crop in good condition.

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CAMDEN COUNTY.

OFFICERS FOR 1899.

President..... H. H. BELLMount Ephraim.
Vice President.....CHAS. C. STEVENSON
Secretary and Treasurer.....R. LEVIS SHIVERS.....Camden.

DELEGATES TO STATE BOARD.

J. M. GARWOOD (two years).....Blackwood.
A. J. DRIVER (one year).....Kirkwood.

REPORT.

BY THE SECRETARY.

The Board have held two meetings during the year—February 26th and November 24th. The first was very poorly attended, the November meeting was much better. The officers met previous to the meeting and adopted the order of business assigning topics, viz., H. H. Bell, “Poultry;” Elwood Evans, “Dairying;” E. C. Bell, “Chestnuts;” Frederick Sleeter, “Cabbage and Pickles;” R. L. Shivers, “Lime.” The meeting was held at Blackwood, and there seemed to be much more interest manifested than heretofore. The officers were elected for the ensuing year as given.

The Institute meeting was held November 21st, 1898, and was considered much beyond the ordinary for Camden county. Addresses were made by Hon. T. B. Terry, of Ohio, on “How I Grow Potatoes;” Hon. F. E. Dawley, Director of New York State Farmers’ Institutes, on “Growing Crops with Commercial Fertilizers;” James E. Rice, Esq., Conductor Farmers’ Institutes, New York, on “Winter Egg Production;” also, “A Quarter Century’s Progress in Dairying—New Demands,” by Mr. Dawley; “New

Things and New Demands in Market-Gardening," by Mr. Bingham and others; "Effects of Different Food Combinations," by Miss Emma C. Sickels, Secretary National Pure Food Association, Washington, D. C.; "Sunshine in Crop-Growing," by Prof. Byron D. Halsted, State Botanist and Horticulturist, New Brunswick, N. J., with a closing address by Secretary Dye.

CAPE MAY COUNTY.

OFFICERS FOR 1899.

President.....DR. E. H. PHILLIPS.....Cape May City.
Vice President.....A. B. WALTERS.....Cold Spring.
Secretary.....H. L. SABSOVICH.....Woodbine.
Treasurer.....VOLNEY VAN GILDER.....Ocean View.

BOARD OF DIRECTORS.

EDWARD LEAMING.....Cold Spring, Lower township.
FRANCIS HARRIS.....Rio Grande, Middle township.
WINFIELD COONS.....Goshen, Middle township.
HOLLIS B. MICKEL.....Petersburg, Upper township
A. STRATTON, Esq.....Beesley's Point, Upper township.
SAMUEL KING.....Erma Post Office, Lower township.
HON. F. LUDLAM.....South Dennis, Dennis township.
JESSE D. LUDLAM.....South Dennis, Dennis township.
JOHN REEVES.....West Cape May borough.

DELEGATES TO STATE BOARD.

A. B. WALTERS (two years).....Cold Spring.
FRANCIS HARRIS (one year).....Rio Grande.

No report furnished.

CUMBERLAND COUNTY.

OFFICERS FOR 1899.

President.....W. S. BONHAM.....Shiloh.
Secretary.....H. O. NEWCOMB.....Cedarville.
Treasurer.....THEO. F. BAKER.....Bridgeton.

DELEGATES TO STATE BOARD.

H. O. NEWCOMB (one year).....Cedarville.
A. W. ONTHANK (two years).....Vineland.

EXECUTIVE COMMITTEE.

MAURICE BACON.....Greenwich township.
JOHN L. MICKLE.....Stow Creek township.
ARTHUR SEABROOK.....Deerfield township.
F. S. NEWCOMB.....Vineland.
JEREMIAH CHAMBERS.....Maurice River township.
WM. M. BROWN.....Lawrence township.
W. S. GANDY.....Fairfield township.
J. S. TURNER.....Commercial township.
OLIVER GANDY.....Downe township.

REPORT.

BY THE SECRETARY.

We have held but one meeting this year and elected the officers named. We had a very good attendance and were addressed by Mr. Ashenfelter on the San José scale. The institutes that were held in this county were very well attended, particularly in Shiloh. The one held in Vineland, owing to the weather, was not so good, but great interest was manifested. The year 1898 has been better in some respects than last year, but in others far below the average.

Corn is somewhat better than last year, with prices about the same.

Wheat has been good, but is not raised to any great extent, except in two townships.

Rye is not grown, except for pasture and to plow in for manure.

Oats were a very poor crop, owing to the rust.

Hay has been good and yielded a little better than last year.

White Potatoes have been very poor, although the early crop was much better than the late.

Apples have been a complete failure.

Pears.—Abundant, but prices poor.

Strawberries.—Poor in price, quality and crop.

Citron Melons.—Large crop, prices low.

Cabbage.—The early crop was good and prices fair, but the late crop has been almost a total failure.

Tomatoes.—Early, were a good crop and prices fair; late, a little better than last year, but not a paying crop.

Peaches.—Short crop, good prices.

In some parts of the county we have been troubled with the swine disease, particularly in Fairfield and Lawrence townships, where it has been very fatal since the middle of last August, but it is somewhat on the decline at present.

ESSEX COUNTY.

OFFICERS FOR 1899.

PresidentA. E. HEDDENVerona.
Vice PresidentWM. DEICKS, SR.....Livingston.
Secretary.....J. H. M. COOK.....Caldwell.
TreasurerGEO. E. DE CAMP.....Roseland.

DIRECTORS OF COUNTY BOARD.—C. B. Crane, I. S. Crane,²S. H. Burnett, A. W. Harrison, J. B. Ward.

DELEGATE TO STATE BOARD FOR TWO YEARS.—F. C. Goble, Verona.

REPORT.

BY THE SECRETARY.

The Essex Board has shown more than usual activity the past year.

The annual meeting held in Roseland Grange Hall, December 14th, 1897, was better attended than our business meetings usually are.

The Master of the Grange, in a few appropriate words, gave us a cordial welcome to their fraternal home. Our President, in his annual address, reviewed the work of the Board and spoke encouragingly of the farmers' prospects, as compared with other occupations, and urged the members to be more zealous in maintaining the influence of the rural sections of our county, especially in relation to our public affairs.

The officers gave their annual reports. Several new names were added to the roll of membership. Held election of officers for the ensuing year. The meeting then re-opened the discussion of the topics which had been considered at the Institute at Caldwell a few days before, and the opinions and methods advocated by our Institute workers were discussed. We all agreed that the Institute was one of the best that we had ever had.

Our Board resolved to try a departure this year and send delegates

to both the annual sessions of the State Horticultural Society, as well as to the State Board, and to hold special meetings to hear reports from the delegates. As a result of this action two special meetings were held. The first one occurred January 19th, 1898, and was well attended, and the proceedings of the State Horticultural Society were ably presented by our delegates, Messrs. S. H. Burnett, C. B. Crane and F. C. Goble, and the day was spent in discussing their reports.

The second special meeting was held February 2d to receive the reports of our representatives to the State Board. These gentlemen also furnished comprehensive and interesting reviews of the several lectures and addresses they had heard at the three days' session at Trenton, and it was unanimously agreed that we had adopted a good plan to get the benefit of these annual sessions of our State societies.

The leading agricultural industries of Essex county are milk-dairying, market-gardening and growing berries and small fruits. The nearby city markets afford an opportunity to dispose of these products to better advantage than other farm crops. Poultry and eggs are produced in a matter-of-course way by all country people, but there are few, if any, who depend upon this branch of farming for a living.

The professional florist finds in Essex county an ideal location. The local market for his products is constantly increasing, although the florist, like the most of humanity, is ever ready to cry hard times and slow sales, yet we see many new greenhouses being built, and cut flowers are considered by many people one of the necessities of life.

Bee-keeping is growing in favor as a side-issue or adjunct to the garden and fruit farm for the purpose of securing the better fertilization of plants and fruit trees, and many are kept for this purpose alone, but there are a number of scientific beemen in this county who make the apiary financially profitable. The past summer was unfavorable for the production of honey, and the yield was not more than one-third an average. In some apiaries very little surplus honey was taken, while last year many apiaries yielded an average of one hundred pounds per hive.

DRAINAGE OF THE PASSAIC VALLEY.

A matter of vital importance to our people, not only as to dollars and cents, in the redemption of our flowed lands, but also as regards the health of all that portion of Essex county lying west of the

Orange mountains, is the drainage of the Passaic valley. This fertile valley, which, according to our geological authorities, was once the great Lake Passaic, has long been subject to overflows and inundations from the extended watershed which surrounds it. When this inundation occurs in the heat of summer, and this valley of about fourteen thousand acres of fertile soil is covered with water for weeks at a time until it evaporates or gradually leaks away down a sluggish stream, it leaves behind nothing but filth and destruction.

Various efforts have been made in years past to drain these meadows, but opposition in some form has defeated them, and the landowners, in accordance with the provisions of a statute law for the drainage of lowlands, finally appealed to the State Board of Geological Survey for relief, and as a result surveys were made and a plan of drainage adopted by the Board of Geological Survey under the direction of Dr. Geo. H. Cook, State Geologist; and the Supreme Court appointed Messrs. Geo. W. Howell, C. M. Harrison and J. H. Blauvelt as Commissioners to prosecute the work. The plan of drainage which had been so carefully prepared by our esteemed State Geologist, Dr. Cook, was also submitted to the most eminent water engineers of New York State and New England, who, after thoroughly examining the subject, approved the proposed scheme of drainage, and assured the Commissioners that the plan was practical, and, if fully carried out, would do the work required. The work was then begun and a large amount of money spent, but in such a way that it gave no benefit unless the whole plan should be completed, when it came to a standstill. A meeting of landowners was called to ascertain, if possible, the cause of delay, and for this purpose a committee was appointed and instructed to report at a future meeting. The chairman of this committee has favored me with a short review of the work.

