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T. S. GOLD, Secretary,

West Cornwall, Conn.

State of Connecticut.

SEVENTEENTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

Connecticut Board of Agriculture.

1883-84.

Printed by Order of the Legislature.

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1884.

STATE BOARD OF AGRICULTURE.
1883-84.

HIS EXCELLENCY THOMAS M. WALLER, *ex officio.*

APPOINTED BY THE GOVERNOR AND SENATE.

		TERM EXPIRES.
ALBERT DAY,	Brooklyn,	1885.
J. P. BARSTOW,	Norwich,	1885.
J. W. ALSOP,	Middletown,	1884.
S. B. WEST,	Columbia,	1884.

ELECTED BY THE AGRICULTURAL SOCIETIES.

Hartford County,	J. S. KIRKHAM,	Newington,	1884.
New Haven County,	LEVI E. COE,	Meriden,	1885.
New London County,	JAMES A. BILL,	Lyme,	1885.
Fairfield County,	E. R. WHITTLESEY,	Danbury,	1884.
Windham County,	ALEX. WARNER,	Pomfret,	1884.
Litchfield County,	J. LEROY BUCK,	New Milford,	1884.
Middlesex County,	J. M. HUBBARD,	Middletown,	1885.
Tolland County,	E. H. HYDE,	Stafford,	1885.

ELECTED BY THE BOARD.

T. S. GOLD, West Cornwall, *Secretary.*

OFFICIAL LIST.

Governor THOMAS M. WALLER, *President.*

J. P. BARSTOW,	Norwich,	*Vice-President.*
T. S. GOLD,	West Cornwall,	*Secretary.*
NATHAN HART,	West Cornwall,	*Treasurer.*
Prof. S. I. SMITH,	New Haven,	*Entomologist.*
Dr. E. H. JENKINS,	New Haven,	*Botanist.*
Prof. S. W. JOHNSON,	New Haven,	*Chemist.*
P. M. AUGUR,	Middlefield,	*Pomologist.*

E. H. HYDE, T. S. GOLD, J. W. ALSOP,
Commissioners on Diseases of Domestic Animals.

JAMES A. BILL, J. M. HUBBARD, ALEX. WARNER,
Auditors.

To the General Assembly of Connecticut:

In accordance with the provisions of the Act creating a State Board of Agriculture, I have the honor to present the Report for 1883–84.

T. S. GOLD, *Secretary.*

West Cornwall, January 9, 1884.

REPORT.

The Sixteenth Annual Meeting of the Connecticut Board of Agriculture was held at Room No. 50, Capitol, Hartford, Wednesday, January 10, 1883, at 10 A. M., Vice-President, J. P. Barstow chairman.

The report of the Treasurer was read and accepted.

Messrs. Alsop, Day, and West were appointed a committee on credentials, and reported E. H. Hyde as member elect for Tolland County, J. M. Hubbard for Middlesex County, J. A. Bill for New London County.

No certificate was presented of the reported election of a successor to Mr. Webb from New Haven County, and on motion of E. H. Hyde, the Secretary was directed to correspond with the New Haven County Agricultural Society to obtain certificate of member from that County.

Messrs. Alsop and Hubbard were appointed a committee to wait on Governor Waller and invite his attendance.

The committee reported that Governor Waller had not arrived in the city.

Officers were then chosen as follows, the Governor being *ex officio* President:

Gov. Thomas M. Waller, President.

J. P. Barstow, Norwich, Vice-President.

T. S. Gold, West Cornwall, Secretary.

The report of the Treasurer was then read, referred to the auditors, and on their approval it was accepted.

N. Hart, West Cornwall, Treasurer.

Prof. S. W. Johnson, New Haven, Chemist.

Dr. E. H. Jenkins, New Haven, Botanist.

Prof. S. I. Smith, New Haven, Entomologist.

P. M. Augur, Middlefield, Pomologist.

Commissioners on Diseases of Domestic Animals, E. H. Hyde, T. S. Gold, J. W. Alsop.

Auditors, J. M. Hubbard, J. A. Bill, Alex. Warner.

E. H. Hyde, Trustee Storrs Agricultural School 1 year, T. S. Gold, Member of Board of Control of Experiment Station for 3 years from July, 1883.

Messrs. Gold and West were appointed a committee to arrange time, place, and subject for winter meeting.

On motion of Mr. Day,

Resolved, That the Vice-President and Secretary arrange for visiting Fairs by Delegates.

Resolved, That the Cattle Commissioners be authorized to employ such veterinary assistance as may be necessary.

Resolved, That an appropriation of fifty dollars be paid to P. M. Augur, Pomologist.

James R. Bill presented to the Board, from the editor, J. Buckingham, volumes 1 and 2 of the Devon Herd Book.

On motion of E. H. Hyde, the Secretary was directed to return the thanks of the Board to Mr. J. Buckingham for his valuable present.

The Board then adjourned *sine die*.

T. S. GOLD, *Secretary*.

WEST CORNWALL, Jan. 11, 1883.

A special meeting of the Board was held at the Scovill House, Waterbury, December 18, 1883, at 8 P. M. Hon. Albert Day, chairman.

The Secretary reported the death of the Treasurer, Mr. Nathan Hart.

On motion of Mr. Kirkham, the Secretary was directed to prepare appropriate resolutions to the memory of the late Treasurer.

On motion of Mr. Bill,

Resolved, That the sum of one hundred dollars be paid to the widow of the late Treasurer.

Resolved, That the sum of twenty-five dollars be paid to the Treasurer of the Board, beginning at the annual meeting in January.

Resolved, That the Secretary be Treasurer *pro tem*, till the annual meeting.

The following resolutions reported by the Secretary were passed by the Board.

Resolved, That in the death of Mr. Hart, the Board recognize their serious loss in being deprived of the services of a faithful and efficient officer.

Resolved, That we desire to present to the family of the deceased this testimonial of our esteem, and the high consideration in which his services have been held by us, as an expression of our sympathy with them.

Resolved, That the Secretary be directed to furnish a copy of these resolutions to the family of the deceased, and that they be entered on the Records.

The meeting then adjourned to the call of the Secretary.

At a special meeting of the Board held at Waterbury, December 21st, at 2 P. M.,

Resolved, That the annual meeting be held in Hartford, the second Wednesday of the session of the General Assembly.

Adjourned *sine die*.

T. S. GOLD, *Secretary*.

WINTER MEETING.

The Annual Farmers' Convention, under the auspices of the Board, was held at Waterbury, December 19, 20, and 21, 1883. The attendance, even on the first day, notwithstanding the inclement weather which prevailed, was quite large, and increased at each session, and a very gratifying degree of attention and interest was manifested in all the proceedings.

The opening meeting was called to order in the City Hall at eleven o'clock on Wednesday, December 19th, by Mr. J. P. Barstow of Norwich, Vice-President of the Board, who said:

Gentlemen:—The hour having arrived at which this meeting was called, the opening prayer will be offered by the Rev. Dr. Anderson, of Waterbury.

Prayer.

O God, who hast created all things, and dost uphold all things by the word of thy power, we come before thee with reverence, with thanksgivings, desiring to recognize thy presence, and to bow before thee as humble suppliants. We recognize thy presence in the world around us, in the revolving seasons, in the laws by which all things are governed. While paying homage to those laws, we would think of thee, who art behind them, and to whom they are the expression of thy purpose, of thy goodness, of thy loving kindness. May they be to us the expression of the divine goodness, of the divine wisdom, and may we reverence thee in all the experiences of our lives. We pray, O God, that we may yield ourselves to thy guidance, and in all the affairs of life may we learn to ask what wilt thou have us to do? We thank thee for the changing seasons, for summer and winter, for sunshine and storm. We thank thee for the fruits of the earth, for we know that all these things come of thy great plan, which embraces us all. We recognize thy goodness, we look up to thee as our father, and we pray, O God, that thy fatherly love may be continually recognized by us, and that we may learn to live as thy children

We pray, heavenly Father, that thy blessing may be upon the Board of Agriculture of this State, and that thou wilt be in the midst of this Convention which they have called together, so that every word that is spoken may be spoken in the right spirit; that we may have wisdom, that we may have the spirit of peace; that we may have the spirit of the learner, desiring to know more and more of those great laws by which all things are governed, and desiring to bless the society in which thou hast placed us. While we prize these gifts of the earth, may we consider that the thing to be prized above all is human life, human society, human progress, and grant that we may so coöperate as to secure the progress of this Commonwealth, and especially progress in the farm life of this Commonwealth; so that the old foundations may remain unmoved; so that the people of the country as well as the cities may flourish like the grass of the earth; so that if there be "a handful of corn in the earth on the tops of the mountains, the fruit thereof may shake like Lebanon."

Our heavenly Father, wilt thou bless all those to whom are intrusted the interests of this organization; be with them in all that they do; fill their hearts with thy love and peace; and may this Convention be a blessing to this city, to those friends who have come together, to our Commonwealth, and to this land which we love.

Hear us, O God; forgive all our sins, and accept us as thy children, for the Redeemer's sake. Amen.

OPENING ADDRESS.

By J. P. Barstow.

Gentlemen of the Connecticut Farmers Institute:—I had hoped we should have His Excellency Governor Waller here to open this Institute, as I know he would have spoken words to you that would have given you much pleasure to listen to, but I hope he will be here at some of our meetings, that we may hear his eloquent voice.

Gentlemen, we meet in this thriving manufacturing city to consider the interests of Agriculture, and it is appropriate that we do meet here, for Agriculture and Manufactures must go hand in hand. Each is dependent upon the other, as without the products of the farm the manufacturer could not live, and without the manufacturer and mechanic the farmer could not sell his products. So each is dependent upon the other; the great law of dependence runs through all the affairs of this life.

What can elevate or in any way benefit the farmer, will also benefit all other avocations.

These farmers' meetings have been the means of great good in the past, and I doubt not this will be quite as profitable as any of its predecessors, as we have those to speak to us who will tell us much that will be profitable to hear, and we hope in the discussions that follow the lectures we shall have a free expression of opinion from all who can add to the interest of the meeting.

When we consider that agriculture is not only the corner-stone, but the whole broadside of the country's financial foundation, when we estimate the army of men engaged in tilling the soil, and the millions of money its products represent, surely it is entitled to the aid of both the National and State Governments.

The men who are trying to elevate to a higher standard the farming interests of this country, are doing a good work, and should be hailed as the benefactors of their race.

Let us have a free interchange of ideas. Let each one, if he has a better way of conducting his farming operation than others, make it known, so by thus comparing experiences we shall make this meeting a source of mutual benefit.

Connecticut farmers cannot expect to compete with the West in raising wheat, corn, and beef for the world, but they can raise that which will return them a fair compensation for their labor, if they will only learn what they can best cultivate, and by intelligently improving their farms, be quite as independent as their western brethren, and enjoy the pleasures of a New England home.

I suppose that it is *one great object* of these meetings to learn how to do this successfully. Let us all try to do all in our power to help the agricultural interests of Connecticut.

When we think of the wonderful progress and development of agricultural and mechanic arts the past fifty years, we can hardly realize that as much may be done in the years to come.

There is one great problem to be solved, that will be as wide-spread in its beneficial results, as anything of the past, and one that must be solved if we are to become a great and populous nation, and that is, the utilizing of the sewerage of our cities and all populous communities.

When some one discovers an inexpensive and thorough way for taking back to the soil all the vast waste of fertilizers now polluting all our streams, not only destroying all animal life in them, but spreading disease and death to all who inhabit their shores, whoever does this will supply the *great need* of this age,—and it must be done soon, or *disease* and *death will depopulate* faster than we can increase. I hope this subject will receive the consideration its importance demands. It is a vital question, and must be met, and I do not doubt but a way will be found to remedy the evil. Its importance cannot be over-estimated.

The experiment at Pullman, near Chicago, is reported to be a great success. The results of using the sewerage as a fertilizer paying a good dividend on the cost of carrying it to the land.

It has always been our good fortune, that each great need of our country has found an inventor standing ready to meet it, and I doubt not this will.

Congratulating the Institute on the auspicious opening, I will not detain you longer.

Mr. P. M. Augur, our Pomologist, will now address you, giving his ideas as to the proper manner of growing peaches, under the title of "Peach Experiences."

PEACH EXPERIENCES.

By P. M. Augur.

While different climes have their delicious fruits which are eagerly sought for and abundantly used, none surpass and few equal in beauty, fragrance, and luscious flavor the choice peach.

In its original type, as in the case of the wild pear of Europe, it had little to attract a refined taste, but like the pear, the peach and its fruit were comparatively hardy and free from disease.

Through the modifying effect of ages of cultivation and selection the present century opened with many choice varieties. It also opened with a dire disease which, from the peculiar effect upon the leaf, was called the yellows; not a scientific name but a descriptive one; and yet not a very definite one.

Probably not one in a thousand of our octogenarians know the time when this disease has not affected the peach in some parts of the country. And yet we find many even now that say there is no such disease; happy for our country were their assertions true.

However, if the disease exists and works ruin to the amount of millions annually it is folly to ignore it, or to fail to investigate it.

My earliest memories include the peach, so abundant as to be fed to hogs, the idea so often dwelt upon by elderly people. I also recall the ideal peach of childhood—and the fact that distance lends enchantment furnishes a key to the fanciful exaggeration of peaches of the olden time.

An old friend, years ago, called on me in peach time. He told of his boyhood peaches, but said he, "we can't raise peaches now." After a little we sauntered through our back yard where a tree of Hale's Early was loaded with a specially fine crop; the old gentleman walked around the tree twice, looking at it from all sides and said, "Phineas, I am astonished; I never expected to see such a sight again." "Did you ever see it surpassed?" said I. "Never," said he honestly. And never after that did I hear him boast of old time peaches. And yet we have this year had an orchard of some two hundred trees on an eastern hill slope that had hardly a tree less fully and beautifully loaded than that.

But to take up experience. In boyhood I delighted to get very choice buds and bud young seedling peaches, and when they gave their first fruit what delight and satisfaction. For a boy or girl who achieves success with fruits or flowers, there is an ecstacy of delight amply repaying all the cost either of time or money. In all, since the period of early manhood I have planted ten orchards of peaches.

My first orchard had the elements of a grand success, and it was a success, but by no means a great one, for the reason that I had numerous varieties, whereas, I should have had only the best succession, such as Mountain Rose, Oldmixon Free, Stump the World, Crawford's Early and Crawford's Late, in which case I should have realized one hundred per cent. more profit than I actually did.

My second orchard followed close on the first and was similar in results.

My third orchard was a grand and complete failure. With a wiser choice of varieties, better trees, planted on my best land, highly manured, I secured an enormous growth, succulent, full of crude sap, and not stopping growth till hard frosts. The following severe winter effected entire ruin. Branches were killed back, bark turned brown and the orchard looked as if a devastating fire had run through it. The only redeeming feature about it was that the apple trees planted between peach have made a fine successful orchard.

My fourth orchard was small, a family orchard, just for ourselves and friends, planted on poor land, manured moderately. It was a quarter acre, the land worth three dollars, planted with fifty trees worth five dollars, manure eight dollars, and the whole investment did not exceed sixteen dollars. It was cultivated three years and then mulched with coarse hay enough to smother weeds and grass.

This orchard was successful in all respects; it gave good fruit continuously for several successive years and paid a large percentage on the investment.

My fifth orchard was a new experiment: it was an orchard of seedlings from select seed, every alternate row being pear trees. The trees were vigorous, reasonably healthy, and produced several very heavy crops, but with one exception the fruit was only fair to good, one however of the Melocoton type was very good. The fruit mainly sold for fifty to seventy cents a basket, while the Stump the World ripening about the same time, were worth one dollar and twenty-five to one dollar and fifty cents, or more than double on the average.

My sixth orchard closely followed the last described with seed more select, planted as follows: In a field planted to corn, every fourth hill in every fourth row instead of corn was planted with peach seed, leaving as they grew the best in each place. The Snow peach, the Anderson Melocoton, the Hale's Melocoton, the Yellow Spanish Melocoton, all came as true to seed as so many beans, but the yellows struck the orchard and those seedlings have all passed away, while a row of Mountain Rose transplanted in the same orchard at the same time is still standing and has borne this year very fine peaches. This experiment materially dampened my ardor for seedling orchards. A wild Tennessee seedling, budded with healthy Oldmixon buds, has the advantage of an equal degree of health, great productiveness, and is so well known in market as always to be salable at good prices.

My seventh orchard was planted to blackberries. William Parry and J. H. Hale visited my orchard, and Mr. Parry said it equaled any peach orchard he had ever seen, in appearance. But with the first crop the orchard failed utterly, and I learned that blackberries and peaches are not compatible on the same ground.

Our eighth and ninth orchards are now in their prime. They missed a crop last year, on account of the peculiar extremes of heat and cold in the winter of 1882–3; this year of 1883 has yielded us about eleven hundred baskets of choice peaches, with good promise for the future. Our ninth orchard of two hundred trees has this year yielded a full crop of beautiful perfect peaches without an exception of a single tree.

Our observations and experience leads us to the following conclusions:

That failures in peach growing are to a great extent preventable.

That we should plant only trees of the best health.

That we should adopt a sensible and uniform course of clean culture, stopping at midsummer each year.

That we should prune and shorten back so as to secure a renewal of strong young wood each year.

That we should fertilize so as to meet the fruit demands, and prevent exhaustion, increasing the amount with the age of the tree.

That we should take no crops from the land after the trees commence bearing, and allow no tree to over-bear.

I desire to allude to the Yellows again, and ask what are we to do about it? It matters little to peach growers whether it be caused by fungi-bacteria, *peach aphis*, or whatsoever other cause, so long as we fail to manage and control it. Like the potato fungus it often first shows itself in a single spot, ofttimes a single branch of a mature tree, and in due time the entire orchard is involved in ruin.

But shall we abandon growing the peach? By no means. While the pear blight, the yellows in the peach, cranberry worm, and curculio, are to be regarded as calamities, yet there are compensations in the better prices of the perfect fruit. Therefore wisdom dictates to avoid, to compass, to overcome the difficulties, and secure the consequent reward.