DRAINAGE REPORT,

BY C. B. CRANE.

On September 1st, 1888, river drainage bonds were issued by the Commissioners to the amount of \$130,000, and the work was begun. The reef just above the dam at Little Falls was blasted loose, but the rock was not removed and the contractor failed. A contract was then made with Morris & Cummings for the removal of rock below the dam, and a large amount of work has been done there. The channel has been widened and deepened, so that the water can now pass away freely, where previously, in time of very high water, it would back up, it is said, over the dam.

About \$100,000 have been spent in the rock excavation below the dam, and about \$5,000 upon the reef above the dam, and the balance, somewhere about \$25,000, in surveying and other expenses incurred and in paying the interest on the bonds.

The plan of drainage proposed included the removal of the first and second reefs above the dam for a width of 200 feet, and the removal of the reef at Two Bridges. Also the lowering of Beatie's dam twenty inches and the placing of gates in one end of the dam, by which an opening twenty-five feet wide and sixteen feet deep can be made in time of high water for the more speedy relief of the meadows above.

A seventy-five-foot ditch through the Morris county slank at Pine Brook, to connect the river above and below the turnpike, making a short cut for the overflow, was also contemplated. Earnest efforts were made to raise funds for the completion of the work by a further sale of bonds, but owing to the opposition of some opponents of the enterprise and the difficulties resulting from the depressed state of financial affairs, a sale of bonds was not effected and the work came to a stop, greatly to the disappointment of the long-suffering land-owners. In June, 1897, a meeting of the owners of flowed lands along the Passaic and its tributaries was held at Pine Brook, and the question as to the best means of getting the drainage of the meadows completed was considered.

A plan of drainage was submitted which proposed cutting a forty-five-foot ditch through the Long Meadows, from Pine Brook to the "Deep of All" bridge.

This plan having been considered and disapproved by the Geological Board years ago, was not approved by the meeting. After a long discussion a committee of five was appointed, afterwards increased to seven, to investigate the whole subject and report as soon as they were ready to a meeting of the landowners. The committee met with a majority of the Commissioners and the Geological Board several times, and reported to a meeting of owners of flowed lands in December, 1897. Professor Smock and Engineer Ward, of the Geological Board, gave what information and assistance they could in helping on the work, and Mr. C. M. Harrison has given the committee much information and many valuable hints regarding difficulties and requisites for completing the work.

The committee feel confident that the plan proposed by the Commissioners will do the work required, and they regret that the work should be compelled to stop for lack of funds. Various benefits, besides that of securing good crops, would result from a proper drainage of the low meadows; a greater freedom from malarial disease, a drier and purer air, and less danger from early and late frosts in low grounds might also be experienced. Various plans designed to aid the work were submitted by the committee and approved, and the committee was re-appointed and requested to aid the Commission in pushing on the work.

As the bonds are nearly due, there will need to be provision made for a re-issue of bonds, which can now probably be made at a lower rate of interest, and it is hoped by the Commissioners that they may soon be able to secure funds and resume the work. Ex-Attorney-General Stockton was recently consulted as to the validity of the bonds, and he stated that the State had honored them by the action of the Supreme Court. The Court of Appeals had also approved of the law, and the question as to the validity of the law had finally been carried to the United States Supreme Court in the contest over the Pequest river drainage, and there again affirmed.

A new survey of the lands to be benefited by the drainage has been made by the Geological Board, which it is hoped will prove satisfactory to the landowners. In view of the situation, as has been stated, the approval of the plan of drainage by some of the most eminent water engineers, the validity of the law under which the work is being done, as given in a recent opinion by Mr. Stockton, and a careful survey of the lands to be drained by the Geological Board, it is hoped that the commission may find no further obstacles

in raising the money to complete the work, and it is believed that besides the advantages to the low meadows, it will greatly promote the permanent good of the whole Passaic valley.

I give herewith a short statement of two prominent dairies in this county.

The Fairfield Dairy is in Caldwell township, and is the largest milk plant in the county. It is the outgrowth of work begun twenty years ago by Mr. Stephen Francisco when he commenced to retail milk from a small farm. But his ambition as a dairyman could not be circumscribed to the limits of a small farm and a single delivery wagon. Capital was soon enlisted in his enterprise, and a company formed. The farm grew until it now includes about 500 acres, and about 500 cows (including bulls and heifers) are kept. The daily output is 3,500 quarts of milk, which is bottled and delivered to consumers.

About fifty horses are used on the farm and in the delivery, and sixty men are employed in all branches of the work. The dairy is equipped with all the modern appliances, many of which are the inventions of the company, and has a capacity to handle twice the present product.

To carry out the idea of purity and uniformity in the milk, no pains are spared to make the cows comfortable. The barns are well ventilated and the animals are fed with regularity. Hay, corn meal and ensilage form the staple bill of fare.

“Certified Milk” is a term which is given to that portion of the product which is especially watched over by a committee of Essex county physicians, after making a chemical and bacteriological examination of specimen bottles taken whenever and wherever they choose, and after a most rigid examination of everything connected with the barn and dairy. The Fairfield company have found that the only way to be sure of the proper treatment of their product was to take the entire control of the distribution of it.

The dairy farm of Mr. William Deicks is in Livingston township, and is a fair sample of the average dairy farm of Essex county. It is conducted under the personal supervision of the proprietor. It includes about seventy-five acres. Thirty cows are kept, and grade Jerseys are his choice, and the milk is sold to retail dealers. The average daily product the past year was 9 quarts per cow, sold at an average of $3\frac{1}{4}$ cents per quart at the dairy. Besides the green fodder and hay and root crops, which are the only feeds grown on the farm, the cows are fed bran, corn meal, malt sprouts and fresh brewers'

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grains. The average daily cost expense of purchased feed the past year was 12 cents per cow. The cows are fed and milked regularly, kept in a comfortable and well-ventilated stable, with plenty of dry bedding and turned out in the yard two hours each day for water. Besides the milk product Mr. Deicks sold from his farm, he delivered to consumers the past year twenty-five tons of hay, at \$18 per ton, and about 500 bushels of potatoes, at 85 cents per bushel.

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GLOUCESTER COUNTY.

OFFICERS FOR 1899.

<i>President</i>	WM. H. HOFFMAN.....	Mickleton.
<i>Vice President</i>	WESLEY B. GILL.....	Swedesboro.
<i>Secretary</i>	ELMER BRADSHAW	Mickleton.
<i>Treasurer</i>	THEODORE BROWN.....	Swedesboro.

EXECUTIVE COMMITTEE.

ALBERT HERITAGE	Swedesboro.
B. FRANK RULON.....	Swedesboro.
BEULAH GARDNER	Mullica Hill.
ANNIE BRADSHAW.....	Mickleton.
GEORGE C. TONKIN	Mullica Hill.

DELEGATES TO STATE BOARD.—Joseph T. Carter, one year, Mickleton; George H. Horner, two years.

GRANGES REPRESENTED.

Swedesboro, No. 5.
Harrisonville, No. 26.
Bridgeport, No. 32.
Mantua, No. 39.
Mullica Hill, No. 51.
Williamstown, No. 85.
Mickleton, No. 111.
Hurffville, No. 115.
Aura, No. 122.
Total membership, 1,152.

REPORT.

BY THE SECRETARY.

The members of the County Board are encouraged by the increased interest taken, not only by those that have heretofore been meeting with us, but by others who are now joining us. The ladies, too,

have assisted by their presence, and have given written answers to the questions assigned them.

The Executive Committee, in choosing questions and assigning them, have done their part in making the meetings interesting and profitable.

Four meetings of the Board were held during the year, with an attendance larger than any year since its organization; the interest taken in the meetings on subjects pertaining to our work is favorable. When farmers thus combine their efforts and work together for mutual benefit the future has a bright side to it. At this day and time, when combination is the order, we have but to heed the warning.

We have held two institutes, one each at Mullica Hill and Williamstown. The State Secretary, Franklin Dye, has aroused the interest of the farmers, and profitable meetings have resulted.

The annual Grange picnic, held at Alcyon Park, is growing in favor. A display of agricultural implements was added this year.

That portion of the county lying next to the river, being sandy in places and light loam in others, is adapted to growing such vegetables as sweet potatoes, early white potatoes, tomatoes, eggplants, peppers, citrons and watermelons.

Shipments from the three points named have been made as follows :

From Bridgeport :	
Tomatoes	1,540 crates.
Sweet Potatoes.....	8,586 barrels.
Watermelons	750,000.
From Swedesboro:	
Watermelons	55,000.
Citrons.....	15,000 barrels.
Tomatoes	94,000 crates.
Sweet Potatoes.....	60,000 barrels.
From Mullica Hill:	
Asparagus, April 19th to July 1st	3,500 crates.
White Potatoes, June 28th to August 20th.....	30,000 barrels.
Sweet Potatoes, August 15th to December 1st.....	8,000 barrels.
Melons during season.....	10 carloads.
Pears	5 carloads.

Also ship daily during season onions, cabbage, peppers, tomatoes, apples, beans, cucumbers, citrons, eggplants, &c. And weekly, about twenty-five barrels dressed poultry.

GLOUCESTER COUNTY.

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White Potatoes, nearly an average crop.

Sweet Potatoes, the largest yield for many years ; quality excellent ; early part of crop sold at usual prices. Later in the fall, prices went very low, and now, November 15th, \$1 per barrel.

Corn, about an average crop.

Wheat, not so good as usual, and very much damaged by an insect.

Hay, eighty per cent. of a crop.

Tomatoes, a full crop.

Apples, almost entire failure, with but few exceptions.

Pears, a full crop ; Keiffers growing in favor. Those grown on light soil are tender and fine-grained.

Watermelons and Citrons, above an average crop. The louse that had been so troublesome for two years was hardly noticeable.

Asparagus, below the average, although some beds produced a full crop.

Cabbage, the early crop good, and sold well ; late not so good. The worms damaged them very much.

Pork, about 90 per cent. Some have lost their entire pens by the cholera.

Poultry.—The raising of poultry for market is on the increase, quite a number devoting their whole attention to it.

The H. Fell Poultry Company, Incorporated, at Hurffville, has an incubator cellar 24 by 64 feet capacity for hatching 14,000 eggs, attached to which there is a nursery 150 feet long, for 3,000 little chicks. Also two brooder-houses to receive the chicks from the nursery—one 178 feet long ; the other 100 feet long ; capacity, 6,800 chicks ; winter fattening pens, 200 feet long. They keep no hens, but purchase all the eggs for hatching, and market 20,000 chickens each year. With the increased facilities they are adding, their output will soon be proportionately greater.

The farmers of the county are perhaps holding their own in comparison with other parts of the State. The question is not so much how to produce more, but how to dispose of our product to reimburse us for cost of production, and some to spare for improvements and the rainy day.

It might be said that farm buildings, fences and general appearance are somewhat neglected, while more attention is being paid to the improvement of farm animals and condition of the soil.

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HUNTERDON COUNTY.

OFFICERS FOR 1899.

<i>President</i>	V. R. MATHEWS.....	Ringoes.
<i>Vice President</i>	JAMES LANE.....	Readington.
<i>Secretary.</i>	WM. W. CASE	Baptisttown.
<i>Treasurer..</i>	I. H. HOFFMAN.....	Baptisttown.

DIRECTORS.

- H. F. BODINE, Hunterdon County Pomona Grange.
- F. S. HOLCOMBE, Ringoes Grange.
- WM. B HOCKENBURY, Locktown Grange.
- JOSEPH HAGERMAN, Sergeantsville Grange.
- J. S. KERR, Kingwood Grange.
- WM. DUBON, Oak Grove Grange.
- M. W. ANGELL, Spring Mills Grange.
- WM. W. CONOVER, Hunterdon County Alliance.
- DAVID COLE, Pleasant Run Alliance.
- J. R. FOSTER, Three Bridges Alliance.
- JOSIAH PRALL, Sand Brook Alliance.
- STEWART BELLIS, Flemington Alliance.
- URIAH SUTTON, New Jersey Fruit Exchange.
- A. B. ALLEN, Hunterdon County Peach Exchange.

DELEGATES TO STATE BOARD.—I. H. Hoffman, Baptisttown, one year; H. F. Bodine, Locktown, two years.

COMMITTEE ON PEACH STATISTICS AND REPORTER TO STATE BOARD OF AGRICULTURE.—Wm. W. Case.

Regular meetings of the County Board, third Saturday in April, August and November.

Other organizations in county :

NEW JERSEY PEACH EXCHANGE.

<i>President</i>	JOHN T. COX.....	Readington.
<i>Secretary</i>	H. F. BODINE.....	Locktown.

HUNTERDON COUNTY PEACH EXCHANGE.

President.....N. B. BOILEAU.....Jutland.
Secretary.....P. M. MECHLING.....Pittstown.

For granges see State Grange report.

REPORT.

BY THE SECRETARY.

Three regular meetings of the County Board have been held—the April meeting at Sergeantsville, the August meeting at the old Fair Grounds, near Flemington, in conjunction with the Farmers' Picnic; the third, in November, was held in conjunction with the Farmers' Institute at Locktown on the 19th. The April meeting was devoted mainly to the dairy question. There was a large attendance at the Farmers' Picnic, perhaps the largest ever seen on the Fair Grounds. Speakers of national reputation enlightened eager listeners on questions of social, political and financial importance. Exhibitions of farm and dairy implements were large.

The season, so far as weather conditions were concerned, was one of the most peculiar on record. Early March resembled ordinary May weather, while April resembled March; May, the rainy season of the tropics, and June, after about the 8th, became so droughty as to stop all thoughts of plowing. Early in June the western part of the county along the Delaware river was visited by a terrific hail-storm and cloud-burst, fruit being totally destroyed, buildings washed bodily away, highways almost obliterated, and bridges demolished, while in some places the roadbed of the Belvidere Delaware railroad was torn out and moved bodily into the river, and many wagon roads took more than one month to make passable again.

Summer weather was about normal, while autumn was unusually warm, which proved very favorable to late-planted corn.

FARM CROPS, ETC.

Wheat and rye were both 100 per cent. crops; prices, November 15th, wheat, 70 cents; rye, 45 cents.

Buckwheat, owing to drought, but little sown; yield per acre and quality, average; price, 40 cents.

HUNTERDON COUNTY.

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Corn, owing to excessive rains previous to June 5th, preventing plowing, immediately followed by severe drought, was curtailed at least 10 per cent. in acreage, and on July 1st promised almost total failure. In many fields much of the corn lay in the ground unsprouted until July 15th, yet, owing to most favorable weather conditions, made a first-class crop in October, the crop being in the end one of the most satisfactory in years ; price, 40 cents.

Oats did not fare so well under adverse weather conditions as did corn, the crop being one of the poorest on record, being not above 40 per cent. ; price, 25 cents.

Potatoes were another light crop, not yielding over 65 bushels per acre.

BEE-KEEPING.

The honey crop the past season was not more than one-fourth as large as last year. Foul brood is still spreading, and unless effective measures are used, and that soon, the bee will be practically exterminated east of the Alleghanies in the course of a few years.

TOMATOES.

There seems to be something practically wrong in our tomato culture, the crop being a virtual failure about three years out of four. During the season just closed Ringoes Canning Company packed but 32,500 cans against a daily average capacity of 10,000 cans ; while Everett & Scarborough, of Lambertville, packed only 145,000 against 250,000 in 1895. This seems to be a paying industry where properly followed, and we would like to see it more fully developed than at present.

FRUITS.

The season just closed showed again an almost total failure of fruits of all kinds. Cherries, strawberries and other small fruits were badly injured by excessive cold and wet in spring, and about finished by the excessive June drought—one of the worst on record.

Peaches were about 15 per cent. of full crop, and apples not more than 20 per cent.

Of peaches, the New Jersey Fruit Exchange, at Flemington, sold 6,000 baskets at an average price of 65 cents, and the exchange at

Annandale, 11,757 baskets at 75 cents. Probably the crop throughout the county averaged 50 cents per half-bushel basket.

Of the crop, the Lehigh Valley, carried 37,149 baskets; the New Jersey Central, 108,666 baskets; the Rockaway Valley railroad, carried 93,317, while the Pennsylvania probably enough to bring the total crop in round numbers up to 250,000 baskets for the whole county.

In the vicinity of Annandale, Lebanon and White House Station, a few lucky growers realized finely on peaches, some netting as high as \$2,500 on the crop.

In the southwestern part of the county the peach has gone to stay. In 1894 29,820 baskets were shipped from Raven Rock—in 1898 none. The peach belt seems now to be rapidly receding to the mountains in the northern part of the county.

DAIRYING.

Dairying is still on the increase, and several new creameries are in contemplation.

Dairy cattle have risen greatly in price the past year, ranging from 20 to 30 per cent. higher than one year ago—good milkers of fair breeds readily commanding \$45 in open market. But as there has been no corresponding rise in prices of the product, generally speaking, and with feed higher, it seems to be a question whether the dairy business is really advancing to a higher plane of prosperity. Very likely when the present demand for milch cows at the advanced price is satisfied, the price of the increased product will fall fully as low and as fast as the price of cows has risen.

The business of the Locktown Creamery, one of the very best in the State, shows a gain of nearly 40 per cent. in amount of milk received over last year. A complete statement of their business the past year is appended to this report. This is about the only creamery that I can get a business statement from in the county.

HUNTERDON COUNTY.

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REPORT OF THE WORKINGS OF THE LOCKTOWN CREAM-ERY FOR THE YEAR ENDING OCTOBER 31st, 1898.

COMPILED BY GEORGE W. HOCKENBURY, SECRETARY AND SUPERINTENDENT.

MONTH.	Number of pounds of milk received.	Number of pounds of butter made.	Butter sold for.	Skim-milk sold for.	Average test of all milk received.	Price paid per pound for butter-fat.	Average price paid per 100 pounds for milk.
1897.							
November	161,425	8,403	\$1,950 69	\$75 94	4.55	\$0 25	\$1 14—
December	167,927	8,586	2,043 87	84 57	4.59	25	1 15—
1898.							
January	178,335	8,996	1,899 92	85 68	4.50	22	99
February.....	159,397	7,968	1,703 91	71 34	4.28	23	98+
March.....	178,688	8,616	1,809 13	87 29	4.28	22	94+
April.....	191,696	9,106	1,858 29	91 50	4.19	21	88—
May.....	236,385	11,197	1,851 90	109 38	4.25	17	72+
June.....	254,537	12,108	2,071 75	124 36	4.21	18	76—
July.....	205,231	9,584	1,817 34	102 55	4.13	20	83—
August.....	236,707	11,433	2,271 96	114 96	4.16	22	91+
September.....	224,621	10,891	2,262 50	108 58	4.24	22	93+
October.....	211,872	10,845	2,523 48	100 78	4.85	25	1 09—
Total	2,406,821	117,733	\$24,064 74	\$1,156 98	\$11 32
Average.....	94 $\frac{1}{2}$

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MERCER COUNTY.

OFFICERS FOR 1899.

President.....WALLACE LANNING.Trenton
Vice President.....J. M. DALRYMPLEHopewell.
Treasurer.....H. R. WITHINGTON.....Titusville (Deceased).
SecretaryFRANKLIN DYE.....Trenton.

DIRECTORS.—J. V. Green, J. B. Horn, A. L. Holcombe, H. E. Hale, D. C. McGalliard, T. B. De Cou, Charles Black, Gilbert D. Rue, Samuel F. Fowler, I. J. Blackwell.