Our conclusions are these:

1st. Avoid any diseased or contaminated stock in propagation, either by seed or bud, as promptly as you would avoid the virus of scarlet fever or small pox.

2d. Seek an orchard location apart from all these contaminating influences.

3d. Fertilize by either well fined stable manures, or special mineral fertilizers, in which sulphate of ammonia supplies nitrogen, high grade muriate the potash—with a good superphosphate.

4th. Lest the land should contain acidity prejudicial to healthy growth apply twenty bushels of lime, more or less, per acre, in direct proportion to the humus in the soil, to sweeten and fine the soil.

Finally, secure uniform growth and uniform fruitage by judicious, systematic management, never allowing an excessive late autumn growth, or a breaking crop of fruit, or the intrusion of the peach borer.

Here let me call your attention to a tree which I bought many years ago from the nursery of Mr. Alfred Whiting of West Hartford. Here is a section of it, a Crawford's Late peach tree, twenty-one years old—old enough to vote. It was on the farm of my father-in-law, in Guilford. I procured the tree for him at the time I purchased some for myself, and when I saw the log at his wood pile, after a great many years of fruitage, I said to him, "How old do you suppose that tree is?" He said, "Well, it may be a dozen years old." We are apt to forget how fast time flies. I sawed off a section of the trunk, and upon counting the rings, I found it to be twenty-one years old. It is a beautiful illustration of steady, uniform growth. That tree gave many crops of choice fruit. It was not a seedling. And, by-the-way, the Crawford's Late has a uniform habit of bearing, where it is properly treated, that makes it very desirable on that account. There was, as you see, a fault in the management of that tree. There was a branch that grew too near the ground, it received some injury, and had to be sawed off, and that side of the tree is considerably affected. I have no doubt that materially shortened the life of the tree. The other side is entirely sound, and up to ten years of age, the annual growth was very uniform, and from that up to twenty, or until nearly the last of its life, there was a steady, uniform growth, and, as a rule, uniform fruitage. If we could always be sure of as good results as that tree gave, it would be very encouraging to plant the peach.

A few words in regard to varieties:

The early varieties of peaches, while quite beautiful, are less profitable than medium and later ones. The Early York is fairly superseded by the Mountain Rose, which is just as good, more free at the stone, and more productive. The Oldmixon Free is a grand peach in every respect; so is the Stump the World. Crawford's Early is a fine peach; beautiful, large, productive, excellent, is quite apt to overbear, and fail in consequence. The Richmond and Foster are much of the same type. Crawford's Late may almost be called the king of peaches for our latitude. It brings high prices, and has a good habit of bearing about right in good seasons. The Steadley, Salway, and Smock, are too late to be sure of ripening in our climate, though we have found they may be picked while hard, and if well grown they ripen up better than might be expected. When we find our Salways likely to be frozen it is better to pick even while hard, and keep in close boxes in a moderate temperature till they mellow than to risk freezing.

Again, if very late varieties are planted give a southern exposure, as you would the Catawba grape, for, on a northern slope, when we have cool nights, the ripening process goes on very slowly indeed, temperature having much to do with tardy or rapid ripening.

No fruit responds so quickly to either good or bad management as the peach; hence the importance of giving just the right management, and to neither overdo nor neglect.

Mr. Gold. I would ask Mr. Augur to be a little more explicit in describing the location of his last peach orchard.

Mr. Augur. I will do so. Our eighth orchard, which contains about 1,800 trees, is on the summit of one of the highest hills in the State, except some of the hills in Litchfield County. Perhaps I would make an exception of Cream Hill and some others, but we are three miles from the Connecticut River, and 625 feet above the river. From the location of that orchard, we see the cupola of the State House in Hartford: we see Mt. Tom and Mt. Holyoke in Massachusetts; we have the full blast of the air from the Adirondacks. The orchard has a northern exposure, a portion of it a little to the northwest and another portion a little to the northeast. But our reason for planting on this high land was to escape the late frosts in spring and the early frosts in autumn, and also to secure a more uniform temperature winters—in such as this,—when we have warm weather in December or January. The last orchard which we planted, which is a year younger than the last mentioned, is on a hill not quite as high, which has an eastern slope. There we have about 225 trees. That land is better. The other orchard is on land worth about $34 an acre. It cost us that; in some parts of the State it would not have cost more than $10 an acre. In fact, I have seen land which has been bought for planting peach trees, and which probably will be planted next spring, at $10 an acre, which is really better than ours; but as we are nearer to the markets, the land is proportionally higher. But it is not remarkably good land. It is land that, on the whole, is a little below the average, and still we find it answers a very nice purpose for peaches. The land upon which the other orchard is situated is worth, I presume, a hundred dollars an acre. I would not by any means object to pretty good land for peaches, if it lay right. I am having a little more of that feeling than I did. I don't believe we can raise fruit, or anything else, out of nothing. If the land is naturally poor we make it good enough to produce what we want.

Mr. D. K. Croffut of Derby. I would like to know if Mr.

Augur ever examined the roots of his trees, to see if there was any trouble about them?

Mr. AUGUR. Not particularly. I did suggest to a gentleman who went with me to the Hudson taking a glass and making an examination to see if the peach aphis had anything to do with it. I feel pretty sure that we have not been troubled in that way; but I have not examined otherwise than with the naked eye.

Mr. E. E. DAYTON. Mr. Augur says his peach orchard is on one of the highest hills of the State, 625 feet above the river. I have a peach orchard that is 1,440 feet above tide water. I would like to ask him if he thinks that is high enough for a peach orchard?

Mr. AUGUR. I should say that would do. I will give in.

Mr. CROFFUT. Mr. Augur referred to the time when peaches were grown so largely in this State that they were fed to the pigs. I have picked up a great many bushels and fed them to the pigs. I set out an orchard of a few trees when I was quite a young man, as people generally do at that time, and they grew very nicely indeed. At last they were attacked by what we call the yellows, I suppose; the leaves began to curl up. I knew there must be some cause. I went to work and dug around the roots of the trees, and the next day, when I examined between the trunk of the tree and the fork of the root, I discovered a gum exuding. On making a close examination, I found that in that gum there was a worm, and he was a pretty lively one, too, for that situation. It was perhaps three-eights or half an inch long; a little white, wiry looking worm. I discovered that these worms worked into the bark and partly girdled the trees. I continued to watch, and I found that when a tree was completely girdled by these worms, it was used up. I then took a composition of lime, red lead, and potash and put it around the tree, in order to eat this gum and destroy it, and those trees did very well for several years, and grew, some of them, to be at least six inches through, until they got to be too old to be of any use and passed away. Since that time, I have been differently situated, so that I have not gone into peach culture very extensively. I think the time is coming when, if we can get hold of the right thing, we shall raise peaches in this State as well as they are raised in other sections of the country. I think if some gentleman will examine this matter, and discover something that will destroy these insects, and keep them from girdling the trees, it will be of great service.

Mr. AUGUR. The gentleman has described the work of the peach-borer, which is very common, to which, perhaps, I did not sufficiently allude; I was thinking of another matter. The borer works just at the surface of the ground, and when we find the gum exuding from the tree, we always know that the borers are there. It is the custom in Delaware, I think, universally, for people who have peach orchards to go through their orchards once or twice a year—better twice—and examine every tree, and, if they find a tree affected by the borers, they make sure that they are exterminated. It will not do to trust to any wash to exterminate them. When the borer is actually entrenched under the bark we must make very thorough work of it; but if there are no borers in the tree in May, we may take a wash made of lime and soap, say, for instance, a pail of whitewash may have a little soap mixed with it, and apply it to the trunk of the tree, a foot or more from the ground, or from just below the ground, removing the earth a little, if you choose, and, during the season, that will protect the tree from the moth which lays the eggs of the borer. We can always keep clear of them if we only do our duty and are sufficiently vigilant; but I have no doubt that one-third of the peach trees throughout the State fail from that cause.

Mr. A. C. BLOT of Watertown. What is your experience in regard to heading back peach trees? Which is the best season? Last year I cut back fifteen, in an orchard which I have, that I have given three different styles of culture to, and I believe that I might as well have pulled them all up. I headed them in between the 20th and last of September.

Mr. AUGUR. That is too early. There is a gentleman in

Ayer, Mass., Mr. Fletcher, who has published a treatise recommending that method. It is not safe. We tried that a little one year and we found it provoked a second growth. It is too early. The peach is pretty active in its growth at that time, and a vigorous shortening in of the tree as early as that is dangerous. We think it is better not to do it until the trees have stopped growing, or, better yet, perhaps, to wait until after they have shed their leaves, and then, in the early part of November, they may be shortened back with safety.

QUESTION. Is it not better to wait until they are in bloom?

Mr. AUGUR. There is one advantage in waiting until they begin to show their bloom, and that is, that if a portion of the peach buds are killed during the winter, you will very naturally cut back less in order to save the crop. Otherwise, it will not make any particular difference, I think.

Mr. CROFFUT. I wish you would try corrosive sublimate around the base of your trees. It wants something pretty savage there. I have tried it on some trees, and it has benefited them very much, with no apparent injury.

Mr. AUGUR. We did, at one time, put into our wash a very little London purple, and saw no harm from it; neither did we see any good. The soap and lime answers the purpose, and this addition of anything more would be simply like putting two cartridges in a gun, where one will answer just as well. Prof. Penhallow, of Houghton Farm Experiment Station, has been studying the subject of the yellows in the peach, and has prepared a formula for diseased peach trees, as follows: For one acre, 100 to 160 trees bearing age, kieserite 25 pounds, muriate potash 150 pounds, dissolved bone black, 450 pounds; a total of 625 pounds, or four to six pounds of mixture to each tree. I would add 100 pounds sulphate of ammonia, as it certainly changes plants from a yellowish look to a dark green very quickly, and while a large amount of nitrogen is not needed a little is excellent.

Mr. J. H. HALE. We have used this wash of which Mr. Augur speaks, with the addition of carbolic acid. We washed a few trees, leaving out the carbolic acid, and the borers were in 25 per cent. of those trees this year; but where the carbolic acid was added to the soft soap and lime, there was not a borer in one tree out of a hundred, and we have 6,000 trees. It seems to me the carbolic acid is essential.

Mr. VAN DEUSEN. We set out a peach orchard seven years ago, but something that we could not prevent has hindered the trees from bearing up to our expectations. Nevertheless, we have felt well paid. I was thinking of it while sitting here, and looking back over the past seven years, I calculated that we had sold from one acre and a quarter, besides supplying a family of eighty people (it is free plunder), $2,000 worth of peaches. The land on which the trees were set is a sort of ledge; underneath is red rock, and it faces the west and southwest. It is not rich land, by any means. One year we had corn on it,—the year before the trees were set out,—with oats afterwards. The corn was not very good, also the oats. It is just such land as I would select to-day were I to set out a peach orchard. Some of those present may have heard me say, that if a horse had had too many oats, and was likely to run away, and I had to hold him too hard, I would take away his oats. Now, if we set out trees on land which we call rather poor, we can give it something to fertilize it, but if it is too rich, we cannot hold in the horse. I would rather stimulate the land than have it too rich, and attempt to hold in the horse. A portion of our orchard is on rich garden ground, and the trees there have not turned out as well as the others that are on poorer soil. I would say that any land which will grow good corn, where you can make a growth of about fifteen inches every year, is suitable for a peach orchard. Put on Bradley's fertilizer, or any other of these commercial fertilizers that you think well of. I have used that. I put on this acre and a quarter, a ton of Bradley's fertilizer when I set out the trees. I raised a hundred dollars worth of something—I think it was early potatoes—the first year after setting out, and the next year I raised a hundred dollars worth of cucumbers. After that, it became so shady that we raised only a partial crop of squashes. But about the fourth year, the trees should bear well, and the land will not bear much else but peaches. With all the ailments and drawbacks that we encounter in the peach culture, there is nothing to-day that I consider so quick and sure of paying a profit. If you can get two or three good crops from your trees, they will pay three or four times the expense. And let us all hail the day when we shall again have peaches so abundant that we can afford to feed them to the pigs. (Applause.)

One very important feature in the cultivation of the peach is the thinning of the fruit. This year our orchard set extremely full. Unfortunately for the orchard I had left and gone to another Shaker family. I urged the necessity of thinning the peaches. They said, "Those trees are strong; they have been headed in, and they have made large and strong branches, and they will bear a heavy weight of fruit." It is true, the branches are large. I could hang my whole weight on them, and I weigh pretty near 200 pounds. There was not a branch of those trees broken this season. But that is not the whole of it. If you do not thin your peaches, where they set very thick, the fruit will be small, and the crop will draw too heavily on the vitality of the tree, and every one that we take off that we do not need is a relief to the tree. Year before last we did not get more than a hundred bushels from this orchard, but the price we got for them paid us quite well for the acre and a quarter. I sold some of them for $8 a bushel, and the whole product averaged $4 a bushel. I think that paid very well for an acre and a quarter of corn land.

One of our Springfield men told me that when he was a boy, he went to his uncle's on a visit, and his uncle told him to go into the orchard and get as many peaches as he wanted, but to bring the peach-stones back with him. "I didn't know," he said, "but he wanted to plant them, and afterwards I thought he wanted to see how many I ate." He said he took in fifty-two peach-stones. I said, "Do you mean to say you ate fifty-two peaches as large as I have growing out here?" I asked him to step out to the orchard, and he said, "Yes, they were as big as those." Said I, "If you can eat fifty-two peaches as large as those, I don't know what you can't eat." Said he, "I can eat those just the same." When the peaches were ripe I took six of them and carried them to this man. One of them weighed nine ounces, and they all averaged half a pound apiece. While I was talking to this same man, a restaurant keeper came along, and he said, "Richard, what are you going to do with those peaches?" Said I, "I have brought them up to see if a man can eat fifty of them." "What are you going to do with them if he don't eat them?" Said I, "I will give them to some good friend?" "Don't do that," said he, "I will give you a dollar for them." I let him have them, and he carried them to his restaurant. I thought I would like to know what his object was in buying them at that price; so I asked him one day, and he said, "To make money. I wanted them to show in the Boston & Albany depot." "Well," I said, "you didn't make much." He said, "I made a little. I got twenty cents apiece for them." This I say to show the importance of thinning the peach, and almost all our other fruit. We make a less draft upon the strength of the tree, and get more in value. When I tell you that I counted the peaches in a bushel of those that I sold for $8, and it took only 140 to make a bushel, I tell you the truth. Now, it takes 200 good Bartlett pears to make a bushel; 140 of those peaches made a bushel, and they were worth growing. "Go and do likewise." (Applause.)

Mr. Sedgwick. In relation to the profits of peach growing: a week before Thanksgiving, I met a peach grower in New York from Marlboro', on the Hudson River, who told me that he had brought down that morning from his place ten baskets of peaches, for which he was paid $100—$10 a basket. This same gentleman, who is one of the most successful fruit growers in that section, has for some time tried the formula which Mr. Augur has mentioned, which Prof. Penhallow has recommended for the yellows. He is acquainted with Prof. Penhallow, has been at his place, and seen his experiments. He says that in his orchards, since he has applied the formula, he has not a case of the yellows, and has never had a more vigorous and thrifty growth of trees in his experience of several years in peach growing. He says it is undoubtedly a good thing.

Mr. ROGERS of New Jersey. In relation to the experiments of Prof. Penhallow, I should say that last spring, when I visited the New Jersey Experimental Station, I was there informed that two or three thousand trees had been grown under his directions, with every evidence of great success, and that they were going to follow up the cultivation of peaches with the use of other chemicals, other forms of potash, for the purpose of seeing how they would affect the yellows, and after a short time I heard that they were meeting with great success in their efforts, but it was too early as yet to make a report upon the action of the various chemicals.

Mr. NORTON. I understand that the Messrs. Hoyt, of New Canaan, recommend the practice of heading in peach trees in October, with the view, among other things, of hardening up the remaining wood, so as to stand the coming winter better. I would ask Mr. Augur if there is anything wrong in that idea?

Mr. AUGUR. I do not believe it will do that, sir, for this reason. I think the leaf is needed as long as it remains green. Our sugar-maple, as long as the leaf holds green, is making sugar for the next season, and the peach leaf, so long as its activity continues, is elaborating the sap of the tree for the next year. Mr. Fletcher in his treatise recommends cutting off, or shortening back, in order to throw the strength of the tree into the remaining buds. Well, I found that the great trouble with me was, that it started the buds into active growth. The dextrine, in the case of the peach, the sugar in the maple, all those compounds that are wanted, are being finished up. The tree is finishing up the operations of the year. I believe every leaf on the tree is needed to do that work, so long as it is in active force. When the leaves fall, then I think we can shorten back. It is the returning sap, not the crude sap, but the returning sap, that comes from the leaf, which we are cutting off; so that I think, just as far as we cut off the growing branches, while they are maturing the sap for the next year, just so far we are injuring the tree. It seems so to me.

Mr. Dayton. I see that Mr. Hoyt is in the room. I will ask him if they practice cutting back at that time?

Mr. Hoyt. A gentleman near Ayer, Mass., one of the best and most successful growers of the peach, recommends cutting back in the fall, so that the wood will harden up and make the buds stronger and more vigorous. His experience has been that trees cut back at that time endure the winter better in that northern region. He has written a work which it is worth while for any one to read. He is a man who has had a great deal of experience, and has studied the subject of peach culture as much, probably, as any man in New England. Mr. Augur is well acquainted with him.

Mr. Augur. I would say, in answer to that, that we cut back three rows of trees in our orchard in September, at the time Mr. Fletcher recommends, and we found that a good many of them started a second growth, and some of the wood died two or three inches back of where it was cut. It did not injure the tree very greatly, but we were not pleased with the result.

Mr. Croffut. Respecting this cutting back, I will give a little experience I have had with other fruit, the chestnut, for instance, which may help solve this case. I had a chestnut tree which bore very small chestnuts. I left it until the next spring, and then I cut off a good-sized branch, and I never saw nicer, larger chestnuts in my life than that tree bore that fall. If a tree is allowed to mature in the proper manner during the fall, and then in the spring some of those buds are taken off, you will find it, according to my experience, just the thing.