DELEGATES TO STATE BOARD.—J. M. Dalrymple, two years, Hopewell; Hon. John D. Rue, one year, Trenton.

REPORT.

BY THE SECRETARY.

The Mercer County Board of Agriculture was organized March 20th, 1883. A considerable number of the most progressive farmers of that time constituted its membership. There were then existing, at least, six local agricultural organizations, all of which sent delegates to the Board and the four quarterly meetings of each succeeding year were well attended.

Within more recent years most of the local organizations have ceased to exist, and death has carried away a large proportion of the original membership, and farmers who have taken their places on the farm have not joined in sustaining the Board. Hence our meetings are not so largely attended as formerly. It is the hope of those still active in trying to advance agriculture by organization and co-operation, as well as by individual work on the farm, that a new interest may soon be aroused in the county organization and its membership largely increased.

The winter meeting held in December last was of great value, the papers and addresses being on questions of immediate interest to practical farmers. A severe storm and icy roads, however, prevented a large attendance. The annual meeting was held on March

26th, when the officers, whose names appear at the head of this report, were elected for the ensuing year.

Mr. I. J. Blackwell read a paper on "Lost Opportunities," showing that while some men complain of "hard times," there are opportunities for improving their condition, often within their reach, that are allowed to pass away unutilized for want of industry, economy and watchfulness. The paper was quite fully discussed and many valuable hints recorded on the minutes of the Board.

Jacob Wyckoff, of Middlebush, spoke on the subject "How Plants Feed." Some interesting remarks were also made concerning the agriculture of Japan by Rev. Mr. Wyckoff, missionary to that country.

A resolution gratefully acknowledging the sturdy support given to measures of interest to the farmers of the State by the Senators and members of the last Legislature, who were instrumental in securing such legislation, was unanimously passed.

The autumn meeting was held at Princeton. The report of the county to the State Board was made up according to returns furnished to the Secretary and had the approval of the Board. Addresses were made by T. B. Terry, of Ohio, on "Improving the Soil;" by Professor E. B. Voorhees, on "Feeding for Profit;" by George L. Gillingham, on "Rearing and Management of the Dairy Cow," and by Mrs. F. H. Valentine, on "Poultry and Egg Production."

A synopsis of Mr. Terry's address is here given :

**IMPROVING THE LAND WITHOUT COMMERCIAL
FERTILIZERS.**

Commercial fertilizers are all right, but, with the prices we get for ordinary farm products, to depend on them takes too large a slice from our income. I will give you a plan that will at least save a large part of the fertilizer bill. You buy fertilizers to get nitrogen, phosphoric acid and potash. The air that surrounds the world is four-fifths free nitrogen. You can buy this, of course, in fertilizers, at a cost of fifteen or twenty cents a pound, where you buy at retail. But the Creator has given you plants that will grow on your farm and make the best of hay, that have the ability to feed on this nitrogen in the air and use it to grow top and root. Your corn, wheat, oats, timothy, &c., cannot get any of this nitrogen in the air, no matter how much they want it. But your clover can, and then you can feed the clover, roots and all, to the corn, wheat, &c. Or you can make hay of the clover and feed it and return the manure to the land. The clover can transfer the nitrogen from the air and make it available for following crops. A heavy crop of red clover, growing two full seasons, may be able to get 200 pounds or more of this costly element in shape so you can turn it into money crops. Where stock are kept, so the clover is fed out, this nitrogen costs less than nothing, as one can grow more clover hay per acre, by cutting twice in a season, than he can hay made from any of the grasses, and this hay has a decidedly higher feeding value, if the clover is cut as soon as in bloom. By growing red clover regularly once in three or four years in the rotation it is practicable to get, with good management, all the nitrogen we want to grow ordinary farm crops, but not enough for market-garden crops.

But now we want also phosphoric acid and potash to feed our crops. These we call mineral matter, as they come from the earth entirely, and not from the air, like the nitrogen. The red clover having a tap root, and sending its fibrous feeding roots down deeply in the subsoil, is able to get much mineral matter from a lower depth than your corn, wheat, &c., can. Clover feeds but little in the surface soil, while the other-named crops feed there largely. The result of growing clover is therefore to pump up a good deal of mineral matter, particularly potash, from the subsoil and leave it in the surface soil, or on it, in the growth of clover tap root and top. When the sod is plowed, and this growth decays, the plant-food

becomes available for following crops. One can get more pounds of available potash in this way than of nitrogen, but not nearly as much phosphoric acid. There is a tendency for plant-food to leach downwards with the rain-water, and clover can bring it up again ready for the crops. The growing of heavy crops of clover on land shades and mulches the surface, and this helps about increasing fertility.

But now one may want some more plant-food than is made available in the above ways, particularly phosphoric acid. If the soil has a fair amount of clay in it he can often get it cheaply by proper tillage. Prof. I. P. Roberts says there are about 4,500 pounds of nitrogen, 6,300 of phosphoric acid, and 24,000 of potash in an acre of average New York soil, within one foot of surface. This is an enormous quantity, and I take it that any fairly good agricultural soil in New Jersey has something like the same amount of these ingredients in it. This is a very important point that many have overlooked. There are tons of idle plant-food in an acre of our soil. Nature gives this to us very grudgingly. A very little is made available each year. If we want any more we must work for it. This was God's plan, and a wise one. We get our pay for study and faithful hard work. There are three points in tillage that will help you about making more of this idle plant-food available. First, make the seed-bed very fine by alternate harrowing and rolling; or a clod-crusher may be used instead of a roller. Keep to work when the land is dry until the surface is almost as fine as ashes. Second, stir the soil roughly once or twice when making a seed-bed. A cultivator with wide teeth will do this work well, for example. Many harrows do not do it. The object is that the chemical actions taking place from the rough stirring, thus bringing new particles of soil in contact with each other, will result in liberating, or making available, more plant-food. Third, cultivate the soil frequently, and keep at it, shallow, except early in the season, while a hoed crop like corn, potatoes, &c., is growing. Thus, you get practically all the advantages of the summer fallow without any of its disadvantages. For example, we plow a clover sod in the spring for wheat in the fall, and while we are working it all summer, nearly, we grow a crop of early potatoes. And we get just as much wheat as though the potatoes had not been there. The roots of the potatoes and shade of tops prevent largely the loss that takes place where the land is bare in a summer fallow.

Now, this tillage will liberate more or less plant-food according as you manage and according to the character of your soil. You can

get the most out of it on heavy soil (if well drained), and the least on very light soil ; and tillage without plenty of decayed and decaying vegetable matter in the soil will not show best results. Again, you must keep something growing on your land as nearly all the time as possible to get your full reward. If you cultivated corn many times during the season to liberate plant-food, and then let the land lie bare through the fall and winter, the plant-food made available by tillage would leach down and get away. Land left bare in summer fast loses its humus, or decayed vegetable matter ; it is burned out. Now, in a nutshell, this is the idea : Grow a heavy clover sod regularly once in three or four years. Plow under the clover or feed it out on cement floors, so as to save all manure, and return this to the land. Then follow with plenty of proper tillage to liberate plant-food that with ordinary management you would never get. Keep the land busy constantly. In this way you can increase the fertility of the soil greatly.

We have been working along this line for about thirty years. We bought a very much run-down farm ; were in debt \$3,700, and had no capital except nine cows, one horse and a few tools. We began a three-year rotation of clover, potatoes and wheat, working systematically as I have outlined. Our total cash sales the first year barely reached \$300 from 125 acres. In thirteen years we had increased the yield of wheat from almost nothing until it had averaged thirty-five bushels per acre for five years. Our total cash sales from thirty-five acres, managed as described, reached \$2,000 to \$2,500, and even more in 1883, for wheat and potatoes. Practically no outside fertility was brought on the land. We did buy a few loads of manure before we learned that we could grow it cheaper with clover, and we bought some feed, but no fertilizers except to experiment with. The land was made to pay for itself and improve itself. Our buildings and fences were almost nothing when we began. Now we are carrying fire insurance policies for over \$10,000 on our buildings and their contents. We have cement floors in all the stables, and a manure shed. I told you the fertility from the clover cost less than nothing. Yes, we have saved not less than \$2,500 worth of grain just from feeding our horses on clover hay instead of timothy. It is so much nearer a perfect food that much less grain is required. So you see I have not told you anything I did not know all about, from long experience. Every fact I have stated is now proven. But we made money out of them long before this was the case. Of course the supply of mineral matter in the soil will give out sometime, and more will have to be put in. But I do not care to deposit money in

our bank, thus losing the use of it, as long as there is enough there so my checks are honored. This is a business matter with me. I have as good a right to mine potash and phosphoric acid as coal or gold. I said to myself if I can pay for our farm and improve it, and get it in good circumstances and have a nice home, by skillfully drawing a little on the surplus in the soil and the nitrogen in the air, why not do it? We are in shape to add mineral matter now any time it may be needed. But without doing this we grew thirty-nine bushels of wheat per acre last year, thirty-seven the year before, and four years ago grew forty-seven and three-fourths. No fertilizer was used. I would not say you could do just as we have, particularly if you have very light soil. Then you may have to add a little purchased potash, and possibly some phosphoric acid, but you can help yourselves very much, anyway. You can get nitrogen for nothing. If your land is too much run down to grow heavy red clover, you can grow cow peas, crimson clover—something—and turn under, to add to vegetable matter in soil, and then, with potash added, you ought to succeed with the red clover. Realizing its value we take care of the clover as well as we do the potato crop, and make it grow. We clip the fall growth after harvest, in wheat stubble, and let it lie as a mulch. Thus we keep the weeds from robbing it of plant-food and water. We keep all stock off, and top-dress all thin places. We sow little timothy, so it won't crowd the clover.

I know farmers personally in a dozen States who have followed this same plan with as good, or better, results. If you manage rightly all through this plan will rapidly increase the productiveness of your soil, at small expense.

CROP CONDITIONS.

Wheat did not yield as large a crop per acre as last year by about three bushels, nor is the quality quite as good. Considerable damage to the grain has been caused by the angoumois grain moth. It is claimed by those having most experience with the insect that the grain should be threshed immediately after harvest and put in bins before the eggs laid in the standing grain are hatched. Their ravages will, in this way, be greatly reduced. With the return to former average yields, the price also was reduced to the prevailing low standard, so that this crop will not swell the financial returns of wheat-growers in the same proportion it did last year.

The average yield of corn for the county is five bushels above the average for the whole State, as given in the returns of November 1st of the United States Department of Agriculture.

MERCER COUNTY.

Rye and oats are reported as yielding a little less per acre than last year.

Hay varies but little in yield, but is low in price. This staple has maintained its place for a long time as a fairly-remunerative crop until now. The reduction of the number of horses used in our cities is supposed to have a bearing on this condition.

Potatoes are not a leading crop in the county. The crop of 1898 was below an average good year, but the price for early and during the autumn was higher, compensating somewhat for the reduction in yield.

Apples and peaches have made a meager yield. Grapes and most small fruits were abundant.

Farm stock is in average condition at least. I believe dairymen especially are giving more attention to sanitary conditions of stables with an honest purpose to furnish a healthful milk-supply. The production of poultry and eggs is increasing, and there is one large plant in the county, that of Mr. McAvoy, near Trenton, where ducks especially are raised by the thousand for a market built up and maintained by the owner.

There are no creameries in the county, as Trenton, Princeton, Lawrenceville, Hightstown and other towns furnish a ready market for the products of the dairy. The large schools located in the first four places named augment the local population and thereby increase the consumption of fresh farm products, both of the dairy, the poultry-yard and the field—an advantage not possessed by every county in the State.

We have a goodly heritage and our farmers are not discouraged. The improvement in general business is felt by them and they are encouraged to hope for continuous improvement for some years to come.

The report of the Inter-State Fair Association, an enterprise of this county, is submitted with this report.

TABLE OF YIELDS AND VALUES OF SIX LEADING CROPS.

Crop.	Acres.	Bushels per acre.	Total number		Price.	Total value.
			bushels for county.	bushels for county.		
Corn.....	22,000	40	880,000		\$0 36	\$316,800
Wheat	12,000	17	204,000		70	142,800
Rye	4,500	15	67,500		39	7,075
Oats.....	11,000	22	242,000		23	52,660
Hay.....	23,000	1.40 tons.	32,200 tons.		7 50 ton.	241,500
White potatoes.....	1,700	75	127,500		60	76,500

REPORT OF BOARD OF DIRECTORS OF THE INTER-STATE FAIR.
ASSOCIATION,

For the Year 1898.

TRENTON, N. J., January 7th, 1899.

To the Stockholders of the Inter-State Fair Association :

Your Board of Directors respectfully submit for your consideration the following brief review of the business of the year :

The Fair of 1898 was held on September 26th, 27th, 28th, 29th and 30th, and was in all respects a successful exhibition.

The attendance was as follows :

Monday	7,704
Tuesday.....	21,755
Wednesday.....	19,688
Thursday.....	37,371
Friday	8,116
Total.....	<u>94,634</u>

The total amount of cash received on account of Fair was.....	\$55,950 99
Cash paid out	<u>48,334 12</u>

Leaving a profit of.....	\$7,616 87
From this amount dividends were paid on the preferred stock, amounting to.....	\$1,400 00
Common stock, amounting to.....	<u>4,600 00</u>
	\$6,000 00

Leaving a balance of.....	\$1,616 87
To be carried into the general account.	

The balance on hand January 8th, 1898, was.....	\$2,005 75
To which add profit on Fair of 1898	<u>1,616 87</u>

Leaves the Association with a present cash balance of.....	\$3,622 62
--	------------

Combining these figures into a general statement, we have the following :

ASSETS.

Real estate.....	\$19,771 61
Buildings and improvements.....	141,854 98
Furniture and fixtures.....	6,346 06
Cash on hand	<u>3,622 62</u>
	\$171,595 27

MERCER COUNTY.

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LIABILITIES.

Capital stock (common).....	\$115,000 00
Capital stock (preferred).....	20,000 00
Surplus (undivided profits)	36,595 27
	<hr/>
	\$171,595 27

Your Board of Directors were constrained to reduce the usual dividend from five per cent. to four per cent. on the common stock, owing to the fact that repairs to the extent of \$1,000 were absolutely necessary to be made to the grand-stand, and other items of expense in connection with the maintenance of the plant were imperatively necessary.

Respectfully submitted, by order of the Board,

JNO. GUILD MUIRHEID,

Secretary.

MIDDLESEX COUNTY.

OFFICERS FOR 1899.

PresidentGEORGE SMITH..... South River.
Vice PresidentD. C. LEWISCranbury.
Secretary and Treasurer RUNYON FIELD..... Bound Brook.

DIRECTORS.

DAVID PERRINE.....New Brunswick.
JOHN B. FIELDBound Brook.
AUSTIN RICHARDS Jamesburg.
CHARLES EDWARDSPlainsboro.
GEORGE W. MOUNT.....Kingston.
I. S. BENNETT.....Jamesburg.
EDWIN GULICKNew Brunswick.
D. C. PIERSONSouth River.
CHARLES ELKINS.....New Brunswick.
DE HART VOORHEES.....Franklin Park.
I. D. BARCLAY.....Cranbury.
H. M. JAFFERS.....Plainsboro.
NOAH RUNYON.....Stelton.
WILLIAM FARR GOODWIN.....
H. H. BROWNJacksonville.
H. WARNE.....
ELDRIDGE EDGAR..... Woodbridge.

DELEGATES TO STATE BOARD.

D. C. LEWIS (one year).....Cranbury.
RUNYON FIELD (two years)Bound Brook.

REPORT.

BY THE SECRETARY.

The Middlesex County Board of Agriculture has, during the past year, held four meetings, which have been well attended. The farmers are showing more interest in the meetings, and find that it is to their benefit to attend them and discuss the different subjects

presented at the meetings. The past year has not been so good financially for the farmers as was 1897 ; prices are lower, and crops were not, as a rule, up to the average. Potatoes were not half an average crop, and of very poor quality. Prices were good early in the season, but after October 1st were much lower. Wheat was badly damaged by the Hessian fly in some localities, and will not average more than eighteen bushels per acre. Oats were almost a total failure on account of dry weather. Hay and corn were the only crops that gave an average yield, but prices are low, especially for hay. On account of the damage done by the Hessian fly to the last crop, wheat was sown this fall later than usual, and there are a good many fields that have a light top-growth, affording little protection against the winter. Small fruits are not grown to any extent in this county, only enough to supply home markets. There is one creamery in the county, which is situated at Cranbury, and most of the farmers in that section find that it pays them to produce milk even at the low prices of the past two or three years. Fertilizers are being used more extensively each year, and a good many farmers find that it pays them to mix their own goods, for then they know just what they contain, and they can use what they know their soil needs for each crop. Farming is not as remunerative an occupation as it has been in the past, and for the reason that conditions have changed, but wherever we find a farmer who keeps up with the times, and is using a little scientific knowledge, we will find a prosperous man.

MONMOUTH COUNTY.

OFFICERS FOR 1899.

President HAL ALLAIRE.....Allaire.
Vice President. L. F. S. SCHANCK.....Marlboro.
Secretary..... D. AUG. VANDERVEER.....Freehold.
Treasurer.....JOHN B. CONOVER.....Freehold.

EXECUTIVE COMMITTEE.

JAMES H. BAIRD.....Marlboro.
DANIEL JONESFreehold.
DANIEL P. SMITH.....Freehold.

DELEGATES TO STATE BOARD.

GEO. L. DU BOIS (one year).....Tennent.
FRANK DENISE (two years).....Freehold.

DIRECTORS.

C. D. B. FORMAN Freehold.
H V. M. DENNIS.....Marlboro.
H. E. HULSEHART.....Lower Squankum.
E. A. SEXSMITH.....Como.
JOHNSON TAYLOR.....Ocean Grove.
JACOB V. CONOVER.....Baird.
GEO. W. BOWNE.....Middletown.
WM. M. CONOVER.....Colts Neck.
W. T. PARKER.....Little Silver.
WM. MORRELL.....Hazlet.
EDWARD SCHANCK..Holmdel.
GARRET B. CONOVER.....Englishtown.

REPORT.

BY D. AUG. VANDERVEER.

Three meetings have been held by the Board during the year, the first on February 19th, when Delegate L. F. S. Schanck read his report of the annual meeting of the State Horticultural Society.

Delegates Geo. L. Du Bois and J. H. Denise read their reports of the annual meeting of the State Board of Agriculture. Topics discussed: "Pork for Profit, or How to Raise the Pig," "Hog Cholera," by I. J. Blackwell, of Titusville, N. J.; "Discussion of the Game Law," by Hon. W. H. Reid; "Forestry," by Hal Allaire. Second meeting was held August 27th. Topics: "Fall Seeding of Grain and Grass Seed," "Experience with Cow Peas and Soja Beans," "Experience with Asparagus the Past Year," "Habits of the Potato Bug." At the annual meeting held November 26th, officers were elected for the ensuing year. The Directors made their annual report and President J. H. Baird delivered his annual address. George L. Gillingham, Lecturer of New Jersey State Grange, spoke on "Poultry from Farmers' Standpoint," and L. F. S. Schanck on "Sorghum as a Balanced Ration for Horses and Cattle." Farmers' Institutes were held under the auspices of the State Board, at Keyport, November 9th and 10th, and Allentown, December 13th. Both these meetings were well attended and much interest shown in the subjects discussed.