Mr. J. H. Hale. We have some 6,000 peach trees growing for the fruit, and we have had to study this question of culture and pruning considerable, and have experimented with pruning and shortening in from the 1st of September or until the time they bloom in the spring, and we are fully convinced, as Mr. Augur says, that it is not safe to prune peach trees until after the leaves are off. Oftentimes, if a tree is pruned almost any time in September, it will start a second growth. If pruned later, perhaps some time in October, if it does not start a second growth, the wood is apt to die back from two to six inches from where it was cut off, and of course, when you cut off just where you wanted to shorten it, you get just so much less. I do not think it is safe to recommend pruning peach trees until after the leaves are off.

I think Mr. Van Dusen struck the key-note of successful peach culture when he said, "Plant on poor land." If we plant on rich land, the tree, he says, like the horse fed with too many oats, will grow and get away from us; but if we plant it on poor land, we can make the tree just what we want. We know a great deal more about fertilizers to-day than we did a few years ago, and are learning every day. I think we can make a peach tree almost anything we want. We can keep it well in hand if we have it on rather poor soil. We have grown ours well on chemical fertilizers. While we have not followed out the experiments of Prof. Penhallow, we have always depended on bone and potash for our main stock of plant food. On one plot of about 200 trees, we have not used potash, as an experiment, to see what the result would be. A good percentage of those 200 trees, which are four years' old, show traces of the yellows, while of the other five thousand and seven or eight hundred, there is only one tree that shows any trace of the yellows whatever, and those have all been liberally treated with muriate of potash. This past year we sold in Hartford (and Hartford is not a market that is willing to pay for the very finest fruit) forty dozen peaches for $1.75 a dozen at wholesale, and a number of them retailed at twenty-five cents apiece. This was in July.

Mr. Hoyt. I would like to ask what fertilizers you use for your peaches?

Mr. Hale. We use Bradley's superphosphate. We have only used one load of horse manure for seven years. We depend wholly on Bradley's fertilizer. One word in regard to heading in. To avoid all danger, we head our trees in after the 20th of March, after the very cold weather is over. When I was a little boy, like all other boys, I used to stub my toe and cut my fingers, and I noticed that in the fall of the year my finger ached worse when it was cut than it did in warm weather. Therefore, I thought it was not a good plan to cut my finger in the fall, nor to cut my peach trees, because they would feel it more in cold weather. Prune them any time after the 20th of March, before the sap starts. But by all means, if you are going to have an orchard, be sure and head it in when it has made a growth of more than sixteen inches. I live on alluvial hills, over 400 feet above tide water. I never trim any kind of a tree in the fall. If I trim a pear tree in the fall, the limbs will surely die back, and that is a hardy tree. If I trim it in the spring, it does not hurt it any. It is just so with peach trees. I would recommend, in our climate, at any rate, the trimming of trees in the spring, by all means.

Question. How much would you head back a vigorous peach tree?

Mr. Augur. I think that depends a little upon the tree itself. If a tree has been headed in repeatedly, I think there is such a thing as overdoing it, making it too compact. It seems to me that the right way is not only to shorten back, but to thin out, so as to leave the tree reasonably open. Where the tree is in good shape, and about what we want, our practice has been to cut back those branches which extended out farthest, those which are most rampant in growth, not cutting off every individual twig, but pruning as you see they want it. If we cut off everything, we make too bushy a tree; that is my idea of it. I have seen trees that had been so headed back that they looked like a sheared hemlock — all a mass of green.

QUESTION. Would you recommend cutting out branches inside?

Mr. AUGUR. Yes, sir.

QUESTION. Mr. Augur says, "Cease cultivation about the middle of summer." I suppose a majority of growers, in cultivating a peach orchard, would be apt to plant potatoes. We cannot very well avoid cultivation of the ground when we dig potatoes.

Mr. AUGUR. Yes; that is one thing to be deprecated. As you say, the digging of potatoes does cultivate the ground a good deal, —mellows it up. In planting potatoes in our peach orchards, I would advise the planting of the Early Rose, or some very early ripening potato. Do not dig over the ground the last of August or 1st of September; dig in July or early in August.

There is one matter with which I have had a little experience this year, and perhaps it may be interesting to you. A few years ago I was in Waterbury, and Mr. Johnson, one of the citizens here, told me they could not raise peaches in Waterbury; the climate was not adapted to them. In riding to the Fair Ground, I passed a beautiful peach tree, that was loaded with handsome fruit. I was so much interested that I called at the house to ask the lady about it, and remarked that Mr. Johnson had told me they could not raise peaches in Waterbury. "Well," said she, "we can't." "Why?" "The boys steal them." We had a little difficulty of that sort; we had to watch our orchards during the ripening season; and we found that it was a very convenient thing to have a little alarm, because, when friends visited us in the night, we liked to know it. Here is an article that was invented by a gentleman in Middletown, of which we had the first one that was made,—the model, in fact. It is on a swivel, and can be loaded with powder or powder and shot, and invariably, an intruder, in striking this line, which is invisible, will draw the muzzle right towards himself, and it operates so that if a person catches his toe, it gives the alarm. One Sunday morning, we had one of these set in our orchard, and my son, who was about a quarter of a mile distant, heard it go off. We went right up to the orchard, and saw no one there; but the neighbors said they saw a man running as long as they could see him.

Rev. Dr. ANDERSON. *Mr. Chairman and Gentlemen:* It seems to me that such a Convention as this ought to receive some sort of welcome from the citizens of Waterbury; at any rate, a welcome expressed in words. I wish I had thought of it before I came here, so that I might have selected my words with a little more care, because it seems to me that the occasion is one that calls for careful as well as warm-hearted expression. There have been Waterbury gentlemen here this morning,—most of them have now disappeared,—who could have extended to you a welcome more properly than I can, but I want to say a word or two to those friends who are gathered here, expressive of my own interest in the matters which you are to discuss and have been discussing, and to say that I believe my interest is shared by a great many of the citizens of Waterbury, notwithstanding they have not yet come into your Convention.

I have had for several years past a farm of two and a half acres on the seashore. That farm has contained an orchard of about twenty-four peach trees, which, notwithstanding the poorness of the soil (laughter), has dwindled to two or three, and which has never yet furnished a peach fit to eat; an orchard of several pear trees, of which three remain, which are like the fig tree that we read of in the Scriptures, covered with abundance of leaves, but with no fruit. For the rest, I have indulged in the cultivation of shrubs and flowers and grass. But it is curious what kind of education a piece of ground like that gives to a man. It is curious what problems it starts. I have had to discuss in my own mind a good many problems which I suppose are before your minds from day to day. First, how to contend with inclement weather,—cold in winter and winds in summer; for we are on the seashore, as I said. Secondly, how to enrich a very poor and porous soil. Thirdly, how to cultivate, and particularly how to prune, the shrubs and plants which are in my care. Fourthly, how to carry on the contest with weeds. And, fifthly, how to carry on the contest with innumerable insect pests. It seems to me that, on my two and a half acres, I am called upon to solve about all the problems which concern you, judging from what I have heard here and what I have read in regard to agricultural matters. And I must say, that the very attempt at a practical solution of these great questions have given me a growing and a real interest in horticulture, in agriculture, and in this whole class of questions which interest the agricultural world to-day; and I suppose that no man who has not been through some such experience, could sit here to-day and listen with anything like the interest with which a man listens who has touched upon this great subject on the edges, as I have done during the past eight or ten years.

But, my friends, it seems to me that, apart from any special interest of this kind in agriculture, horticulture, and the like, the citizens of Waterbury ought to be glad to have an Agricultural Convention meet in the midst of them. As you know, we are one of the most enterprising and prosperous of the little cities of New England. We are extremely busy, and that is, perhaps, the reason why there are not more of our citizens here this morning. We go by machinery here; every man has to listen to a gong, and has to arrange his life-work with reference to that engine, doing its work day after day and year after year, which you will appreciate in your homes. We send to you clocks, we send to you pins, and we send to you watches, and we are going to send more and more of them. They are things of utility rather than ornament which are made in Waterbury and in such cities, and which are sent out into the rural districts of Connecticut, of New England at large, of the Great West, and into lands beyond the sea. We are so busy, my friends, that we are apt to think that the whole world is a manufacturing world, and are apt to lose sight of the foundation upon which you and I must alike build. We are apt to forget that the producer is the man who stands back of all this, and that, with all our prosperity, our capital, and our skill, we should be as nothing whatever, were it not for these men in the fields and in the woods whom you represent to-day. We are dependent in our grandest results upon the work which the men of New England, the men of the Far West, the men of the great wheat-growing region, of the grain-growing region, as well as the men who do a similar work in the fruit orchards and gardens of New England, New York, and New Jersey, are doing ; and it seems to me if we were wise in our little cities, we should open our hearts to the men of agriculture, and should say to them "God speed!" when they come among us to discuss these important subjects.

But there is another phase of it. The Waterbury of to-day is in strange contrast with the Waterbury of the year 1800, and that is true of a great many New England towns. We are now a manufacturing city ; we were then a rural district. Many of the manufacturing cities and villages in the Naugatuck Valley and in other valleys of Connecticut were, in the beginning of this century, simply rural districts. I do not know of any more interesting, and I do not know of any more important transformation which has taken place on any piece of territory of the size of Connecticut, than that which has taken place in this State during the present century,—the change from an agricultural to a manufacturing condition. You know on how large a scale that transformation has been going on in Connecticut, in Massachusetts, and, to a certain extent, in other States of New England ; going on, also, in other parts of the world, and here in Connecticut, I suppose, more than in any other part of the world in the same length of time. Well, obviously, it has put the agricultural communities of Connecticut at a disadvantage, to a certain extent, just as it has put the religious parishes of Connecticut at a disadvantage. These hillside parishes are not what they were once, in comparison with the city parishes, although they may treasure up and hand down to future generations qualities which are worth just as much to-day as they were then. And the same is true of our agricultural interests; they are not what they were once in comparson with the hum and stir of city life; but they are important, nevertheless, and they require all the more care, all the more thought, and all the more applied science, because of this transformation which has taken place. If it is more difficult to secure a living from the rocky fields and hillsides of Connecticut than it used to be, it is because the standard is different. You want to have just as good a living as we do; your daughters want to be as well dressed as ours, and your sons want to be as well educated. And it is highly important, it seems to me, that you agriculturists of Connecticut learn to apply the science, the experience, the knowledge of all kinds which can be gathered from the literary and scientific world, in order to bring up the level of your home life, your social life, and your religious life, to the highest level, if possible, which is reached in our most favored cities.

Now, as I said before, it has seemed to me that nothing better could be desired for securing such results than a Convention of this kind. I have been peculiarly interested in the combination of common sense and scientific knowledge which I have heard in the remarks that have been made to-day. I can see how science is coming to mean something else than talk. I can see how you are applying it at the very roots of your trees. It is not science running wild; it is science controlled by experience, by good judgment; by judicious utterance. The benefit of these annual conventions will be felt in their good effects in your homes; and we shall feel it in our turnips,—for it seems that Waterbury rejoices in turnips; and we shall feel the good effects of your moral influence, also, in raising up boys who do not steal peaches. (Applause.)

Adjourned to 2 o'clock.

AFTERNOON SESSION.

The meeting was called to order at 2 o'clock, Mr. Barstow in the chair.

THE FARMER'S SMALL-FRUIT GARDEN.

BY J. H. HALE.

A little four-year-old darling in our family, when afflicted with some slight pain or ache, used often to amuse us, when asked what the trouble was, by saying "I feel bad, but I don't feel *bad*." Now I mean small-fruit garden, not small fruit-garden, for as a rule farmers' fruit-gardens, or orchards rather, are usually large enough, giving an abundant supply of the larger fruits, such as the common varieties of apples and pears, but are deficient in the small fruits; and it is my purpose here to speak in behalf of these choicest of God's gifts to man, possessing as they do the following advantages over the large fruits : They are more easily propagated, hence are less expensive to start with; bear much sooner after planting. Many of them ripen at a time when there are no other fresh fruits to be had, and as a rule may be depended on to produce a crop every year. They are not only delicious luxuries, but substantial and healthful articles of food. While the plants of strawberries, raspberries, blackberries, currants, gooseberries, and grapes, either in bloom or in fruit, are often very beautiful, many of them may be trained in forms that will greatly enhance their beauty while not in the least injuring their fruiting qualities. Raspberries or blackberries thickly planted and closely pruned can be made to do good service as a trusty hedge, and no better highway or division fence can be had than a four-strand barbed-wire fence covered with grapevines. We intend to do this about our whole farm within the next year or two.

Complaint is often made through the agricultural press that farmers as a rule have less fresh fruits than city people. And to a certain extent this is true ; it is not, however, as many seem to suppose, that the farmer sells all his fruit for the sake of the money it will bring, but from the fact that being busy from one week's end to the other with the general affairs of the farm and often being at his wits' end to make both ends meet, having to be farm superintendent, day-laborer, marketman, cow-boy, and all-hands. The poet's dream of fresh berries and cream to be eaten under the vine-clad veranda, does not often come to the overworked and tired farmer. And while his home may be barren of the choice varieties of small fruits well and judiciously cultivated, it is not that he would deprive the loved ones dependent on him of these choice luxuries, but rather from the fact that he has always thought it impossible for any but the most experienced to cultivate them with any hope of success. And as soon as he becomes acquainted with the better varieties and learns how easily they can be grown, when by proper cultivation a bushel of strawberries, raspberries, blackberries, or grapes can be grown almost as cheaply as a bushel of potatoes, the farmer's small-fruit garden will become as much a fixture as the kitchen garden.

Small fruits have been grown for centuries, but it is within the last thirty years that special attention has been given to their culture and the producing of new and improved varieties; and since the introduction of Wilson's Albany strawberry, Doolittle's improved black-cap, Philadelphia raspberry, Lawton blackberry, and Concord grape, these and their seedlings, combined with a number of chance seedlings, have given us a hardy and productive race of small fruits that may be grown on almost any soil and cultivated by the most inexperienced, and yet give fair return for money and labor expended; while with a little extra care and attention enormous crops may be obtained. And as the plants may be had at any nursery at such low prices, any one owning a spare rod of ground has no excuse for denying his family these delicious and nutritious fruits.

It is not necessary for me to go back two or three hundred years and trace the history of small-fruit culture down to the present time, but rather begin at once to show you as best I can how and what to do to obtain the most and best fruit at the least expense. Being neither a chemist nor botanist I could not, if I would, explain to you the chemical effects of the different fertilizers used upon the roots, wood, leaves, and general structure. My observations at previous meetings of this Board have taught me that our Connecticut farmers want plain practical statements and experience that will show them how the thing is done in the fewest possible words, and this I will endeavor to do as briefly and plainly as possible, not that I can hope to make all points clear or show you the best way to do everything in the small-fruit garden, but simply open the way and give you such hints as will help you to work out your own small-fruit salvation, for work it out you surely must.

Their importance as an article of diet is at last beginning to be appreciated, and the sooner we all understand it the better, that every dollar expended on the fruit-garden will save at least two dollars in butchers' and doctors' bills. Three times a day the whole year round our tables could and should be supplied with these refreshing and health-giving fruits of our own growing. How much better for the boys and girls at school to have a dish of fresh berries, a cluster of grapes, or a cup of raspberry jam, and good nutritious bread and butter for their dinner, than to have the mother slave herself to death from day to day in preparing some health-destroying compound of grease and spices in the shape of loaf-cake, doughnuts, or mince pie, to tempt the appetite and destroy the stomach, as well as a lot of good flour, eggs, and butter, that might be used to give health and strength rather than destroy it. I note with pleasure in my travels about, that fruit-growers and such farmers as have plenty of fruit very seldom have pastry of any kind upon their tables, its place being supplied by fruit, either fresh or canned; and since the improved methods of canning that have been adopted in the past four years, it is possible to have fruit at any season of the year, approaching in flavor that fresh from the vines—red raspberries retaining their flavor the best of all.

The taste for fresh fruit is growing fast, and while many of our farmers know that they ought to supply it to their families, they still fight shy of planting, and say they can buy what berries they want cheaper than they can grow them ; yet they will not buy one-hundredth part of what their families would use if it could be had for the picking. My own family is not a large one, yet we manage to dispose of from six to ten quarts of strawberries, raspberries, currants, and blackberries, per day through June, July, and August, and the next three months we worry along on peaches, pears, and the product of 116 grape vines. Another excuse for not planting is, that they have not suitable soil. Now, as a matter of fact, any soil that will produce the ordinary farm crops can be made to produce small fruits in perfection if liberally manured and well cultivated—the more liberal the culture the better will be the crop. And in the preparation for planting, I would recommend the use of a subsoil plow, whenever the nature of the soil will admit of its use, for in my own experience I have always noticed a marked improvement in the growth of plants wherever it has been used, affecting as it does a more perfect drainage in a wet soil or season, and allowing the plants to root much deeper, and thus be able to withstand drouth should it occur. One-fourth of an acre is little enough ground to devote to the small-fruit garden, say ten rods of strawberries, eight of raspberries, five of blackberries, four of currants, one of gooseberries, and twelve of grapes. This will give say ten quarts of fresh berries per day for nearly three months, besides a surplus for canning, and the grapes would supply ten to fifteen pounds a day for at least three months more.