CROP REPORT.

Asparagus.—The cold and wet spring retarded the growth of asparagus. The yield was light, but prices good. In some sections the rust has prevailed and some beds have been taken out. Large quantities are grown for market and canning, mainly in the northern part of the county.

Corn.—Quality good.

Sweet Corn.—Largely grown for the seashore trade. Good yield and quality; fifty cents to \$1 per 100 ears.

Wheat.—Quality good.

Rye.—Quality of grain and straw good; price of straw very low, from \$5 to \$6 per ton.

Oats.—Very little grown in the county.

Hay.—Good quality.

Crimson Clover.—Fine yield; grown to plow under.

Apples.—Too cold and wet at time of blossoming.

Pears.—Blight not prevalent.

Grapes.—Those who sprayed their vines with the Bordeaux mixture saved their crop; unsprayed were destroyed by black rot.

Strawberries.—The leading varieties grown are the Gandy, Charles Downing and California Seedling.

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Raspberries.—Not as many raspberries and blackberries grown as formerly, on account of rust.

All melons were unusually fine during the season, the frequent rains making them large and of fine quality.

Cabbage.—Damaged by worms.

Cranberries.—The yield for the county about 20,000 bushels. Fine berries ; prices low.

LIVE STOCK.

There is very little change in the live stock condition from the past few years. Farmers do not raise many of their working horses ; they prefer to buy of dealers. There are several large stock-breeding farms in the county where fine blooded horses are raised ; prices are according to the speed developed. The number of cows kept varies but little. Where convenient to market, milk is sold, others fat calves, and a few make butter for market. There are two creameries in the county. Number of sheep and lambs about the same as last year. Poultry—turkeys and chickens—same as last year. One dealer in Freehold, one day before Thanksgiving, sold over 1,000 turkeys. Chickens are sold mostly during the season to hotels and families along the shore, at good prices, from eighteen to twenty cents per pound, alive, for early chicks ; for late or full-grown, ten cents per pound. The number of eggs sold is very large. There are several breeders of fancy poultry. Swine number same as last year. There are a few localities where the swine disease or hog cholera is prevalent. The herds that were first attacked were those that were sent to the shore to be fed on the refuse from the summer boarding-houses.

GENERAL REMARKS.

There is more demand for farms. Farms with good buildings bring from \$50 to \$125 per acre, small farms from sixty to one hundred acres preferred. The leading money crops are potatoes, hay and fruit. Most farmers practice mixed farming near the shore ; convenient to the New York boats, market-gardening is practiced. There are four canning establishments in the county ; one at Freehold cans peas, beans, beets and spinach, which uses the product of seven hundred acres, with two crops per season on a large part of the land. One factory at the Phalanx and two near Red Bank can tomatoes, asparagus, peas, fruit, &c., and do a large business. There are a

number of greenhouses where lettuce is extensively grown for the New York market, at high prices. Two large nurseries—one at Baird, owned by D. Baird, and one at Little Silver. The J. S. Lovett Company do a very extensive business. There are other smaller nurseries in the county.

MORRIS COUNTY.

OFFICERS FOR 1899.

President OSCAR LINDSLEY.....Green Village.
Secretary W. F. ELY.....Madison.
Treasurer..... WESLEY D. HOPPINGHanover.

BOARD OF DIRECTORS.

WILLIAM JAMES.....Chatham Township.
S. E. YOUNG “ “
L. J. FISH..... “ “
JAMES COOK.....Hanover “
B. S. CONDIT..... “ “
S. M. HOPPING..... “ “
J. J. MITCHELL..... “ “
JOHN OLIVER.....Passaic “
W. B. LINDSLEY “ “
N. D. GOBLE “ “

DELEGATES TO STATE BOARD.

W. F. ELY (two years)Madison.
OSCAR LINDSLEY (one year).....Green Village.

No report furnished.

OCEAN COUNTY.

OFFICERS FOR 1899.

<i>President</i>	CHARLES MILTON RORER.....	Cassville.
<i>Vice President</i>	PATRICK DAVITT	Toms River.
<i>Treasurer</i>	H. R. WILLS.....	“
<i>Secretary</i>	M. G. POHL	“

DIRECTORS.

E. E. APPLGATE.....	Toms River.
S. GIBERSON.....	“
J. POST.....	“

DELEGATES TO STATE BOARD.

H. R. WILLS (one year).....	Toms River.
CHARLES M. RORER (two years).....	Cassville.

REPORT.

BY THE SECRETARY.

During the year 1898 the Board held but two meetings. The first meeting took place in February, 1898, at which the delegates made a full report of the transactions of both the State Board of Agriculture and the Horticultural Society, after which a discussion of the most interesting points followed.

The second meeting was held September 3d. The exhibition of products was postponed on account of many of the crops being very backward this season and the samples unsatisfactory for exhibition.

The Board expressed its thanks for assistance from the State Board.

The results of seeds distributed by the Agricultural Department furnished some discussion. Of all the different varieties, the “Queen” tomatoes were the most satisfactory. The vines were strong, bearing very prolific, fruit early and lasting, size over medium, smooth, well shaped, flesh firm, flavor delicate, and for canning is much preferred to other varieties.

Mr. W. H. Ellis raised the question, "How are we to arrest the destruction of cabbage by insects?" Mr. H. R. Wills stated that he places a pan or pans with water in the field. In this water he pours some coal oil, in the center he places half a brick, upon which he places during the night a lantern. The insects are attracted by the light, fall into the oil and die.

Mr. Ellis and Mr. Post drew the attention of the Board to sheep culture and the injuries done by dogs. As long as dog taxes are not strictly enforced, so long will it be impossible for farmers to raise sheep successfully. Hundreds of worthless curs cruise the country night after night, destroying game, and a flock of sheep exposed would be soon destroyed. Tax every dog, and compel the owners to pay the same.

The third meeting was called for October 22d. No quorum, owing to sickness.

There are no creameries in the county. Three men are engaged in the dairy business near Toms River and five near Lakewood, with a total of 178 cows; there are others with smaller dairies.

We have no canning establishments. Several farmers are engaged in market-gardening and a few in small-fruit culture. Mr. Mac-Bean, florist, of Lakewood, has a greenhouse comprising 40,000 square feet of glass, and gives steady employment to eleven men.

There are no farms devoted exclusively to stock-raising. A few farmers are engaged in poultry production. Mr. Herman Fuhr, of Toms River, raises high-bred homing pigeons, among which he has some having a 500-mile record. There are no nurseries in the county.

Fifty to seventy dollars is the average price for farm lands. There are but few unimproved farms. The number of worthless dogs which are allowed to run at large proves a great hindrance to sheep-raising. Not half enough swine are raised for home consumption.

SALEM COUNTY.

OFFICERS FOR 1899.

<i>President</i>	RICHMAN COLES.....	Woodstown.
<i>Vice President</i>	ELMER H. SMITH.....	Salem.
<i>Secretary</i>	H. C. PERRY.....	Friesburg.
<i>Treasurer</i>	REEVES FLITCRAFT.....	Woodstown.

DIRECTORS.

RICHMAN COLES.....	Woodstown.
ELMER H. SMITH	Salem.
H. C. PERRY.....	Friesburg.
REEVES FLITCRAFT.....	Woodstown.
EDWIN L. BORTON.....	Woodstown.
M. D. DICKINSON.....	Woodstown.
C. R. LOVELAND.....	Cohansey.
THEODORE HOLTON.....	Sharptown.
JESSIE L. COLSON.....	Woodstown
B. F. STRAUGHEN.....	Pedricktown.
SAMUEL FLITCRAFT.....	Pittsgrove.
HARMON HITCHNER.....	Elmer.

DELEGATES TO STATE BOARD.

RICHMAN COLES (one year).....	Woodstown.
S. JACKSON MORGAN (two years).....	Woodstown.

SOCIETIES REPRESENTED.

Salem County Pomona Grange, No. 6.
Woodstown Grange, No. 9.
Course's Landing Grange, No. 60.
Friesburg Grange, No. 81.
Naturalist Field Club, Woodstown.

REPORT.

BY H. C. PERRY.

The Salem County Board of Agriculture held three meetings during the year, all at Woodstown. At the annual meeting January 26th, Richman Coles gave a very interesting report of the twenty-fifth

annual meeting of the State Board. Franklin Dye addressed the meeting ; subject, " Profit." Then followed a discussion on the subject of hog cholera, and also on the use of the Babcock milk test. At the next meeting, April 27th, Louis Schaible, of Shiloh, gave a lengthy report of the annual meeting of the State Horticultural Society. A paper by Prof. E. B. Voorhees on " Tomato Culture " was read, and the subject discussed by the members.

The question, " What is the Best Method of Replenishing our Dairies and the Best Feed for Raising Calves for the Same?" was opened by Louis Schaible. He said he considered it cheaper to raise calves than to buy cows.

Reeves Flitcraft read a paper on the same subject, as follows :

Mr. President—I have been requested to give my experience in replenishing dairy cows. I select the best male to be found, as that means one-half of the battle to begin with. I prefer the Jersey or Guernsey ; the latter is more preferable, as the animals are larger and stronger than the Jerseys, and produce higher-colored milk. Many people taste with their eyes. Then select from your choice cows the females. Teach them to drink when quite young, as they will learn sooner—say two or three days old. Give two or three quarts morning and evening on the start. When about ten days old commence with the separator milk. I prefer to have the milk boiled, as it seems to agree with them better. Increase the quantity as the calf grows older. I feed the calves according to conditions. As the calves grow older I like to increase their digestive capacity by filling their stomachs, as you all know the profitable cow is the one that can digest a large quantity of milk-producing foods. As yet, I give nothing in summer but milk and grass, and in winter milk, stalks, hay and ensilage. I always try and keep the calves thrifty and growing as fast as possible, but guard against having them too fat, as you are aware that, as a rule, the fat cow is not a good milk-producer.