Strawberries.—Strawberries being the first fresh fruit of the season, are usually eaten rather more freely, hence should have more space devoted to their culture than any of the others, unless it is the grape. So many strawberries have been grown in the past under a careless, slipshod method, or rather no method at all, that the mistake is made in supposing that profitable crops can be thus grown, hence a failure is often made by planting on land that has not been well prepared. To start with, the land should be well plowed, subsoiled, and harrowed, two or three, yes, a dozen times over, if need be to make it soft and mellow, so that the plants may get a good start from the very first. Well-rotted stable manure is usually at hand on most farms, and if applied liberally will give good returns. But from a somewhat careful study of the manure question in the cultivation of large fields of strawberries for market, I think a better crop of fruit can usually be had from the use of commercial manures, having but a small amount of nitrogen, and the fruit be of better texture and flavor than when stable manure or nitrogenous commercial fertilizers are used. I may not be able to explain it to the satisfaction of the scientific gentlemen here present, but the strawberry is a gross feeder, and whenever well-rotted manure or fertilizer containing a large amount of readily available plant food, of a nitrogenous character, such as blood and bone, Peruvian guano or fish scraps, is used, it will take it up greedily, and a very rank foliage growth is the result the first year, and the plant seems to make its plans for an enormous crop the next season; but somehow it never quite keeps its promise, making a much greater show of foliage than fruit, and what fruit there is, is watery and insipid in flavor, and will keep but a short time after being picked. While, on the other hand, I have found that a manure of raw ground bone and wood ashes, or muriate of potash, encourages a much less rapid plant growth early the first season, but that it is steady and even the whole season through, and by fall we have a fine stand of well developed, but not rank, foliaged plants that will always at fru t-ing season the next year give a heavy crop of firmer, brighter colored, and better flavored berries than can be grown on the same soil by the aid of manure containing a large percentage of nitrogen. Whatever manure is used, it should be applied broadcast after plowing, and harrowed in thoroughly, not by going over once or twice, but a dozen times, or till the whole field is as mellow as the best of our old onion gardens.

While the strawberry may be planted with fair prospects of success any month in the year that the ground is free from frost, the best time is early in the spring, while the plants are in a dormant condition. For a small family garden, they are often planted in beds, with plants fifteen to eighteen inches apart. However, as they can be grown more cheaply by the aid of horse cultivation, they should be planted in rows sufficiently far apart to admit of it. In fact, I often wonder why it is that all garden vegetables are not so planted, instead of, as at present, in small beds or narrow rows, where all of the labor of cultivation must be done by hand in the most expensive way.

We are improving greatly in all of our methods of culture and in the implements used, yet it is safe to say that the right instrument to cultivate berries with, to the best advantage, is yet to be invented. Many that are effectual in destroying weeds are also very destructive to the roots of the plants. Rows, three and one-half to four feet apart, and plants ten to twelve inches, with all runners cut, will, in my opinion, give the most and best fruit at the least expense, although it must be admitted that many of our most successful growers still practice growing them in thick matted rows one and one-half to two feet wide. The great bugbear of narrow row or hill culture is cutting the runners; but this is a mere nothing to the labor of picking out the weeds from a matted row during the last three growing months of the season. And while strawberries can be grown more cheaply in the narrow rows, the fruit will be larger and of better quality, and in case of drouth will suffer less than in matted rows.

By the selection of varieties and the soil on which to plant them the strawberry season may be prolonged to six weeks or more, if the earlier varieties are planted on warm early soil, or that having a southern exposure, and the later ones on the heavier moist soil, or that with a northern or western exposure. If you already have a taste for fruit culture, and have a fair start with the family garden, in making a selection of varieties choose first in regard to eating qualities, placing productiveness second; but to a beginner I would recommend planting first those most hardy and productive, regardless of quality, and when you and your family get well filled with these will be time enough to plant the better sorts.

Pistillate or imperfect flowering varieties are as a rule the most productive, and can be made to produce even more than they generally do, if care is taken to plant them sufficiently close to perfect flowering sorts, that an abundance of pollen may be supplied to every blossom and every berry be perfectly developed. While in most plantations there are usually five to eight rows of pistillates to every one of perfect flowering, I have noticed that the very best results were obtained by planting them in adjoining rows, or not more than five to six feet away.

Being continually asked what is the best perfect flowering variety to plant with this or that pistillate, I have been compelled to study the matter to some extent, and while it may be too fine a point to discuss here, experiments made some years ago convinced me that the size, form, color, texture, and flavor of the pistillate strawberry is greatly affected by the perfect flowering sort that furnishes the pollen to fertilize its blossoms.

Take the Crescent, a pistillate sort you are all acquainted with, fertilized by the small, sour, but firm Wilson, and most of them will be small and sour, yet much firmer than the Crescent when fertilized by such varieties as Pioneer or Charles Downing. I have never seen a coxcomb-shaped Crescent in my life, except when grown with the President Lincoln, a variety that has a majority of misshapen berries. Usually poor in flavor, the Crescent is passably good when grown with the Charles Downing. Ever since its first introduction, Mr. Olcott has furnished uniformly the best-flavored

Crescents that have come to the Hartford market, and if I mistake not, the most of them have always been fertilized by the Downing.

There is room for further experiments in this direction, but enough is already known to show me, that to get the best-flavored Crescents we must fertilize them with the best-flavored variety we can get, and the same rule applies to all other pistillate varieties.

If planting is done in spring, all blossoms should be cut off as fast as they appear, and no fruiting be allowed the first season, as it so exhausts the plants as to greatly enfeeble their growth, and in many cases kill them entirely, especially should dry weather follow the fruiting season. As soon as plants become well established, commence running the cultivator between the rows, and continue it once in a week or ten days all through the season.

Hoeing around the plants as often as necessary to keep the soil loose and free from weeds, if the ground is not too stony, and a sharp keen-edged hoe is used, most of the runners can be cut with that as fast as they appear, leaving little to be done with shears or knife; but when this is necessary, it can be done very rapidly, as most of the runners start out from one side of the plant and can all be gathered up by the hand when one good clip of knife or shears will do the business; and the whole field can be gone over very rapidly at little expense.

At the approach of winter, as soon as the ground is frozen, cover the whole field with a mulch of some sort, salt-marsh hay, pine needles, or tobacco stems are the best materials, although straw, coarse stable-manure, cornstalks, or forest leaves may be used to good advantage. Whatever is used, care should be taken not to get it too thick directly over the plants, one and a half to two inches being sufficient, as much more would be likely to smother them, especially if the winter follows with a great amount of snow. Do not remove any of this in the spring, as the plants can easily grow up through it, and it is of great assistance in retaining moisture during the fruiting season as well as keeping the fruit clean. After fruiting, if the strawberry patch is alone by itself, so that there is no danger of injuring other plants, mow off the top and loosen up the mulch, and set fire to it some day when there is wind enough to cause it to burn quickly without injury to the crown of the plant, which will soon after throw up a new growth, when cultivation should begin and continue through the season. In this way narrow rows may be continued in bearing for several years quite successfully. If the matted row system is followed it is easier to renew by setting out new beds each spring and plowing under the old ones directly after fruiting.

Raspberries.—Following strawberries, or rather coming with the last picking of them, are the raspberries, red, black, yellow, and purple. Good crops may be grown on any soil, but the best is a deep moist loam. October is the best time to plant, but it can be done successfully any time in the fall, or very early in the spring, and green sucker plants of the red varieties may be transplanted much the same as cabbage or tomato any time during May, June, or July, and if shaded for a few days, will make a fine growth and produce a crop the next season. Some years ago, when good plants of the Cuthbert were scarce, we put out one-half acre of these green plants in June, and the next year sold $360 worth of fruit. Soil properly prepared for strawberries will be in good condition for raspberries; open furrows with a light plow in rows five to eight feet apart, the distance depending somewhat on the varieties to be planted and the system of culture to be followed. If to be grown in hedges, mark out rows seven to eight feet apart and drop plants two feet apart in the rows, in soil that is not too rough and stony. They may be set quickly and well by taking the top of the plant in one hand, holding it in the furrow so that the roots will be about as deep as they had originally been grown, then with the feet crowd in the earth, from each side of the furrow, and tread it down firmly about the roots. In this way one man can plant three hundred or four hundred plants in an hour. After all are planted cut off the top level with the ground, and fill in the furrow with a plow.

If planting is done early in the fall they will get well rooted before winter, and will be ready to make a very early growth the following spring; late fall planting should be protected through the winter by a shovelfull of coarse manure, or a mound of earth over each plant. Spring plantings should be made early, as the young sprouts that come from the roots start as soon as the frost begins to come out, and are liable to get broken in handling. If planting has been done in the fall, and tops cut close to ground, the first spring cultivation can be best and most cheaply done with a common drag tooth-harrow going over the whole field. This will kill all young weeds just started, and so loosen up the ground over the plants, that the spring growth can easily break through and at once get a good start, and so show the rows plainly, to be followed by the horse and cultivator a week or two later, and this should be kept up early and often, until the 1st of September, when all cultivation should cease, that the growth of plants may be checked, and the wood ripen up well before the hard frosts come, which would be likely to kill many of the plants if cultivation was continued late in the season, for while we have a number of almost hardy varieties, we have none that are entirely so, and must manage their cultivation so as to ripen the wood as early in the season as possible.

With a fair start in the spring, the plants will make a growth of from four to six feet the first season if allowed to do so, but it is best to pinch off the tops when two and a half or three feet high, which they should be by the middle of July. This will cause them to send out lateral shoots, so that nearly double the crop can be obtained. Many of these laterals, reaching a foot or more in length early in summer, may be pinched off, causing them in turn to throw out laterals, so that by fall we have a strong stocky bush capable of withstanding the winter winds, and carrying its crop of fruit the next season without the use of stakes or trellis of any sort.

After the first year canes will make a much stronger growth and should be pinched when not more than eighteen inches high. The two or three topmost laterals growing nearly upright will be three feet or more in height by July, and by pinching these off an enormous amount of fruiting wood may be obtained. For hill culture three, or at the most four, canes are sufficient. Hedge-rows should not be more than a foot wide at the ground, with canes eight to ten inches apart. By close pruning, and the spreading of the laterals, we will have a solid, compact hedge, two and one-half to three feet wide at the top, and if rows can be arranged running north and south, plants will be less likely to winter kill than they would in hills or in rows running east or west, the solid, compact hedge, with three or four feet of open space between the rows, furnishing a sort of race-way for the currents of cold air. Some cultivation should be given early in the season each year before the plants are in bloom; but it should be shallow, so as not to break the roots. In fact, after the first season, there should be no deep plowing or cultivating between them at any time, especially among those that are propagated by a division of the roots, for the more they are broken the more abundant will be the suckers, and except what few are wanted for making new plantations, or for fruiting canes directly in the row, these are useless as weeds, and should be treated as such as soon as they appear above ground. Cutting them off just at the surface will soon destroy them.

Most cultivators advise cutting out and removing all old wood directly after fruiting, to make room for the new canes; but as it soon dies, it does not take any nourishment from them, and being hard and dry it furnishes an excellent support for the young, green wood until such time as it is fully ripened and matured, and able to sustain itself. We very rarely remove any of the old wood from our raspberry plantation, not disturbing it at all till the following spring, when it is dry and brittle, and is trodden down and broken up and left around the plants by the men as they pass along pruning and thinning out the bearing canes.

After fruiting, cultivate same as first year up to about the first of September, and with such cultivation give an annual dressing of manure of some sort. The black-cap varieties may be kept in full fruiting from four to six years, and the red varieties twice as long.

Blackberries.—Blackberries require much the same general care and culture as raspberries, except, perhaps, it is not necessary to manure quite so liberally to get good crops, and they can often be grown successfully on soil that is too light and dry for raspberries. The earlier varieties will ripen here by the middle or last of July, with the late raspberries, while the later sorts, especially if on heavy, moist soil, will continue in fruiting through August, and often into September.

Currants.—Currants, for the best results, require a deep, rich, rather moist soil, yet can be grown on any, even on land that is very dry and sandy, they can be grown to perfection if heavily mulched during the summer. Four feet apart each way, or in rows five feet apart, and plants three to three and one-half feet in the row, is about the right distance. Early in the fall, or as soon as the leaves drop, is the best time to plant; or it may be done successfully at any time before the ground freezes, or, again, very early in the spring. But, like raspberries and blackberries, while spring plantings will usually live and grow well, the fall set plants will make a much better growth the first season. However, it is better to plant this coming spring than to put it off till next fall. Prune closely at time of planting, and each year following thin out all crowding branches and shorten in the new growth one-half, and they may be continued in bearing for years if manured annually.

Gooseberries.—Gooseberries should be treated much the same as currants, and if they can be planted where they will be partially shaded during the middle of the day, they will be much less likely to mildew.

Grapes.—Grapes are so easily grown, that plant a vine almost anywhere you will, you can depend upon abundant annual crops after the third year, if clean culture and close pruning are strictly attended to. Trained to a single stake six feet high, or to a trellis not over five feet, and the vine not allowed to spread more than the same distance each way, allows of all the room any vine wants to produce the best results. Many systems of pruning and training are pictured out in the books; but any that results in close annual pruning will give an abundance of fruit at small cost. Enclosing the cluster in small bags made of manilla paper as soon as the berries begin to form, is strongly to be recommended, for after some years' trial it is found to prevent rotting and to greatly increase the size and beauty of the fruit, while not injuring the flavor in the least.

In mentioning the different small fruits, the distances at which they should be planted are recommended with the supposition that each are to be grown alone, or at least independent of any of the others. But where land is plenty, and there is enough uncultivated on most farms, I would recommend that not less than one-half acre be devoted to the small-fruit garden, planting all together and at greater distances, which will be of great advantage in case of drouth. The best plan that I know of would be to mark off the field in straight rows six feet apart each way, which is none too far for raspberries, blackberries, and grapes, while currants and gooseberries will bear enough larger and finer fruit if given such an amount of room. And by planting four or five strawberry plants in each hill, and allowing them to form a large matted hill one and one-half to two feet across, an amount of fruit may be obtained that will astonish any one who has not tested the matted hill system. By planting six feet apart we would get about six hundred hills on one-half acre; say fifty each, early and medium, and one hundred late ripening strawberries; fifty early and twenty-five late black-caps; twenty-five early and fifty late red raspberries; twenty-five yellow raspberries; twenty-five early and fifty late blackberries; thirty red, fifteen white, and five black currants; fifteen gooseberries; and eighty-five grape vines of early, medium, and late ripening varieties.

A field planted in this way could be cultivated at one-half the cost of that of one in rows, where it would be impossible to use the horse and cultivator as freely as this would admit of; for in the fruit garden, as in all of our farm operations, our aim should be to produce the best crops at the least expense of hand labor; the horse and cultivator being made use of whenever possible.

Enemies.—There are a number of enemies more or less destructive in the small-fruit garden; none, however, that I know need be feared to any extent here in Connecticut, if simple precautions are taken to prevent in season.

The common white grub is often quite destructive to the roots of strawberry plants; but as it is seldom found except in land that has recently been in sod, it is best to plant on land that has been cultivated for some years previously; but if grubs are known to be in the ground, they can be prevented from doing any harm by sprinkling a little flour of sulphur in and around the roots at time of planting.

The rust or leaf blight, so destructive to many strawberry plantations in recent years, seems to affect some varieties much more than others, and to a certain extent can be prevented by planting only those varieties the least liable to its attacks. It usually shows itself first during warm, wet weather, the last of May or early part of June; first a few brownish red spots, not much larger than the head of a pin, are seen, but these soon spread rapidly over the whole leaf, and often in a week or ten days three-fourths of all the foliage will be brown and dry, about ruining the whole crop of fruit. Following the lead of friend Olcott, I have found that a very light dusting of lime will entirely prevent this, if taken in time; knowing just the weather that will breed this fungus, keep a stock of lime on hand and you will be able to prevent it to a great extent.

The raspberry cane borer, and the blackberry rust, have thus far done very little damage in this part of the country. Whenever they appear it is best to cut out the canes and burn them, and thus prevent spreading.

The green currant worm, both on currant and gooseberry bushes, is easily destroyed by dusting with white hellebore or air-slacked lime. Mildew on the grape is held in check to a great extent by the use of sulphur blown on with a bellows.

VARIETIES.—In selecting varieties to plant there are now so many good ones to choose from that little fear need be had of getting any that will not give good results; but as the best cost no more than the poorest, it is well to use some care in the selection. Choose varieties that are known to do well in your own immediate locality, rather than highly praised novelties. The following list comprises, so far as I know, the best of the old and new varieties that are well adapted to the family garden. Some few of the new ones of course are not fully tested, yet having fruited them all on our own grounds by the side of many of the standard sorts, I am convinced that the ones named are well worthy of trial. And from the older varieties I have left off many that are quite valuable yet lacking in some essential quantities found in the newer sorts. Crescent Seedling, Miner's Prolific, Kentucky and Sharpless, of the older ones, and Manchester, Mt. Vernon, Piper, Mrs. Garfield, Daniel Boone, and James Vick of the new varieties of Strawberries. Souhegan for early and Gregg for late black caps, Hansell for early and Cuthbert for late red, and Caroline for yellow make up the raspberry list. Early Harvest and Snyder for blackberries. Red Dutch, Fay's Prolific, and Victoria for red; White Grape for white and Lee's Prolific for black, give a grand list of currants. Downing and Smith's improved for Gooseberries. Early Victor, Worden, Concord, and Herbert for black; Brighton, Delaware, Jefferson, and Vergennes for red, and Lady, and Pocklington for white grapes, will give a succession of fresh fruits from June till mid-winter.

Thus far I have said very little as to the uses of the different species of small fruits, and while I have no doubt that it would only be doing the proper thing to spend some little time in explaining the many different ways in which they may be served, either in their fresh or preserved state, I think we can safely trust it to the Yankee ingenuity of our ladies to find some way to use all the fruits we will be likely to supply them.

I can think of nothing better to close this paper with than the following from Leisure Hours for Feb., 1884. "Home without a mother is a familiar phrase, as is also home without a baby, but a home without a fruit garden seems, to us, to be no home at all."

Mr. Blot. I would like to ask Mr. Hale what time he has found to be the best season for pruning grape-vines?

Mr. Hale. Ours are usually pruned in November.

Mr. Blot. Does it make any difference what time you prune them, between November and March?

Mr. Hale. We have a lady in our family about seventy-eight years old who takes care of those 116 grape-vines. She could tell you a great deal more about it than I can. We furnish the vines and set them out and she takes the entire charge of them.

Mr. Blot. She is not here; I am interested in grapes and want to know whether it makes any difference what time they are pruned.

Mr. Hale. Mr. Williams of New Jersey can answer that question a great deal better than I can.