I will say, further, after a calf has a good start on milk, say eight or ten months old, my feed in winter consists of stalks, hay and ensilage, with no grain, as I have found by experience that the animals will come through the winter in a thrifty condition.

I would certainly recommend raising your own cows, and not depend on purchasing your dairy cows. Every cow on my farm was raised there from calves.

At the next and last meeting, July 27th, M. D. Dickinson read a paper by Elmer Duell on the " Cost of Raising a Calf Until It

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Becomes a Cow." Mr. Duell's figures were \$34 at two years of age. Reeves Flitcraft read a paper on the same subject; his figures were \$40. Reuben Woolman, of Elmer, read a paper on "Growing Early Potatoes." A. W. Borton, of Mullica Hill, gave a talk on "Growing, Storing and Feeding Turnips to Stock." The advantages of growing crimson clover were also discussed at this meeting.

CONDITION OF AGRICULTURE.

The year just closed has not been so favorable for the farmers of this county as had been hoped.

Corn was about an average crop.

Wheat not so good as last year.

Oats a light crop.

Hay nearly up to the average.

White Potatoes a light crop.

Sweet Potatoes an average yield, but prices low.

Apples a light crop.

Pears above the average.

Peaches about three-fourths of a crop.

There were but few *Grapes*.

Strawberries an average yield.

Raspberries only about one-half.

Blackberries a full crop.

Watermelons and Citrons an average crop.

Cucumbers about three-fourths of a crop.

Early *Cabbage* good, but late *Cabbage* almost a failure.

Tomatoes looked very fine until the vines had attained nearly full growth, when the heavy rains came, which destroyed the first bloom, and by the time the next bloom came it was too late for ripening and in consequence the crop was light, but the prices were higher, which partly compensated for the shortage.

Canning.—There are numerous canneries in the county that put up annually large quantities of tomatoes, a few of which I am able to report as follows: Lower Alloways Creek reports 8 canneries, with an annual average pack of 1,674,600 cans; Pilesgrove, 5 canneries, annual pack, 1,800,000 cans; Quinton, 3 canneries, annual pack, 1,525,000 cans; Lower Penns Neck, 1 cannery, annual pack, 600,000 cans. They paid \$7 per ton for tomatoes, an increase of \$1.50 from last year.

DAIRYING.

Dairying is one of the most important industries in the county. I am able to report from five townships as follows: Pilesgrove reports about 110 farmers engaged in dairying, 3 creameries, using 4,245,000 pounds of milk annually. Lower Alloways creek reports 62 farmers, 498 cows, 1 creamery, using 564,140 quarts of milk annually. Quinton reports 26 farmers, 442 cows. The milk is sold in Quinton, Salem, Camden, Atlantic City and Ocean City. The net price received for milk per quart at the creamery, 2 cents; Camden, $2\frac{1}{2}$ cents; Philadelphia, $2\frac{1}{2}$ and 3 cents; Salem 2 to 3 cents; Atlantic City, 3 cents; Ocean City, $2\frac{1}{2}$ and 3 cents; Quinton, retail, 4 cents. Lower Penns Neck reports 12 farmers who sell milk in Salem. Elsinboro reports about 25 farmers, 300 cows. Oldmans reports 4 dairymen.

Farms.—There are no abandoned farms reported in the county, and but few changing owners. The average price of average farm land, with good buildings, is \$60 per acre.

SOMERSET COUNTY.

OFFICERS FOR 1899.

PresidentJOSEPH FITZGA.Somerville.
First Vice President.....PETER W. WIKOFF.....Millstone.
Secretary and Treasurer.....ARTHUR P. SUTPHEN.....Somerville.

DIRECTORS AND VICE PRESIDENTS.

C. MARTIN WIKOFF.....Bedminster.
WILLIAM C. LANE.....North Branch.
JOHN A. LAYTON..Liberty Corner.
WILLIAM V. LAYTON.....Liberty Corner.
DR. J. D. VANDERVEER.....North Branch.
LOUIS H. SCHENCK.....Neshanic Station.
WILLIAM J. LOGAN.....Somerville.
JAMES J. QUICK.....Somerville.
ARTHUR RANDOLPH.....South Bound Brook.
ABRAM B. VOORHEES.....Middlebush.
PETER SUTPHEN.....Hillsborough.
HENRY S. VAN NUYS.....Millstone.
S. S. VOORHEES.....Blawenburg.
ERNEST C. TAGGART.....Griggstown.
CHARLES F. DE BELE.....Plainfield.
A. P. VOORHEES.....Plainfield.
HON. E. E. COOPER.....Plainfield.
HENRY ROGERS.....Plainfield.

DELEGATES TO STATE BOARD.

W. HENRY ROGERS (two years)Plainfield.
ERNEST C. TAGGART (one year).....Griggstown.

REPORT.

BY A. P. SUTPHEN, SECRETARY.

I have the honor to report that State Senator Reed and Assemblyman-elect Cooper are both members of our Board. At the last session of our Legislature there were several laws passed in the inter-

est of the farmer. Among them we particularly refer to the increase of appropriations for stone roads from \$100,000 to \$150,000; an increase of the appropriation to defray expenses incident to contagious diseases in cattle to \$10,000; amendments to the game laws, authorizing farmers to destroy animals doing damage to crops, and protecting farmers against trespassers of various characters; the law prohibiting the use of adulterated linseed oil, insuring pure feed for stock, and also securing the passage of the act whereby unfair assessments in other counties can be inquired into, so that taxes not properly assessed in any locality may, upon the complaint of Somerset county, have their assessments examined and corrected as justice may require. Somerset county has been paying an excess of \$2,400 a year over what it received. This is wrong and unfair. An attempt was made to correct this, but unfortunately it failed. This matter ought to be persisted in until made right.

This Board has an active, contributing membership of one hundred, and during the year has held four meetings, as follows: Annual meeting at Millstone, December 6th, 1897; March 12th, May 21st and August 27th, 1898, at the Court House. The meetings have been well attended and an increased interest manifested. The management adopted the plan of giving certain subjects to members of the Board, requesting them to open the subject in an address of ten minutes. The programmes were prepared and well distributed throughout the county, consequently the meetings were well advertised and brought out good audiences.

At the meeting held May 21st the programme was as follows:

First. "Sugar-Beet Growing for Profit." Speaker, William H. Rogers.

Second. "Asparagus-Growing for Profit." Speaker, Runyon Field.

Third. "Crimson Clover." Speaker, Henry S. Van Nuys.

Fourth. "Preparing Ground for Corn." Speaker, Thomas C. Stryker.

The speakers made carefully-prepared, thoughtful and intelligent addresses, and opened their respective subjects so that general discussion followed, making the meeting one of interest and profit.

At the August meeting, which was conducted in the same manner, Mr. Runyon Field gave an address on "Potato Culture," Mr. Peter W. Wikoff on "Wheat Culture," Mr. Randolph on "Raising Strawberries," Mr. C. W. H. Burroughs on "Bees for Profit."

These gentlemen are all practical and successful farmers. Their

remarks were made from practical experience, and their advice was thoughtfully considered and well received.

This is a valuable help to the members, and shows at once the value of organization and consultation, forcibly presented in the following, cut from an exchange: "Farmers could protect themselves by organization. Let them combine and handle their own products direct. The fruits of their labors should go to swell their own bank accounts and the bank accounts of those depending upon them for support, and not to one-man cornerer of grain. Farmers, organize all over the United States! Let the Eastern farmer keep in touch with his Western brother, refuse offers that come from outside parties, do their business through each other, and make the profits direct. Do away with one-man combination that has for many years cornered your grain, the people dependent thereupon for life and cornered you, the farmer, worst of all. Own your own agencies, handle your own markets and thereby own your own homes, where you and your families may dwell happily together without fear of the bond-clipper, note-discounter or commission merchant who all too often brings you in debt for produce shipped to the city."

We believe that proper organization will go a great way toward correcting the "hard times" cry of the farmer. In comparing the products of the farmer this current year with that of last, we find it favorable to the farmer. The estimate for crop yields will be found in the State statistical table. Peaches, an important fruit product in this county, although a comparatively light crop, sold for more money than in several years. That the farmers have received more money for their products this year than last, is evidenced by the fact of bringing more money to the county seat, and a better feeling is observed. Public improvements in the matter of public roads are encouraging to the farmers, and they are coming to believe that their interests are being considered both by the lawmaker and town citizen.

The question of taxes must be considered. Taxes are now becoming burdensome, and it is a question whether the present generation should be taxed at such an excessive rate, thus keeping them poor and greatly in debt, or whether bonds for improvements should be issued, and let future generations assist in paying for benefits that they will obtain by inheritance.

Valuable assistance has been rendered our Board by the attendance and addresses of Prof. E. B. Voorhees, of New Brunswick, and Secretary Dye, of the State Board.

Two orchards in Bedminster township, infested with San José scale, have been destroyed under direction of State Entomologist Prof. John B. Smith, of New Brunswick. His promptness in making an examination, when requested, gave him the confidence of the farmers in the neighborhood, as well as of the owners of the infested orchards, who at once consented to destroy the trees and so to prevent the spread of the pest.

In closing this report I desire to say that the Somerset County Board has been a source of advantage to the many farmers who have availed themselves of membership, and I believe that through organization the average farmer feels nearer the law representatives, and so has additional confidence that they will consider his interests. Therefore there ought to be a membership of at least five hundred. My hope is that the year to come will be fruitful of large returns to the farmer, and that his income may be larger and his taxes no greater.

SUSSEX COUNTY.

OFFICERS FOR 1899.