Mr. Blot. We would like to hear from Mr. Williams, then.

Mr. Williams. I think it makes no difference if the wood is thoroughly matured. It used to be the received opinion that the vines should be pruned in the spring, but I think fall pruning is about right. I have just finished mine—about a week ago.

Mr. Van Deusen. Mr. Hale spoke about close pruning. I would like to know what he calls "close pruning?" Whether to one bud, two buds, or more?

Mr. Hale. Keep it down to the stake, not over six feet high. That is not supposed to be very close.

Mr. Van Deusen. Suppose it to be on a trellis, fan-shaped, and spread out, do you prune to one or two buds?

Mr. Hale. She usually prunes to two buds, where we get the best grapes.

Mr. Van Deusen. Such a vine would bear about how many?

Mr. Hale. From one four-year-old vine of the Early Victor variety, we picked this year about seventeen pounds.

Mr. Van Deusen. We have some forty vines. A year ago we had a grape-vine on the side of our house where they picked two bushels of Concord grapes. We have an arbor about 330 feet long. I stood one day looking at that vine on the side of the house, and I said, "There are more grapes on the side of the house than there are on 660 feet of arbor." I took it into my head to see if there could not be something done. I had trimmed to two buds heretofore and rubbed off the first one, leaving only one that fruited. This vine is ten years old and it has borne every year since it was three years old. This year I have no doubt it had six bushels; the year before I think they told me it bore ten bushels. I think that when you cut a vine down to one bud or two buds it is a great shock to the system. A grape-vine, and especially a Concord vine which is a very rapid grower, should have plenty of room, and if you set your vines further apart, you would get better grapes and more of them, and we should not have to pay the nursery man so much for vines. (Laughter and applause.)

Mr. Blot. I would like to ask Mr. Hale if, in this climate, we do not have a stronger vine and better fruit if we trim the Concord to six or seven feet?

Mr. Hale. The best fruit I have seen grown here has been grown on a stalk not more than five or six feet high.

Mr. Blot. In Europe, along the Rhine, and through France and Germany, they cut the vines down to four feet; but does not the Concord require a little higher trellis than other grapes in this country?

Mr. Hale. It is a little freer grower than others. I should not think you would get any better fruit.

Mr. Hinman. I would like to inquire if the Rogers No. 4 does not want more wood than the Concord—a great deal?

I have no luck at all in trimming that. If I let the vines run by themselves, they give me good crops; but whenever I have pruned, it has been at a loss of fruit. I was through Mr. Dickerman's vineyard this fall, and he told me that he had found precisely the same result. He said he was obliged to let some vines take care of themselves; they had a little of the wild Indian in them, and it was necessary to allow them to take to brush occasionally, in order to produce good fruit.

Mr. Hale. The only Rogers No. 4 we have runs over the broadside of the house, and bears well. It goes without any pruning whatever.

Mr. Gold. When in California this past summer, I noticed, on some of the best fruit farms, that the foreign grapes were trimmed to a single stump, two or three feet high, and bore their fruit close to the ground. On those same farms American grapes were also cultivated, on trellises, and a pretty liberal growth of vine allowed. They said they did not admit of the same short pruning as the foreign grapes; that their system was entirely different with regard to the Isabella, Catawba, Concord, and others, than with the foreign varieties that they were growing upon those same fruit farms.

Mr. Blot. That is the information I would like to get. I know of foreign fruit farms where they raise grapes, and they cut some of them as low as two feet and a half. That is the Chasselas; and they hold themselves, without any support. But in this climate, is it not better to let them grow seven or eight feet? Would we not have more and better grapes, and would not the vines last longer, and be more thrifty?

Mr. Gold. Our New Jersey friends ought to answer this question for us.

Mr. Blot. I have seen grape-vines trimmed here by foreigners, who had just come over from the old country, and they trimmed them down to four or five feet, and invariably the fruit has been poor. I would like to know from some one who has had more experience than I have had, if our Ameri can grapes do not require a little longer trimming?

Mr. JESSE P. ROGERS, of New Jersey. I believe one of the great points in trimming grapes is to get very fine fruit—large, heavy clusters. To do that, with most vines, short trimming is required; say, of the Concord, from four to six feet. Rogers' Hybrid has been spoken of here. Almost all of the Rogers' Hybrids, the Diana, and several others of that style of grape, need very long arms—twenty, thirty, or forty feet; and, with arms of that length, as a general rule, the grapes are a great deal better. No arbitrary rule can be laid down for trimming grape-vines; but they must be trimmed according to the nature of the vine itself. But I should think that a vine not trimmed at all would run all over creation, and get away from us. The very gentleman who said, this morning, that he would keep oats from his horses if they ran away from him, now says: "Trim your grapes very long." I am sure his horse would get away from him there.

Mr. FENN. I have made a practice of taking the laterals, such as I wanted to fruit next season, and cutting away the old wood, retaining the new, and from those branches which put out, I have obtained not only the best fruit, but the largest, and finest bunches. I have a Diana vine, which I set out more for shade than anything else. I would not undertake to say how many grapes that vine has borne; but I know it has borne a great many. It is in a locality where the grapes do not ripen very well; they do not get sun enough, and some seasons I get a poor crop; but a majority of the seasons they ripen well. A great many claim that I am severe in cutting; but I always cut away the old wood, retaining the new, and I have the best results from that system of pruning. I only give it as my experience. I don't know whether it is best for others to follow it or not.

Mr. BLOT. I have always done that way myself. I had a three-year-old grape-vine this year that gave me thirty pounds of grapes. What I want to know is, as between cutting to four or five feet, as they do in Europe, and seven or eight feet—which would be the most profitable?

Mr. AUGUR. I have listened with very much interest to the paper which we have had this afternoon, and I think it is to be very highly commended; and especially, I would say, Mr. Hale's selection of varieties is capital.

This matter of pruning grapes has been alluded to, and it is a matter of very great importance; I think more than almost anything else, except the cultivation. The Concord grape has been spoken of; and that is the grape of the country. Probably nine-tenths of all the grapes that go to the New York market are Concords. I wish they were better; but they are fairly good, and the people are satisfied with them. The question is—How to raise the Concord grape, and how to prune it? I was pleased with the remark of our friend, Mr. Rogers, of New Jersey, in regard to different varieties requiring different management. I think that is eminently so. Indeed, I know it is so. What is necessary for the Concord will not do at all for the Delaware.

In regard to the Concord, I spent most of last week up the Hudson, visiting the vineyards there, and enjoyed it exceedingly. I saw a great many extensive vineyards. They have a way of raising the Concord grape there which is perhaps a little peculiar to their locality, but they are very successful. I saw vineyards there from which over ninety tons had been shipped. Their method is what is known as the Kniffen system, and it consists of posts, with a trellis of two wires, one three feet from the ground and the other about six or six and a half. The vine is trained so as to form, you might call it, a double T. There are two arms that run on the first wire and two on the upper wire. The vines are planted about eight or nine feet apart, and occasionally a man plants them as far apart as ten feet,—but I think that is the exception,—and, as Mr. Fenn has very well remarked, they manage to raise their fruit on young wood. This is a peculiarity, and they feel that it is a necessity; and I find that old arms and short spurs are what they detest. But, on the other hand, they calculate to get a new arm on a wire, each way, each year, and limit the fruit production to those new arms.

If any one should happen to be at the railroad station in

Marlboro' or Newburgh, in the shipping season, he would be simply astonished. He will find twenty tons, and more, going to New York in a single night.

Well, as I remarked, they use the Kniffen system exclusively for growing the Concord. I think all of them adopt that. On the other hand, for the Delaware, they adopt an entirely different plan. Mr. Holmes, at Little Hope, near Newburgh, who has probably the best Delaware vineyard on the Hudson,—at all events, the best I have seen,—cuts away everything to within six inches of the ground, except one new cane, and that up six feet high. The laterals of that new cane are trained off each way, perhaps two feet and a half. He sold his Delaware grapes this year, in New York, at from eighteen to twenty-five cents a pound, wholesale, where the Concords were bringing from two and a half to three cents. But he only raised about half the amount per vine that he got from his Concords. He calculated to get from his Concord vines about twenty pounds of choice fruit to a vine, and from his Delawares about ten pounds. But they were wonderfully choice, and, as I remarked before, for a considerable portion of his Delaware grapes he got twenty-five cents a pound. He feels greatly encouraged in raising Delaware grapes at that price.

The yield from some of their best vineyards on the Hudson river has been reported as being six tons to the acre, on land upon some of which you would hardly venture to plant corn. I found that Mr. Holmes's (and several others have imitated him) had but one arm, about six feet long, and that is trained up vertically.

Mr. Blot. What time do they pinch back the laterals?

Mr. Augur. That is done in summer, after the fruit is set.

Mr. Blot. For the Delawares, as well as the others?

Mr. Augur. Yes.

Mr. Blot. How far do they allow the laterals to grow before they pinch them?

Mr. Augur. I was not there in the fruit season; the fruit was all gathered. I only saw the naked vines; but I should judge, from two and a half to three feet each way from the main stem. We all understand that the fruit is produced on the present season's wood, and from each of those eyes on this vertical stem there is a branch which has from three to four clusters, and where the wood is tolerably short-jointed there are a good many branches and a good many clusters; those are thinned out and the wood shortened back a little, according to the growth.

Mr. Wheeler. I would like to ask Mr. Augur or Mr. Hale if the practice of girdling vines during the fruiting season is recommended now, as it was some few years since?

Mr. Augur. I believe it is a practice that is very generally condemned. It is occasionally done in order to secure larger fruit; but, in a great many of the horticultural societies, it is against the rule to accept fruit from girdled vines.

Question. I would like to ask if they take a new cane for the next year?

Mr. Augur. They do, invariably, from near the ground.

Mr. Williams. The locality that my friend speaks about is noted throughout the land as being one of the finest grape-growing regions in this country. It is a paradise, comparatively speaking. They know nothing of mildew or rot, the two great difficulties with which we Jerseymen have to contend. The climate in this respect has a great deal to do with the success of grape culture. What the climate is here in Connecticut I cannot say, and it would be unwise and presumptuous for me to advise you how to prune your vines.

Perhaps the idea that this gentleman on my left has advanced may have something to do with it. It is a question whether we do not get better crops if we give our grape-vines light and air than we do if we adopt the system which Mr. Augur has described as practiced on the Hudson. I have long been of the impression that mildew is largely developed and fostered where the air is confined near the ground. I have always found mildew near the surface on my vines. Of course, if we trim our vines any considerable distance from the ground, we will get less radiation from the surface; but if we can avoid mildew, that will be an important element in the raising of good crops.

Mr. Blot. That was the reason I asked the question. Through Burgundy, the middle and south of France, Italy, the Rhenish provinces, and Germany, there is comparatively no dew at the time the grape commences to turn; but in this climate we generally have very heavy dews at that season. It is my impression that dew has something to do with mildew, and, by trimming our grape-vines up higher, I think we should avoid the effect of mildew, to some extent at least.

Mr. Williams. That is the advantage of California. They can pick their grapes from the vines and throw them upon the ground, and remove them when they please. Apropos of this subject, I had a letter from a friend in Burlington county, N. J., who practiced the European method of short pruning, who has always been successful in taking the prizes at the exhibitions. I don't think we can do it. This last season has been the worst that I have ever experienced in my life, for grape-growing. So that it will not do to lay down general rules. We have had heavy dews and we have had very cold nights—the thermometer down to 50 or 56 every night.

Mr. Augur. I would like to ask Mr. Williams, from New Jersey, if he has noticed any difference in regard to the rot and mildew between those vines which were partially sheltered and those which stood in the open ground.

Mr. Williams. My vines are all in the same condition, as near as may be. I have adopted the Kniffen system of pruning, because it is the simplest I have known of, and I cannot say that I have found any difference with the rot. I think it has appeared more on the lower arms, as a general thing, than on the others. I know that when I was a boy I could grow Isabella grapes as good as anybody ever wished to put in his mouth, but I have not been able to do it of late years.

QUESTION. Will the gentleman give us the method by which Isabella grapes can be grown to perfection?

Mr. WILLIAMS. I cannot tell you how to do it. I know I used to do it. In fact, they grew themselves. We put them on a trellis and let them run. We merely pruned them to one or two buds, and we could get as fine clusters of Isabellas and as fine berries as you can get from Rogers' Hybrids; but we cannot do it now.

QUESTION. Will the gentleman explain whether pruning has ever been a success with any of the Scuppernong varieties of grapes?

Mr. WILLIAMS. I should not expect to grow the Isabella, or any of that class, if I did not prune pretty severely, because any grape-vine that will produce fruit will kill itself by over-bearing if you do not prune it. The great trouble is, that we expect the vines to do too much. You might as well expect a five or ten-year-old child to do the work of an adult. Up the Hudson, the section Mr. Augur speaks about, the best growers estimate on fifteen pounds per vine. If they can get fifteen pounds from a vine they are satisfied.

Mr. AUGUR. Speaking of the Isabella grape, we have one vine of the Isabella which is on an arbor between the main part of the house and the L, and I think we have not missed a crop of well-ripened fruit for the last eight or ten years. This fall we have enjoyed them exceedingly. But this vine is partially sheltered. We avoid cold currents, and perhaps dew, to some extent, and we always expect a well-ripened crop from that vine.

Mr. ——. I have no theory, but I have a bit of experience that may be useful. I have a Diana vine which was set out twenty years ago, and it soon covered the side of the house, embracing about 1,800 square feet. I have not failed of a crop but one year, and that was when I took it down and trimmed it. I have had from four to six bushels of well-formed clusters every year.

Mr. ——. My experience has been directly the reverse of that of the gentleman from New Jersey. Wherever I have trimmed an Isabella vine, I have not got so good fruit. I have seen it, in the southern country, from forty to sixty feet high, and I do not believe the Scuppernong grape can be pruned to any advantage.

Mr. ——. I will tell you my experience. I have cultivated one vine for nearly twenty years. It is protected on the southeast. I let it grow until it gets as big round as a quarter, or a little larger. Then, when a sucker comes up from the bottom, and gets about the size of my thumb, I cut up the old stock and let it run. I have not failed for twenty years in getting a crop of nice, large, splendid Isabellas. I will guarantee that any man who will try that method will succeed. I have had them entirely ripe the thirteenth of September.

Mr. Rodgers. I think that the difficulty is this: that if vines are not summer pruned, as a general thing, the fruit-eye will not form a vigorous growth, and, if the vine is trimmed, the eyes will not develop and produce fruit, and a great deal of the crop is lost in that way.

Mr. Blot. I would like to know of those gentlemen who do not prune grape-vines how many they can set out to the acre, and how far apart they would set them?

Mr. Hale. One will cover an acre, I guess, if you give it a chance.

Mr. Blot. There is such a thing as cultivating grapes on an outbuilding and around the house, but my question relates to profitable field-culture.

Mr. H. L. Jeffries, of Washington Depot. I would like to inquire of Mr. Hale and Mr. Augur if they have noticed, during the past season, a louse, very much like the green aphis, at work on the under side of the grape-leaves, and also a hole punctured in the green wood, about a foot from where the shoot starts? After several of those holes have been punctured the stem dies. I have been called on by quite a number in New Milford and Kent to look at vines that were troubled in that way this fall. My attention was not called to it early enough so that I could find any insect that troubled the vine; but I have seen whole vineyards of Rogers' Hybrids, some Isabellas, and even some wild vines in the woods, troubled with this insect. If any gentleman has had any experience in this matter I should like to hear it.

Mr. Hale. I have not known of it.

Mr. Augur. It has not troubled me. I would like to ask what time in the season it showed itself?

Mr. Jeffries. My attention was called to it just as the leaves were falling, this fall. The way I came to go and examine the vines, a gentleman asked me if I would go and see what was the matter with his vine; it looked as if it were being eaten up. The leaves had very much the appearance as if they had been dipped in hot water. If this plague gets well started, it will not take a great while for it to spread all over the State. I will take pains to send specimens of the wood and the insect to any entomologist who will examine it. I have the insect, whatever it is, in a bottle, and shall keep it during the winter, and let it hatch out next spring, to see what it is.

Mr. Augur. I have a branch that Mr. Jeffries handed me that is affected in that way; but it is something that I am not familiar with. I have not experienced that difficulty myself. I should suppose that some insecticide would be a remedy, if you knew just when to apply it.

The Chairman. If there is no more to be said on this subject of fruit-culture, we have some gentlemen here who would like to discuss the subject of bees. We would be glad to hear from Mr. Jeffries.

Mr. Jeffries. I am not going to say a great deal in regard to handling bees, but there are a few plagues that affect them as well as other things. My attention was called particularly to an insect that infests hives this summer by a letter from Mrs. Squires, of Reading, Conn. She wrote to me to make inquiries in regard to a species of red mite, very much like the small hen-louse, and informed me that within three miles of her there was an apiary of twenty colonies that had been very profitable, which was destroyed by that mite last winter. She noticed them herself this spring, and they apparently disappeared about the middle of June. On the 20th of October they again made their appearance, and to such an extent that some ten days before she wrote to me the hives were literally covered with them, as thick as ever the inside of a hen-house was covered with hen-lice. She sent specimens of these insects to Prof. Sherlock, of Lansing, Mich., and after a pretty thorough examination he sent word that he should advise the use of fresh meat, or something similar, that would entice any carnivorous insect from acting upon the bees. After he had tried several experiments himself, he wrote to her again, and advertised in the publications relating to bees for information on the subject. I find that this insect is causing trouble in two or three other places, and threatens to sweep away, in part at any rate, the honey-gatherers from this State.

We have not only that pest to trouble us, but we have a disease called "foul brood." This is a disease of the imperfect form of bees—what is called by entomologists the pupa—while it is in its chrysalis state. Should that sweep through this State, as there is a fair prospect that it will, not only our friend Mr. Hale, but all who are engaged in the business of raising small fruits, will have to suffer. Our honey-bee is the strongest fertilizer that I know of, and I guess nobody else watches them more closely than I do. There is no other insect that works on the raspberry-blossom as thoroughly as does the honey-bee. You will find that the honey-bee is the main fertilizer of the raspberry-bloom.

After hearing from Mrs. Squires on this subject, I wrote to Mr. Gold to know if he would make a call on the bee-keepers of the State to investigate the trouble. The parasite can be carried from apiary to apiary by bees visiting the flowers and coming in contact with each other. Twenty of these small insects can lie on the thorax or central part of the honey-bee. There is only a space about as large as a very small pea for them to cluster on. They are not noticed by the naked eye, and, being of the louse family, will deposit their eggs on the hairs of the body. They are traveling through several parts of the State, and I have found, by talking with gentlemen this afternoon, that there is evidence of their presence a short distance below us here in the Naugatuck valley. It will take but a short time, with the distance that bees travel on the wing, to carry these parasites through the State, and the rapidity with which they breed will in a short time scatter them through all the apiaries. There are quite a number of people in this State who are making a business of apiculture, and it stands to reason that they should make some move to find out to what extent these parasites are now working. That was the reason why I called on Mr. Gold to see if there could not be a discussion at this meeting in regard to the parasites and foul brood. I brought some of the specimens with me, and a sample of foul brood, and if anybody is interested in the subject, or wants any information on it, I will try to answer what questions I can, and will give them what information I can; and I would like to have those who are possessed of any information to give me some in return.

Mr. Gold. Let us hear something about foul brood. Explain the points in connection with that.

Mr. Jeffries. There are two kinds of foul brood with which I am acquainted. One of them is a malignant type. That type can be carried from apiary to apiary by the honey-bee. It is a fungoid growth on the bee. When the egg is laid it hatches into larvæ in three days; it is from five to seven days a grub, and then is sealed over and remains in a chrysalis state from eight to about fourteen days, according to the weather, somewhat. While it is in that chrysalis state it decays and can be noticed readily by a very offensive smell. Disinfectants like carbolic acid and soda are used for it. The extent to which malignant foul brood is detrimental to bees was shown in the State of Michigan a year ago by five thousand hives being destroyed by it in one season. The other type, before it gets free from the chrysalis state, begins to turn yellow. When they get their full growth in the grub state, before capping, they will look plump, like any ordinary larvæ, and then they will turn a yellowish brown, and finally dry up. It takes about seventy-two hours from the time the first evidence is shown of the second type of foul brood before it becomes developed. Both of them are claimed by entomologists to be the results of fungus.

QUESTION. I would like to inquire what the indications are of the presence of foul brood?

Mr. JEFFRIES. In the first stages, you will detect it by there being a few cells in the comb that are capped over. On picking them open they will be found to contain the bee in its most perfect form, but it is a viscid, rotten mass. It holds its shape, but, at the same time, it is putrified, and the scent from it is very disagreeable. You could not pass within ten feet of the hive without smelling it. It leaves the cell in a dirty-looking state. I dare not carry the malignant type with me, because it is something that scatters easily.

QUESTION. Can you give any reason why the bees do not clear that out themselves?

Mr. JEFFRIES. They cannot; the cells are capped over, and they know that there is not a perfect bee there. But they never have been known to clean it out. If you uncapped the cells with a knife and put the comb back again, they would not remove the putrified corpse, but would desert the hive.

QUESTION. Are we to understand that this is a recent development?

Mr. JEFFRIES. It is something that has been known ever since the year 1796, but it is spreading, through carelessness, I think, through several parts of the State.

Mr. AUGUR. Do I understand that it is worse now than it has been for a period of years?

Mr. JEFFRIES. It is worse than I have been able to find out that it has ever been previously. In Woodbury, it has destroyed over one hundred stocks, within three or four years, in one neighborhood.

Mr. Augur. Can you suggest any sanitary conditions by which it can be avoided?

Mr. Jeffries. No; I cannot. The original cause of its appearing is not known. The scientists are now at work upon it to find out, if possible, where it first shows itself.

Question. Can you tell whether bees work by moonlight or not?

Mr. Jeffries. Yes, sir; they do during the bass-wood season. I will relate an instance that will answer the question exactly. In 1876, I was at Mr. Stone's, in Woodbury, when he came up from the river about half-past seven o'clock at night, and he said there was a swarm of bees in a bass-wood tree down by the river. I doubted it, and went down there to look for myself, and found they were at work very busily. I then went to where I had two hives on a knoll, and I found the bees were going back and forth quite rapidly. Since then quite a number have noticed the same thing, so we know that, during the bass-wood season, they will work, where those trees are close by, by moonlight.

Question. How far was this bass-wood tree from the hives?

Mr. Jeffries. The farthest hive that I know of might have been an eighth of a mile distant.

Question. How far do you think a bee goes in the day-time from his own hive?

Mr. Jeffries. The only way that I can answer that question is by saying that, in 1873, I had a hive of Italians in Woodbury, and there not being any other Italians nearer than Bridgeport or Meriden, they were found over in Roxbury Centre, which was some six and a half miles from where I had the hives standing.

Question. Do you think that the Italian bee will go further from the hive than the common bee?

Mr. Jeffries. Yes, sir; I cannot positively prove that, because I have no way of tracing the black bee. We can take the Italians into a locality where there is nothing but the black bee, but we cannot take black bees into a locality where there are only Italians.

Question. Does Mr. Jeffries recommend crossing the Italian with the common bee?

Mr. Jeffries. No, sir; I do not.

Question. Would you prefer the Italian over the common bee?

Mr. Jeffries. Yes, sir.

Question. Why?

Mr. Jeffries. Because I am convinced, from what I have seen of them since 1872, that they are far stronger honey gatherers and more gentle to handle. They are more prolific and stronger of flight. On an average, three good, strong Italian hives will give as large a yield as five hives of the ordinary bee. That is about where they have stood in a great many trials.

Question. Is the result of a cross between the Italian and the native more good natured than the Italian itself?

Mr. Jeffries. No, sir; they are more vicious, as a rule.

Question. Are they more vicious than the common bee?

Mr. Jeffries. Yes, sir.

Question. Can you tell, in one word, how to prevent the moth miller—that is the greatest foe that we experience?

Mr. Jeffries. Yes; keep good, strong stocks, use a moveable comb hive, and what harm the moth miller does you will never know.

Question. Can you get an Italian stock of bees by putting Italians into a hive of common bees?

Mr. Jeffries. Yes, sir; every time.

Question. How long will it take?

Mr. Jeffries. About forty-five days in the height of the honey season.

Question. The next brood will be perfect Italians?

Mr. Jeffries. If the queen is pure, and purely mated.

Mr. Van Hoosear of Wilton. Would Mr. Jeffries put his bees in a cellar in winter to keep them?

Mr. Jeffries. In regard to putting stocks in a cellar to winter, if I had a cellar properly situated, and from fifty to one hundred and fifty or more stocks, I should winter them in the cellar; otherwise, I should not. Unless there are stocks enough to maintain a degree of heat from forty-two to forty-eight, it is more detrimental to put them in a cellar than to keep them out; that is, as far as I have known of its being tried. Keeping them in the cellar during the winter does not have much to do with it, but when you bring them out in the spring they are apt to die off very quick.

Question. I would like to ask Mr. Jeffries if he ever knew a hive buried during the winter in the ground?

Mr. Jeffries. Yes, sir; I have. There are a great many hives buried, and they are buried very successfully, too. If there are two or three benches, I consider that is one of the best ways you can keep them, and the safest way, for two reasons. The great enemy that bees have during the winter time is man himself. They are in a partially dormant state, and when they have once clustered and got into their own quarters, they want a severe letting alone until they come out of themselves. To disturb a hive of bees in winter, when they are once clustered, is as sure death to them as taking a good dose of arsenic is to a man.

Mr. Van Hoosear. Would you ever bank a hive with snow?

Mr. Jeffries. I have banked hives with snow very successfully, but how much banking is necessary is not positively known. I have seen them four feet under the snow, where they have wintered safely; I could not ask them to winter any better. But to go and stamp the snow around the hive for the sake of getting it there, I should say would jar the bees so much that it would do more harm than the snow would do good; the one would counteract the good effect of the other.

Question. Can that degree of heat which you speak of be maintained outside of a cellar?

Mr. Jeffries. Not without a house. Whenever packed out of doors, the main object is to keep them as cool as possible, keep them quiet, and prevent their consuming more honey than is in stock; and that same packing that keeps them cool and quiet during the winter time, when they warm up in the spring, prevents their feeling the changes of weather which keeps them at such an even temperature that brooding is carried on steadily. Where they commence to breed pretty freely and there comes a cool spell to such an extent as to cause them to contract their cluster, there are two things lost; one is the loss of the extra amount of honey consumed, and the other is the loss of the young bees that should replace the old ones. It takes one old bee to raise one young one early in the season.

Question. What is the general age of bees?

Mr. Jeffries. During the height of the honey season, the age of the workers is from forty to forty-five days. When they are not gathering honey, they live from five to six months. A young working bee that is hatched in September, October, or November, will live through until March and April, perhaps into May, according to the winter; but one that is hatched the middle of June will not live to exceed forty-five days; at least, I cannot find that they live longer than that.

Mr. Van Hoosear. Will you tell us about how many queens are hatched in a hive at a single breeding?

Mr. Jeffries. The number of queens hatched in a hive is according to the age of the cells when started. If the eggs are all laid in one day, and there should be fifty eggs laid in queen's cells, and they hatch simultaneously, we should find that number of queens in the hive; but, invariably, the queen that hatches first will destroy the rest, unless the stock is strong.

Question. Does the queen ever feed herself, or is she fed by the workers?

Mr. Jeffries. Both ways. Sometimes she feeds herself, and sometimes they feed her. During the height of the honey season, when they are gathering honey freely and she is laying rapidly, any bee that happens to come in with a lot of honey and passes her will offer her food. I have noticed that by watching them in a hive with but one comb and glass on both sides.

Question. When you send a queen through the mail, why do you put workers with her? Is it to feed her?

Mr. Jeffries. More for company than anything else. A queen alone does not carry well.

Question. About how many do you ship with her?

Mr. Jeffries. The distance that the queen is to be transported makes a difference in the number of workers that should be shipped with her. If she was not going more than a mile or two, I should put her into the same cage I was going to introduce into the hive; but if I was going to send her five hundred miles, I should put from a dozen to twenty-five or thirty workers with her, according to the season of the year. Early in the spring and late in the fall she would need more than she would in the height of the summer season.

Question. How many eggs does a bee lay, usually, for one brood?

Mr. Jeffries. They are continually laying from the time they begin in the spring until they shut off in the fall.

Question. Can you give an estimate of the aggregate number?

Mr. Jeffries. I cannot give you an estimate without figuring, because the number varies considerably. Experience this summer has proved that they will lay twenty-four hundred eggs in twenty-four hours. The way we verify that is by putting a new piece of comb into the center of the brood-comb, taking it out after a certain length of time, and measuring a given number of cells that have eggs in them.

Mr. Bill. If a working bee lives but the short period of time of which the speaker has told us, I would like to make the inquiry where he "shuffles off his mortal coil," whether in the field gathering honey or around the hive?

Mr. Jeffries. I never have been able to find out yet, and I doubt if anybody else has decidedly found out, that bees stay in the hive to die, unless it is in the winter time. I have noticed a great many bees that appeared as though they were troubled with some disease, or were going to die, that would crawl out of the hive to the ground, perhaps but a few feet from the hive, and there die. A great many bees that come out in the morning never get home; and not only in the morning, but all through the day. If a bee dies in the hive he is immediately carried out.

Question. I would like to ask the gentleman if he ever finds a stock that is dead in the spring, with plenty of honey in the hive, and if he can give any cause for it?

Mr. Jeffries. Yes, sir. One reason assigned for a stock of bees dying out during the winter, leaving a hive full of honey, is that the stock is weak in the fall, and another is that they become queenless. When a stock of bees casts a swarm, the old queen leaves that hive, and, after leaving the hive, there are no queens for the hive except in the embryo state. These chew their way out of the cells after the old stock leaves, and when they are from three to five, or perhaps eight days old, they fly out of the hive to seek mates. That mating time is a critical period with the old stock. If the queen is caught by a bird or insect or fails to arrive safely at her own hive, that swarm is queenless, unless the apiarist replaces the queen or furnishes the means to raise another. A stock in a box hive in that condition will very often continue to work as though they had a queen, and, there being no queen to replace the old bees with young ones, and the old bees not being worn out by raising a brood, they will, perhaps, continue until late in the fall, and the next thing the bee-keeper knows, he finds in the spring that his hive is without bees, but with plenty of honey.

QUESTION. Is the queen a bee that very often goes out from the hive?

Mr. JEFFRIES. A queen goes out on two occasions from the hive; once for the purpose of mating, and after that for the purpose of leading a swarm. Under no other circumstances are queen bees, as a rule, known to leave the hive, except when they are taken out.

Mr. VAN HOOSEAR. What do people mean when they say "the king bee?" Do they mean they do not know anything about it?

Mr. JEFFRIES. That is it, exactly. They show that they are ignorant of what they are talking about. There were works written years and years ago in which the chief one of the hive was spoken of as "the king bee;" but Francis Huber, in 1796, gave to the world a positive elucidation of the fact that the chief bee in a hive was a female, consequently, a queen. But she is not a queen, so far as any royal power is concerned.

QUESTION. When a colony leaves their home with more than one queen, what is the cause and the result?

Mr. JEFFRIES. If a stock of bees issues with more than one queen, it is from one of two causes. First, if the stock contains an old queen in the spring, and they feel disposed to supersede her and raise another one, they are going to "make assurance doubly sure" by trying to raise several. If three or four, more or less, of those hatch at the same time, the bees, if the stock is very strong, will protect those young queens, and, not being disposed to have more than one, or not allowing more than one to stay in the hive, they will attempt to swarm, and very often all the queens there are in the hive will issue with that swarm; consequently, when they are hived, they have a fight, and one remains. Then the result is either queenlessness in the original stock, or more than one in the swarm that issues.

Dr. Bowen. The gentleman has spoken of a hive being deprived of its queen; is there not such a thing as taking a cell intended for a common bee, nourishing the larva, and having it grow into a queen?

Mr. Jeffries. Yes, sir, the bees will do that. In order to obtain that result, you take a stock of bees that has the larvæ in all stages, from one day up to capping, and deprive them of their queen, in the space of two or three hours, they will go to work and enlarge the cells of grubs that would otherwise be workers or imperfect females, and by nourishing those larvæ and feeding them with a richer pabulum, they will produce a queen. The difference between the queen and the worker is, that in the queen the ovarian organs are developed and in the worker they are suppressed.

Dr. Bowen. Is a queen bee hatched as soon as the others?

Mr. Jeffries. Exactly the same. From fifteen days and eighteen hours from the time the egg is laid up to sixteen days and a half. That is the longest time that we can find. It makes no difference whether you take a grub that would be a worker or whether you take an egg laid purposely for a queen, in a queen's cell.

Mr. Van Hoosear. Can you tell us why honey will not run out of a cell that is not full?

Mr. Jeffries. Because of atmospheric pressure. That is the only answer that I can give you. When a cell is filled with honey by the bee, it is not filled perpendicularly full, as it is where you cut the capping off. They fill the cell with an oblique dip, by pressing over the back of it, and when they cap it, they commence to cap it on the lower side, capping until they reach nearly the upper edge of the cell. The way the expert in handling honey determines whether a box of honey was put up by the Italian or by the common black bee (and he does not have to be a very great expert, either, to be able to tell) is by the way the capping is put on. The black bee does not put the cap directly on top of the honey, while the Italians will fill the cell as full as they can get it.

QUESTION. Is there any covering put on that honey as the bee passes along?

Mr. JEFFRIES. Nothing but wax as it falls from the bee as it comes from the mouth of the cell. We cannot find any other covering by looking at it closely with a strong magnifying glass.

Mr. CROFFUT. Do you think if bees are well cared for there is food enough in Connecticut to support any number of them?

Mr. JEFFRIES. As near as I can find out, there are between fifty and seventy-five thousand stocks in the State of Connecticut to-day. In places where we have been showing people how to change from the old-fashioned box hive to the movable hive plan, I find that they are just about trebling, and in some cases increasing four times, the number of stocks that were originally in the locality. Those stocks, under the improved care, and by saving the best, seem to give four times the amount of honey that they did before in the box hives. I think that the number of stocks that there are in the State can be increased six or eight times, and, with proper care, make a very good paying investment. Where they are properly taken care of, I believe that the people are satisfied that they pay as well as anything else they can do. I know two or three men, within a few miles of where we now are, who have obtained from four to six hundred dollars this year as the result of taking care of twenty or thirty stocks in movable comb hives. You may think that everybody can do that. I do not think so, because you have got to understand bees in order to take advantage of them, and if you don't take advantage of them, you will not get the benefit. It is a mathematical problem in regard to handling them clear through, because you have got to increase your stocks in the spring at such time as to have the strongest of your working force in the harvest, or as one of our best bee keepers says: "You must manage to have your bowl right side up when it rains porridge." If you allow them to increase without regard to when your honey harvest is coming, you will not have workers enough to take the whole of it. It will be just like mowing your hay field before a shower or cutting down all your hay at once. Unless you have help enough to get it all up, you will lose part of your crop. Our honey crop lasts but about six weeks, and by having our stocks in proper strength in time, it can be gathered very profitably.

Mr. Van Hoosear. Do bees secrete or extract honey?

Mr. Jeffries. They extract it from the flower.

Mr. Van Hoosear. Is it perfect honey then?

Mr. Jeffries. No, sir, it is evaporated afterwards. You can take almost any of our prolific honey plants and obtain the liquid from the blossom. Last year, our sumach was so full of honey, that I could turn a blossom over on a sheet of white paper and it would be covered with the dilute honey in its crude form. That would need evaporating about three-fourths. The honey from flowers does not need so much evaporation.

Mr. Augur. I would like to ask Mr. Jeffries if he will name in their order some of the best honey-producing plants?