<i>President</i>	NELSON DE WITT.....	Deckertown.
<i>Vice Presidents</i>	{ THOMAS ROWE	Augusta.
	{ LEBEUS MARTIN.....	Deckertown.
<i>Treasurer</i>	GEORGE VANDRUFF	Deckertown.
<i>Secretary</i>	WILLIAM H. LEPORT... ..	Deckertown.

DELEGATES TO STATE BOARD —J. A. McBride (two years), Wm. H. Leport (one year).

REPORT.

BY THE SECRETARY.

At the last meeting of the Sussex County Board there was but a small attendance and a short discussion of farm topics.

The season of 1898 opened favorably in the spring for growing crops, but was too wet for early plowing, which delayed the sowing of oats until late in the season.

The late frosts and the excessive wet weather, followed by dry, are undoubtedly what ruined the apple crop. Early-blooming fruits suffered from the frosts.

CROPS.

Wheat was about an average crop in straw and grain, and owing to the high prices of last season there seems to have been a larger acreage sown, and as the price has dropped back again and the farmers did not realize as much as they expected, they have not sown so large an acreage this fall.

Rye is about an average crop, though not near as large as last year, particularly in the amount of straw.

Oats not more than one-third of a crop; owing to unfavorable weather and blight the straw was short and the grain light.

There was a larger acreage of buckwheat sown than last year, but the yield was not as large nor the quality so good.

Corn was a large crop in this county, particularly the late planting. The acreage of this crop seems to be on the increase, owing to its feed value.

Dairying is yet the leading occupation of this county, though owing to low prices the dairyman receives for his product, he has in a measure been forced to engage in some other kinds of farming. The prices remain low, even when there is a scarcity of the product, the middlemen and creamerymen get the whole thing and give the farmer what they choose, which is not much, and it seems impossible for the farmers to get together and demand their share of profits. Though the price of milk is low, cows sell high, so that those that are raising their own stock and those that breed for market seem to be on the top at present.

The peach industry, which has grown to be one of the largest occupations of the farmers of this county, was a light crop this year, but the prices were very satisfactory.

Small fruits were generally a good crop, particularly strawberries, blackberries being about the average, both in quality and quantity.

The poultry business is increasing largely, and there are many flocks that are a credit to their owners.

Farm help becomes more scarce every year and wages are high, as compared with the price the farmer receives for his produce.

Secretary Leport reports twelve creameries in the county and gives, for three townships, a total of farmers engaged in the dairy business 108, with an average number of cows in each of 19. Total for all, 2,118. The above list of dairymen sell their milk at the creamery or ship to New York or nearby cities, with the exception of three who sell in Deckertown; a few make butter.

Another list is given, township not named, comprising 72 farmers, with an average of 30 cows in each dairy. Total, 2,178. A report also is given from Sandyston township, stating that there are no creameries in the township, but gives the names of 30 farmers who are engaged in the dairy business, with an average of 14 cows to the dairy. Total, 420.

Adding the three lists together gives number of cows reported to be 4,716, and it would be an interesting report were we able to state for each county the total number of farmers engaged in dairying, number of cows for the State and the output of each dairy.

UNION COUNTY.

OFFICERS FOR 1899.

<i>President</i>	E. P. BEEBE.....	Elizabeth.
<i>Vice President</i>	GIDEON E. LUDLOW.....	Cranford.
<i>Secretary and Librarian</i>	F. E. WOODRUFF.....	Cranford.
<i>Treasurer</i>	OGDEN WOODRUFF	Elizabeth.

DIRECTORS.

D. G. FINK.....	Westfield.
J. E. BREWER.....	Westfield.
D. T. MAGIE.....	Lorraine.

DELEGATES TO STATE BOARD.

F. E. WOODRUFF (two years).....	Cranford.
E. P. BEEBE (one year).....	Elizabeth.

ALTERNATES

OGDEN WOODRUFF.....	Elizabeth.
J. E. BREWER	Westfield.

REPORT.

BY THE SECRETARY.

The Union County Board of Agriculture has held eleven meetings during the year ending December 1st, 1898, with an average attendance of about seven, which meetings were held in January, February, March, May, November and December. Among the subjects discussed by the Board were: "Cultivation of Trees," "Hay Farming," "San José Scale and Other Insects," "Cultivation and Care of Orchards and Small Fruit."

The Farmers of Union county seem to take but little interest in this Board. The meetings are attended by a few of the best farmers, who realize the advantage of having such an organization. The condition of agriculture in the county is about the same as last year. Farmers complain a great deal of the low prices of produce.

CROP REPORT.

The corn crop was large, but the severe windstorms damaged it greatly. Wheat and rye yielded well, as also did oats. The hay crop was the largest one of a number of years, consequently prices have been low.

Owing to the very wet spring, potatoes rotted badly in the ground before coming up, hence the crop was very small; not so large as last year.

Apples, pears and peaches each yielded a small crop, particularly apples.

The strawberry crop was normal, but the prices were so low it scarcely paid to market the fruit.

Union county has no creameries, and no butter to any extent is made, the milk being sold either wholesale or retail in the cities and large towns. About 500 of our farmers are engaged in the dairy business, getting from three and one-half to seven cents per quart for their milk.

At Elizabeth there is one tomato canning establishment, operated by E. B. & W. A. C. Earl, who pack 15,000 dozen annually.

About 100 farmers are engaged exclusively in market-gardening, and fifty engaged in raising small fruits.

There are about twenty-five florist and greenhouse establishments.

Jonathan Townley, of Elizabeth, raises mushrooms, and Justice Morris, of Elizabeth, raises squabs for market.

We have five nurseries—Flerner & Felmy, of Springfield, 200 acres, with output of from 30,000 to 35,000 a year; Elizabeth Nursery Company, fifty acres, output of from 20,000 to 30,000 a year; E. P. Beebe, of Elizabeth; T. A. Ball, of Westfield, and H. T. Jones, of Elizabeth.

Farm lands with good buildings are worth from \$100 to \$500 per acre. Probably one-third of land of the county is unimproved—held by capitalists or speculators.

WARREN COUNTY.

OFFICERS FOR 1898-99.

<i>President</i>	WILLIAM C. ADDIS	Delaware.
<i>Vice President</i>	JOHN N. RACE.....	Washington.
<i>Secretary</i>	WILLIAM EUGENE OBERLY.....	Broadway.
<i>Treasurer</i>	OWEN OBERLY.....	Stewartsville.

DIRECTORS.

W. O. WARD.....	Hainesburg.
S. READ	Mount Hermon.
A. D. ROSEBERRY.....	Belvidere.
HENRY PURSELL	Phillipsburg.
A. F. RUSH.....	Stewartsville.
DANIEL FITTS	Washington.
ALBERT FLEMING.....	Stephensburg.

DELEGATES TO STATE BOARD.

B. R. CLIFFORD (two years)	Delaware.
WILLIAM C. ADDIS (one year).....	Delaware.

REPORT.

BY B. R. CLIFFORD

The meetings generally have had a larger attendance than heretofore and the interest much better.

With warm weather during March the hopes of the husbandman were highly elevated, but April was the most disagreeable recorded here, greatly retarding the sowing of oats and corn-planting.

With an unusually wet spring and early summer, there was a serious drought the last of July and early August. Notwithstanding these serious drawbacks there were several crops that were very satisfactory.

Wheat, though variable, was, upon the whole, a full crop.

Rye above the average in straw.

Hay medium. Many meadows were too wet to produce their annual crop. The early crop was gathered in fine condition, but the late was badly damaged.

Oats was the poorest crop in many years. The wet, cold spring seemed to prevent growth, while weeds of all kinds made an unusual growth, choking out the crop, showing conclusively that a wet, cold May does not always produce large crops of oats and hay.

Corn was so delayed in planting that a large part was badly damaged by wind and storm, still it produced a fair crop.

Potatoes were very poor, many were a total failure and but few secured a half-crop. Blight and drought were the main causes of failure.

Apples in the northern part of the county were a fair crop, but almost a total failure in the southern. The cause seemed to be the difference in the time of blooming. Prices were good, making this one of the most profitable crops grown, and many will increase their plantations.

Pears a medium crop, the Keiffer being about the only kind that produced fruit in paying quantities.

Peaches were about a total failure. There are as many theories in regard to the cause as there are peach-growers.

Strawberries wintered in very fine condition, but the heavy frost and freeze just as they began to bloom destroyed many and caused more to grow imperfect, which somewhat reduced the price, which was low. Many quit picking on account of price, and the acreage will be very much reduced the coming year.

Blackberries grown chiefly for home use.

Raspberries wintered all right, but the drought of June caused a total failure, with the exception of the reds. These were a partial crop, and sold readily for large prices.

Melons were a large crop; quality best to medium; prices were fair, with quick sales.

Sweet Potatoes, fine crop and superior quality; prices low.

The acreage of *Celery* is continuously on the increase, and there is no doubt that this county is destined to become a great celery center.

Late *Cabbage* was a total failure. Early was a fair crop, but did not bring remunerative prices.

Early *Tomatoes* were badly affected by blight; late-planted were a medium crop and brought good prices.

The demand for first-class horses is on the increase, and at remunerative prices.

WARREN COUNTY.

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Milch Cows.—The demand is still large and prices still advancing. Growing young stock is now very profitable.

Milk production is still the farmer's main dependence in a large part of the county, but cheap freight, cheap feed, &c., give our Western friends a great advantage over us.

Pork has not been profitable, light pork selling the past week for from four to four and a half cents per pound, dressed weight.

Poultry is increasing gradually and is profitable. In fancy stock this county is second to none, as reports of the various fairs show that a large number of first awards came to exhibitors from this county.

Sheep.—Those who held on to their stock through the pinch are now receiving their reward ; prices are high and demand increasing.

Farm help is becoming less, as manufacturers are increasing their output.

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