Mr. Jeffries. Our best honey-producing plant, early in the spring, is the yellow willow. It has a spike of flowers about as long as your finger and about as large round. The first blossom the bees work on is that of the skunk cabbage, and, after that, the others that follow are not of much account other than to start the early breeding. But the first plant that yields honey in abundance is the yellow willow. Then come our fruit blossoms, and, when the hard maple blossoms, that is another. Soft maple is a good honey tree, but it generally blossoms in a season when the bees cannot get the advantage of it; they cannot get the honey that it secretes, and for that reason it does not amount to a great deal. After the fruit blossoms are gone, and the blossoms from the trees, there is a little scarcity until we get the white clover blossoms and the blossoms of small fruits. After the small fruits and white clover, we have basswood and whitewood. After basswood, or as it is winding up, come sumach, and our boxing season is over. That brings us to about the 15th of August, as a rule. In the fall, we have the golden-rod, the asters, and a species of Spanish needle, as it is known to the bee keepers, which grows in the swamps and gives a great deal of honey, and so do heartsease and smart-weed.

Question. I would like to ask a question in regard to the willow: Whether it is the staminate or pistilate plant that bees feed upon?

Mr. Jeffries. Both of them; because from one they gather the wax which is absolutely necessary for the brood-comb, and from the other they gather only honey. The yellow willow has the most honey in it.

Question. My question had reference to what is sometimes called "pussy willow."

Mr. Jeffries. The pussy willow does not amount to much; it is the yellow willow. The pussy willow has a reddish flower. The early pussy willow gives us no good results at all.

Mr. Van Hoosear. Can the common bee work on the red clover and get any honey from it?

Mr. Jeffries. Not much.

Mr. Van Hoosear. Can the Italian?

Mr. Jeffries. They do. The Italian bee works the red clover quite persistently.

Mr. Hoyt. Are you able to detect any difference in the fragrance of honey gathered from buckwheat—I have often heard it said that it is not as good as other honey?

Mr. Jeffries. Of course I can; where honey is gathered entirely from a buckwheat field, you can taste it as strongly as you can taste the flower when you take it up in your hand.

Mr. Day. At what season of the year do you get the best kind of honey?

Mr. Jeffries. If I answer that question, I shall have to answer it with reference to the kind of honey which I like best. I suppose that the golden-rod gives the finest flavored honey.

QUESTION. Is there any artificial food that can be fed to bees profitably to be converted into honey ?

Mr. JEFFRIES. No, sir ; it cannot be done. You may feed them anything you have a mind to, and it is just exactly as you fed it to them when you take it from the comb. Bees change nothing that they take into the honey sack at all. Sugar and water fed to them and stored in the comb remains sugar and water after they have put it there. It is a good plan to sow a little salt around the hive ; they will work on it some. I never could notice that there was any honey taste to sugar and water, and I never have seen anybody else who could, although it has been fed to bees for the sake of finding out if the bees, when they stored it in the comb, gave it the taste of honey to a person who did not know what it was.

QUESTION. Do bees work on locust trees ?

Mr. JEFFRIES. Yes, sir ; it is one of the best honey trees. The flowering locust they do not work much on ; the black locust is the one they work on most. If a person has a stock of bees it will pay him to plant a black locust tree, and when it gets to be about eight or ten inches through cut it down for posts and use it in the fence, and let the stump sprout. You will get honey enough out of the black locust to pay for the occupation of your soil. The blossom of the one I mean is rather pinkish, and the honey is in the lower part of the flower to such an extent that you can see it plainly with the naked eye.

Mr. ———. Perhaps I can describe the locust so that the assembly will know what I mean. It bears a long cluster of blossoms, and each blossom is like a pea-blossom, somewhat. The leaves are divided into a great number of segments. It is classed as a timber tree, and, as Mr. Jeffries says, when it is cut down it makes first-rate posts and lasts forever.

Mr. JEFFRIES. There is a little yellow in all of the locust blossoms.

Question. Does the bee bite the grape or other fruit?

Mr. Jeffries. I answered that question last winter at Rockville. I can satisfy any reasonable man, by an examination of the mouth of a bee, through a powerful microscope, that it is impossible for a bee to bite through the skin of the grape or any other fruit. After the skin has been punctured they will suck the fruit dry of its saccharine substance, but they cannot puncture it.

Question. Does the king bird do much injury to bees?

Mr. Jeffries. Yes, sir; it is very disastrous round an apiary.

Question. Whether the queen bee ever stings?

Mr. Jeffries. The queen bee stings her own sisters, but does not sting people. I have never known of but one instance where a queen bee stung the person who handled her.

Prof. J. W. Clark of the Amherst Agricultural College was called upon to speak on the subject of fruit.

Prof. Clark. I was not here this morning when the paper was read, and do not know what was said, and if there is anything you want to ask me about, I think it will be best for you to ask questions.

Question. I would like to know if there is any hope of peach-trees being cured of the yellows?

Prof. Clark. I think the yellows may be a disease and may not; I don't think there is anything known certainly about it. The trouble seems to be that the circulation of the sap in the tree is clogged; that is, it does not circulate as freely as it should, and in that way the cells of the wood become clogged, and what is wanted is to clear the cell and let the sap circulate freely again. That Prof. Goessmann has done by fertilizing the tree; that is, by giving it muriate of potash, bone, and phosphates, and then heading the tree back severely. I have seen a tree, the leaves of which were not more than an inch and a half long, very narrow, yellow, and all rolled up, so that you would think the tree could not live, so improved by fertilizing it and then cutting back, that the leaves were six inches long, an inch and a half wide, and as dark-green as you ever saw on a peach-tree. By cutting the tree back you leave only a few buds to start, those start vigorously, the circulation goes on freely, and the tree becomes healthy. The experiment so far has been successful, but I do not think it has gone far enough to enable us to say that you can take any tree which shows signs of yellows and save it.

Mr. ———. A dozen years ago I commenced the cultivation of peach-trees, and I have had more or less peaches every year. Until this last season I had a pretty good supply; but the season was very dry, and I saw certain signs which indicated a return of the yellows; that is, little diseased shoots came out of the tree, close down to the root and grew a few inches with a diseased, pale look. It is the same appearance that we had years ago, when it was so difficult to raise peaches in this State. The question has been started in one of our agricultural papers whether there is any hope of saving our peach-trees, and some person who has had experience suggested that the best remedy was the axe.

Prof. Clark. In regard to the growing of peaches, I think it depends as much on freedom from borers as anything else. That is something that I think the peach grower has to contend with more than with what you call the "yellows." I think a good many say that the yellows have injured their trees, when the real trouble was the borer. I think that more young trees die inside of three or four years from the time of planting on account of the borer than from any other cause. I had charge of the nursery at the College, and wanted to sell a man some peach trees. He said no; he wasn't going to set them out, because the yellows were killing his trees. I asked him if he had looked for the borer. He said "yes." "Did you find him?" "No." I went out and looked at his trees, and from the first one I took out eight or ten borers. So he went through his whole orchard and found a great many borers. The year after the trees grew well and looked healthy. We have found that the borers bother us more than anything else. We have cut eight or ten trees that looked as if they had the yellows, because we thought it was better to remove them rather than run any risk.

Question. What quantity of muriate of potash do you use?

Prof. Clark. We put on about a pound of muriate of potash and two pounds of ground bone, and the next spring we put on as much more—from a pound to two pounds of muriate of potash to a tree.

Question. Do you scatter that around broadcast?

Prof. Clark. Yes, sir; simply putting your fertilizer up close to the body of the tree does not amount to anything. Throw it out as far as the limbs go, so that it will cover the whole ground. The roots will find it, except right up close to the trunk. I think growing trees in grass is a poor plan. I don't think grass and fruit trees grow well together.

Mr. Rogers. In regard to the amount of bone-black to be applied, it is put down in the Massachusetts State Report at 150 pounds per acre; at the Houghton Experiment Farm, it is put down at 450 pounds, which is the true quantity?

Prof. Clark. The more you put on, of course, the better. You want to give the tree plenty of food to start it vigorously, so that the food will be at hand and it can get all it needs. Give a good, liberal dressing. I don't suppose you will weigh it out; you can vary a pound one way or the other, and it will not matter much; but give the tree a good supply of food and it will look after it itself. If you do not head the tree back I think you will not get so good a result as you will by heading back, because when you do not head back you have hundreds, perhaps thousands, of buds to start; whereas, if you cut off four-fifths you have only one-fifth left, and they have all the roots to grow from and will make a vigorous growth, when, if you do not head the tree back, it makes only a very slow growth.

Mr. Hale. Is it not cheaper to prevent them by the use of a wash than to dig them out?

Prof. Clark. I doubt it. The insect will lay its egg in all parts of the tree. I have dug out grubs in the branches of a tree that were some distance from the ground. They do not do the damage there that they do when they are in the trunk near the ground. When they are in the trunk they injure the whole tree.

Mr. HALE. We wash the whole of our trees; put the swab in the crotches of the tree as well as over the branches and trunk.

Prof. CLARK. Either way would do, just as you think advisable.

QUESTION. What time in the year do you dig them out?

Prof. CLARK. We dig them out in August and September. The insect begins to lay about June. You can begin the last of July or first of August. You will find them anywhere from a sixteenth of an inch long up to an inch and a quarter or more. I know I dug out of one tree over thirty very small ones; they were not as large round as a pin, and not more than an eighth of an inch long. They had simply got through the outside skin of the bark.

Mr. HOYT. Have you ever heard of the use of brimstone to renew the vigor of peach-trees? I met a gentleman a short time ago who used to bore a half or three-quarter inch augur hole into the heart of his peach-trees and fill the hole with brimstone.

Prof. CLARK. I think that would be about the same as hanging old iron or anything else up in the limbs. I think you want to go below and fight the insect at the roots.

QUESTION. Do these borers generally work at the surface of the earth, around the bottom of the tree?

Prof. CLARK. The borers generally work near the surface; the egg is laid in the body of the tree, generally within a foot of the ground or lower. Then the borers usually work down. I have dug down three inches below the surface and found the borers there.

QUESTION. Would you cut back peach-trees now?

Prof. CLARK. Yes, sir; if you cut back your trees now you would not want to cut off many large limbs without giving them a wash; that is, something to keep the air out. They may be trimmed any time from the time they drop their leaves until spring.

Question. What wash do you use?

Prof. Clark. I use principally metallic paint. It is an iron paint and is very cheap—about five cents a pound.

Mr. Williams. If the wash prevents the moth laying her eggs near the surface of the ground, will she not lay them elsewhere just as well?

Prof. Clark. I think the moth will lay her egg in one place just as readily as another. Of course, when they get under the bark it is soft, and they have got to go through the bark above the ground, because the eggs are a little above the ground.

Mr. Williams. My impression is that they are more apt to enter the bark at the ground, where it is soft, than above.

Prof. Clark. I think that two-thirds of the thirty I dug out were eight inches from the ground. They seldom run up; more often run in a slanting direction downward, but some will run straight down.

Question. What cultivation do you give the ground where you set out your trees?

Prof. Clark. We plant the ground with corn, potatoes, squashes, or anything to keep it under cultivation; that is, to keep the soil stirred. I should not want to sow it with grain.

Question. Don't you think it is advantageous to have the land rich?

Prof. Clark. No, sir; not very rich, because if you have the land very rich it will induce a rank growth of wood, which will not ripen. For instance, the fall of 1880, I think it was, was a damp fall. Our first frost came the 5th of October, and the trees were growing. That frost was a freeze, the thermometer went down to 20. It killed the young peach trees, and apples, pears, quinces, and plums quite to the ground. You want to make your growth slow and have it firm and well-ripened. Then your tree will stand a good degree of cold, when if the wood is soft and full of sap, it will winter-kill. Do your cultivation the first of the season, and let it go the last. One difficulty in heading back trees in the summer is that if you head them back very severely, it will start a fresh growth, and the wood will be soft. I think heading a tree back checks the growth and tends to develop fruit buds; but if you head it back too severely, it will induce a new growth, and you will get the opposite of what you are after.

Mr. Ayer. When starting an orchard is it safe to plant peach stones?

Prof. Clark. Yes, sir. I think that if anyone will plant peach stones and will see to the trees and bud them, he will get better trees than he will to set them. That is what we planted. We have set our orchards all over with apples, and in between we have planted peaches. Where we planted nine hundred apples, we planted three peach stones for every apple tree. The stones were not very good, and all of them did not grow, but we are going to finish it this spring, when we think we shall have good seed. I think if anyone who knows how to bud will adopt this method and see to the trees (they will require a little better care), he will get fruit just as soon as he will if he sets out trees, and the roots will run deeper in the soil than where they are cut back in transplanting. I do not think the dry weather will affect such trees as much as it does where they have been reset, for the deep-feeding roots simply give moisture.

Question. How much wood ashes would it take to equal a pound of muriate of potash?

Prof. Clark. A bushel of wood ashes does not contain over four pounds of potash; probably only about two or three pounds. It will be cheaper to buy muriate of potash than to buy ashes, although in ashes you would get some other things besides potash.

Question. In case a peach tree is covered with fruit, and it comes on dry, as it did in some portions of our State, this year, what is the best thing to do?

Prof. Clark. If you keep the surface of the soil stirred the trees will not be affected by drought as much as they would otherwise, because the breaking up of the surface acts the same as a mulch. Just stir up the surface, digging down but an inch or two, and it will form a mulch and stop the moisture from evaporating as quickly as it does when the soil is left untouched.

Question. Would you do that at any particular hour?

Prof. Clark. The moisture evaporates most rapidly in the middle of the day, when the sun shines.

Question. What kinds would you set?

Prof. Clark. I should set Crawford's Early. I put that first. Next, the Old Mixon. You do not get as much per basket for it, but it is a more vigorous tree than the Crawford's Late, or the Crawford's Early, either, and it produces more fruit. I think the Crawford's Early is more profitable than the Late because it is a better bearer. Although the Crawford's Late is a little larger, it is sour, it is not of as good flavor, and the time for peaches begins to go by when the Crawford's Late comes in. I should set the Crawford's Early, the Old Mixon, and perhaps the Crawford's Late.

EVENING SESSION.

The meeting re-assembled at seven o'clock. Mr. Barstow presided, and introduced as the lecturer, Mr. J. M. Hubbard.

"CONCERNING THINGS WHICH SEEM WORTHLESS."

By J. M. Hubbard.

The ideal utterance upon an occasion of this kind should be practical and instructive. Some one who has the ability and the opportunity to master in whole or in part some subject of interest to us, and who has made good use of both, should tell us what he has found out, and how the knowledge he has acquired may be of use to us. It is because I am not able to do this that I come before you with some embarrassment. But I take refuge in the thought that suggestion as well as instruction has a value, and the man responsible for my appearance before you at this time and with this theme knew that it would be all that I could offer. If, therefore, you fail to receive benefit from what I shall have to say, the responsibility for your disappointment must be partly his.

The subject which I bring to your attention upon this occasion has none of the attractions of novelty. Whatever of interest it excites, or benefit it brings, must be drawn from other sources.

With worthless things, or things which seem worthless, we are all familiar, and there come to most of us times and seasons when they seem far too familiar with us. There isn't any strife for their possession, nor contest over their ownership. Like the poor, we have them always with us. Indeed, it seems sometimes as if we were shut in, imprisoned almost, by them; as if they limited sharply our achievements and acquisitions and formed an unwelcome escort, attending us everywhere, and by their constant presence keeping away the things of worth which are the objects of our ardent desires. The farmer may think—I know of one farmer who has sometimes so thought—that he has more than his share of this most unwelcome escort. The farms are few, if, indeed, there are any, which do not contain plats of worthless land. The sandy plain, the rocky ledge, or the saturated bog—how often the farmer thinks, if I could but sink out of sight that worthless tract, how gladly I would do it. And if he turn for consolation to the contemplation of his best acres, he will be pretty apt to find their value discounted by the presence of worthless material. Of his most valuable productions he finds that the value is limited to a portion, and sometimes a small portion, while the large remainder is, or seems, worthless. Meantime, growths which possess no value whatever, strive with a vigilance which never ceases and a perseverance which never wearies, to rob his crops of the fertility lodged in his soil, and of the kindly influences of the sunshine and the rain. The implements he uses, through wear and exposure, are constantly and rapidly losing value and becoming worthless.

And as to his living machines, for such may all his domestic animals be considered, for them time is doing the same work that wear and exposure do for the others. After maturity, time runs away with value very rapidly, and the old horse, ox, or cow is always traveling towards the point of apparent worthlessness.

I said the farmer might think his case exceptional in the extent to which worthless things surround him, and crowd in upon him, and obstruct his path, and cause him trouble and worry; but I have to confess to an underlying conviction that if he so thinks, he is, after all, mistaken, and that the truth is rather that all vocations are beset with the same or similar difficulties, and all lives are attended with the same unwelcome presences. We must remember that we see distinctly and realize vividly the difficulties in our own paths, and the trouble in our own lives, while the obstacles which lie in the way of our neighbor, and the troubles with which he has to do battle, make but slight impression upon us. I presume there are those who regard the farmer's life as a peaceful idyl, free from care, and with only so much of labor in it as is needful for exercise and good digestion. They picture his situation much as Milton did that of our first parents in the garden of Eden, with little to do but to reach out their hands and gather the bounty which lavish nature, with a hint or two in the way of preparation and seeding and culture, makes ready for their use. We smile at such a picture, but we are liable to fall into a similar error in judging of work with which we are wholly unfamiliar, and lives of which we see only the outside. It may be that our estimates of the ease with which success is won in other vocations, are in some cases wide of the mark.

So while my subject has its application to the farmer's business, and is pertinent in a farmers' meeting, its application and pertinency are by no means thus limited. It takes hold of considerations which are of interest to the farmer, not so much because he is a farmer as because he is a man. And I think it well, even in a farmers' meeting, to remember that our interests are not limited to or by, our business, but that we have a share in everything which affects the welfare of humanity. Whatever difficulties we contend with, whatever troubles assail us, find their counterparts and comrades in other lives—yes, I think, in every other life. Farmers as well as others—others as well as farmers, hold in their hands material possessions with value fleeting or flown, and besides these we all have such a long list of immaterial property that belongs in the same category. Our plans which promised so much, our hopes that we rated so high, our purposes which assuredly had good material in them; how many, many of them all, must go at length into the seemingly worthless class. The plans, fair as they seemed, wouldn't work. Some obstacle there was—some difficulty which we did not anticipate, and found no way to overcome, and it left our plan worthless, and all our expenditure upon it of time and thought and labor was lost. Our hopes, too, how valuable they seemed to us. A prince's ransom could not have purchased them. They gilded for us all the future, and filled the atmosphere of our thought with rosy light. How could it be that they should turn out worthless? But that is just what they did, or seemed to do. We never realized what they promised us. They never rendered the service we expected of them. Where, then, shall we place them but in the worthless class? Our purposes were closely allied to our plans, and they shared the same fate. Occasionally a plan succeeded, occasionally a purpose was fulfilled, but of the long, long procession that went the other way, what shall we say? Were they worthless? At least they seemed so.

Well, if they were worthless, what use to spend time or thought upon them? Isn't it better to dismiss them from our minds, and give our attention wholly to the things which are obviously valuable? If we could do this it might be wise, but we cannot. The two qualities of worth and worthlessness are so associated and the things which they distinguish so intermingled that we cannot limit our study and our scrutiny to either class. We must give attention to both. The constant effort to separate them, and the wide uncertainty as to where to place so many things compels this. You cannot even sort a potato crop, without giving attention to the little ones as well as the big ones. It requires some scrutiny to determine that a thing seems worthless. If a deeper study should reveal the fact that this worthlessness was only seeming, the time and attention expended upon it might be well repaid. Or, failing in this, our study may disclose to us a philosophy which shall reconcile us to the existence of things for which we are unable to find use or value, and this may be our compensation.

We cannot ignore these things, and we need to study them in order to learn how to feel toward them, what to think of them, what to do with them. Quite early in the course of this study one will be apt to make the discovery that worthlessness is not an inherent quality. No thing can be named of which I would dare to say that it is always and everywhere worthless. I do not think any two persons would agree entirely upon a list of things which seemed worthless. One would be sure to include things to which the other would assign some value. A slight difference in circumstances might lead to this difference in judgment. I know a man who is annoyed by a worthless sand bank in the immediate vicinity of his dwelling. His neighbor, living two miles away, would gladly pay one hundred dollars for that sand bank. It is worthless, not because of what it is, but because of where it is. Two other persons might differ in their judgment of an article towards which they stood in precisely the same relation, by reason of difference in themselves, and the same person might, at different times, give opposing judgments concerning the same thing, all outward conditions remaining the same, because of change of feeling or increase of knowledge within himself. These assertions need neither illustration nor proof. I confidently appeal to the consciousness and observation of every one of you for the evidence to sustain them. They show that worthlessness, instead of being an inherent quality, is ever the child of circumstances. It is very often a creature of time or place. A thing is, or seems, worthless because it is in the wrong place, or because the time for it to be valuable lies either in the past or future. This quality may attach to an article because it is in the possession of the wrong person. Our own limitations are perhaps the most fruitful cause of the worthlessness of things We are ignorant of values, and it is therefore to us as if they did not exist. If we only knew enough, there might be nothing in the wide world but would have a value for us. I think that there is scarcely anything of which we can say even that it seems worthless until we have fixed its place in locality, in time, and in relation to human knowledge and human need.

Worthlessness is a thing of degree as well as a creature of circumstance. Our ordinary thought may not recognize this fact, yet some underlying consciousness of it would seem to be shown by the structure of the word we use to express it. Our thought may be that the thing is worth nothing, but what we say is that it is worthless; that is, worth not so much. It is as if we had a zero mark like that upon our thermometers, and all degrees below that mark must be distinguished by the minus sign. But as the heat of the low degree is just as truly heat as that of the high degree, may it not also be true that the worth of the worthless thing is as genuine as any? If this be true—and I am going forward for a space, any way, in the presumption that it is—the real subject of our study s "worth." Value, much or little; worth, more or less; what is its nature, and upon what does it depend? How is it produced, and how destroyed? Why is it so apt to elude our grasp? How can we capture it, and how retain it after it is captured? It is easy to ask these questions, but you do not need me to tell you that it is not easy to answer them. Indeed, you know as well as I that any full and complete answer to them is impossible. If we can even approach an understanding of them, and get a partial answer to them, our study of them will be well repaid.

One response, in the nature of an answer to these questions, comes from commerce. The test and measure of value it furnishes is the market. Anything is worth what it will bring in the market, and if it will bring nothing there, it is worth nothing. This response helps some, but it does not satisfy. Commerce renders an immense service to humanity, but its powers are confined within narrow bounds, and limited by sharply-drawn lines. Within those lines it has proved one of the most efficient agents of civilization. It has created the markets of the world, mighty reservoirs, into which each producer pours his surplus production of one thing, or class of things, and from which he draws as he is able, of many things to satisfy his varied wants. It is hardly possible to over estimate the broadening of life which has come to us through the operations of commerce.

But there are some things which commerce cannot do for us, and while we recognize the importance of its function and service, we must not expect of it that service which it is not qualified to render. As a gatherer and distributor, its work has been enormous in extent, and generally beneficent in character. But, in the determination of value its work is very imperfect. Markets can only measure the value of what goes to market, and that is only each producer's surplus. That portion which he can use for himself he need ask no market to fix the worth of. In the case of some classes of producers this is but trifling in amount; but the farmer—the New England farmer especially—is generally so circumstanced that he can use largely of his own productions. Need he go to market to learn the worth of luscious fruits, and fresh, crisp vegetables from his own orchard and garden, or flesh-food and milk products from his own flocks and herds? I tell you nay. These things have for him a value in no way related to that which might be placed upon them in the market. Indeed, to some of them, the touch of commerce is a defiling touch. Their highest value is for him, and him alone, who produces them.

I have on other occasions emphasized this feature of the farmer's life, and it is worthy of emphasis. Some of her choicest bounties, some of her richest treasures, nature reserves for him, and him alone, who will come near to her and take them, with no intervention, from her hand. Of the value which the market fixes for the things which go there to be tested and appraised, it may be said further that it bears but a loose and vague relation to real value. This is what is done in the market. Two men meet, each of whom has of some one thing a surplus above what he can use, and for which he desires to procure in exchange as much as possible of something he can use. Their agreement of exchange, the ever-fluctuating balance of their desires and necessities, is what fixes market value. It is well enough in its place, but it is not that test and measure of value for which we are seeking. The true foundation of worth is use or service. Whatever we can use, whatever serves us, is worth something to us. Of these two words I like "service" the best. It is the broader term, and takes in elements of worth which could hardly be included in the word "use." Use implies co-operation on our own part, but service may be rendered, not only without our co-operation, but without our consciousness, even. Indeed, service, and that of exceeding value, may be rendered us in opposition to our desires and efforts. We do not always know when, or by whom, or by what we are served, and yet it must be true that all real service is valuable, and that which renders it is worth something.

I think we shall find this measure of value a very comprehensive one. It is not only good for those things which may or may not go to market, but it will also measure those intangible treasures which we have agreed to include within the scope of our inquiry.

If we ask, What is health worth, or relief from pain, or escape from danger, or deliverance from fear, or sympathy in trouble, or the society of friends, this measure will give us the answer for which we should turn in vain to the reports of any market. They are worth the value of the service they render, but it is only indirectly that money, which measures market values, has any power to command them, and it is utterly incompetent to indicate their value. It may be said further, as in the line of accurate definition, that the real value of a thing is in its capacity to render service rather than in the service actually received from it. The service received is controlled by limitations that belong to ourselves. We may be unconsciously served, and served even against our will, but we can never be served beyond the limits of our capacity to receive and appropriate service. Food, beyond what a man can eat and digest, has for him only the commercial value.

Clothing, except for comfort and adornment, belongs in the same category. So much of each as he needs, and only that, he gets the real value of. If he have no appreciation of the beautiful; all the wealth of nature and art in this direction can have no value to him. Limitations of value such as these, partial in regard to some things, total as to others, plainly attach to the person rather than the thing.

It may be said further in the same line, that the value which is based on service is not of necessity conditional upon, or limited by, ownership. A rich man's money may create and maintain a beautiful garden, where everything combines to please the eye and satisfy that hunger for beauty of form and color, the germ of which must, it would seem, be the common property of humanity; but the rich man's money, thus expended, may render a larger service, and so be actually worth more to his poorer neighbor than to himself. It should, I think, be a great source of satisfaction to those who hunger for beauty, but have not the means to purchase largely of beautiful things, that so much of this element is abroad in the world, and that so far as the simple enjoyment of it is concerned, whatever one's eye can command and his soul can appropriate is his. In taking it he robs no one, but simply comes into possession of his own.

Wealth of thought, like wealth of beauty, is his who can appropriate it rather than his who can purchase it. Nor does that fully express the truth of the matter. These things cannot be acquired by purchase. One may buy the casket which contains them, the mould in which they were formed; but, to possess the jeweled treasure itself, he must earn it, he must conquer it, he must deserve it. A man may buy a book which contains an overflowing fountain of wisdom and of wit—which fairly bubbles over with mirth and sympathy and right feeling; but does he thereby possess these treasures? Not at all. He must acquire them, if they are to be his, by a different procedure, and it may be that he cannot acquire them at all.

In the light of these considerations, what should be our feeling and thought, and what our action relative to those things which *seem* worthless? The emphasis, if you please, is upon the word "seem," for this discussion is to go forward upon my part on the assumption that there is nothing absolutely worthless; nothing but what may be of use in some way; nothing but what is capable of service if we could but learn when and how. If we cannot prove this, we may adopt it as the scientists do some of their theories, as a working hypothesis, to the truth of which many things point, and the fallacy of which, if it be fallacious, will best be shown by assuming its truth and seeing whether or no the things we know to be true will fit it.

Now, it is very possible that every person in this audience has in mind something that seems to them worthless. It may be that no two of you are thinking of the same thing. I do not care for that. It is enough that for whatever is in your thought you can find no use; from it you can command no service. Our inquiry must be directed to find out, if we can, the reason and the remedy for its seeming worthlessness. We will not admit that it is incapable of use or service, for to do that would be to block the wheels of investigation, and to stifle the spirit of inquiry.

One very common reason why a thing cannot be of service is because it is not in the right place. Take, for illustration, a beef animal. Place him upon some remote portion of the South American plains. His hide is worth a trifling sum, but that is the only portion of him which has any value. Bring him where facilities for transportation are a little better, and his tallow is worth something. Another remove puts value upon some of the choicest portions of the carcass, and so by successive removals you extend the range of values, until you find the place where flesh, and blood, and bone, and horn, and hair, and hoof, and even intestinal contents, have all a value. Throughout all this course, extending use runs evenly harnessed with increasing value. It is because these portions can be carried where they all find use that they become of value. Illustrations upon this point might be multiplied a thousand-fold, but we neither have need of them nor space for them.

Our one illustration suggests the remedy for worthlessness arising from this cause. It lies in a perfected system of transportation. Either the serviceable things must be carried to the persons who need them, or the persons themselves must be transported to the locality where the things they need are to be found. We call one movement "transportation," the other "migration." Both are finding, in this busy age of ours, an astonishing development. Though accompanied by much of incidental suffering and waste, both are, in the main, grandly beneficent. They bring need and its supply together. They furnish the opportunity for service to the things formed for service. They supply the lack of service to those whose lives for want of it were narrowed and darkened and shortened. It may be that you will not readily perceive just how to apply this remedy to the case that troubles you. I cannot promise that you can so apply it, and yet you may be able to do it.

Problems of this kind are now occupying men's minds as never before, and some most astonishing results have been attained. The surplus grass upon the Kansas prairies, worthless a short time ago, is now carried a thousand miles into the mountains to feed the miners' mules. It is a movement which gives the Kansas farmer an additional source of income, the miner cheaper and more plentiful food for his beasts of burden, and the railroad company employment for both labor and capital in the business of transportation. It is beneficent in every direction.

Now, considering what has been accomplished, in recent years, in the extension and improvement of the means of transportation, it is absurd to suppose that the movement is to be stopped just at the present point. No doubt but it is to go on. Things are to be carried for us; they are to be brought to us; we are to be taken to them, far more expeditiously, safely, and cheaply than at present. And the thing whose worthlessness annoys and afflicts you may yet be brought or sent where it may render its service and find its value.

When we speak of a system of transportation our thought is apt to range over a wide extent of territory. We think of a state, or nation, or a continent. We see long lines of railway with their swiftly moving trains. We see canals, and rivers, and broader waters, with all the varied transports which float upon their bosom. It requires some effort to bring our thought down even to the common neighborhood roads in this connection. It will perhaps excite a smile if I speak of a system of transportation within the limits of the farm. Yet, this is what every farm should have, and to some extent must have. That this system be a good one, well devised, and well maintained, and liberally used, is of more consequence to the individual farmer than all the railroad problems outside the farm. The farmer as well as the railroad engineer needs to study questions of lay-out, and grade, and road-bed, of rolling stock, and motive power. Rapid movement, easy movement, along its lines of transportation, is as essential to the successful prosecution of the business of a farm as it is to the commerce of a nation. That class of things which seem worthless or worth but little, because out of place, is numerously represented upon the farm. Three out of four of them do not need to be carried beyond its boundaries to find their place and use. Many times this is impracticable, because of the wretched system of farm transportation, framed without thought and maintained without care, which is a good deal more common than it should be.

Surely in regard to all things worthless because misplaced, the general nature of the remedy is obvious, and our age is rapidly working out the complex problem of its application. We shall not see its complete triumph, but it is given us to see that it is coming, and to have some share in its fruits.

A thing may seem worthless because misplaced in point of time. Our point of time is the present, and the thing we hold may belong to the past or the future. If it belongs to the near and clearly anticipated future, we easily reconcile ourselves to the situation, and even rejoice in it. If you can see clearly that the city lot you hold is going to double its value in five years, you are well content to hold it, even though you can make no present use of it. And on the farm the thrifty young orchard which represents a considerable investment, and for the fruit of which you must wait ten years, is precious to your thought. If it promises well you are satisfied. Even in case of the forest growth, where a much longer period must elapse before its worth can be realized, you are content. The fact is, we live very largely in the future, and if its promises are distinct, even though distant, they satisfy us.

But we contemplate with very different feelings those things whose time of use and worth lies behind us. There is no going backward for us, and the thought, If I had only had this thing last year it would have been of so much service to me, is very different from the thought with which we look forward to the future use of things.

There is, however, one class of things in regard to which we ought to reconcile ourselves to the loss of value through the lapse of time. I refer to those which have accomplished the service they were fitted to render. The farm gives us many examples of this class. Whatever has life grows old, and that which is subject to use, wears out. The enfeebled old horse, the moss-grown and decaying fruit tree, the worn-out mowing machine, once valuable, but from which all value has passed away; what should be our thought, and what our action toward these? Our thought must be one of respect for the good work done, the service rendered, and the value transmuted into other forms. Our action may not violate this respectful thought. And I hold it to be no such violation, as to machine or animal frame, which has accomplished its work, to remand its substance back to the great store of unwrought material whence all works of skill and strength, as well as all forms of life have come, and to which they must all, soon or late, return. The old mowing machine is properly no longer a machine; it is simply a quantity of material. Its iron may go again into the furnace and be recast into other forms for other uses. Its wood may cook our food or warm our bodies, and after that its ashes may fertilize our fields. We feel differently in the presence of the higher forms of animal life, and may hesitate to cut that life short. Yet the time is sure to come when the kindest feeling and the wisest thought unite in saying, that for these worn-out servants of ours a painless death is better than the life that remains to them.

While the farm furnishes many instances of this class of worthless things, the farm beyond any other place, gives opportunity to utilize raw material of this sort. No work-shop in the world can compare with soil in its power to work up all forms of material. Nothing that will burn or decay is worthless upon the farm. Our New England soil is like a factory with abundant power, and plenty of willing workers, asking at our hands the material to work up into articles of value for our use. These workers help themselves as far as they can. They tear the solid rock to pieces and wrench from the inert material all that their power will enable them to get. They gather from the atmosphere all that their outstretched hands can grasp. But it is not enough for them, and anything which has once before been made up is in the best possible shape for them to use, and is very welcome. Pity, isn't it, that anything of this kind should be withheld, when they are so willing and able to use it?

That class of things which owe their seeming worthlessness to our own ignorance must be a large one. We can form some idea of it from the things whose uses have been discovered within a brief period. The elastic gum of a tropical tree formed, not long since, a sort of toy, handy to erase a pencil mark with, but of value so slight that its loss would hardly have been felt at all. Imagine if you can the consequences if now rubber goods were stricken out of existence. It would occasion a catastrophe of large proportions in trade and manufacturing, and bring a sense of privation to well nigh every household in the civilized world. The varied uses of electricity recently discovered, and by no means fully known as yet, have changed its position in the thought of men, from a mere curiosity, to one of the most efficient agents whose services are at our command. The discovery of new uses for things already in some degree serviceable, is in the same line of worth-giving, and points the direction in which we must look for a remedy in many cases of apparent worthlessness.

We must extend the field of our knowledge. It must cover more ground and be more thoroughly cultivated. The function of the human element in the world is to discover and develop value in things. And this is work which may give employment to the noblest powers. To study the nature of things, and learn their uses and the service which they can render, and then so to adjust surrounding conditions that the beneficent action may take place ; this is a work which ought to satisfy the best aspirations of our natures. You may think that this work, important and attractive as it is, must be confined to that favored few, who, with special mental equipment for the task, and ample means for its prosecution, are able to devote all their time and energy to it.

No doubt this class will be the leaders of the movement, but all men may be their partners and co-workers. The first thing to be done, and the thing of most importance, is to acquire knowledge, to collect facts, and there are few men whose equipment for service is so deficient, and whose opportunities for work of this kind are so limited, that they cannot help effectively. Sometimes the fact that a man is shut up to one opportunity is a great advantage to him.

If he can do but one thing, that thing may at least be done thoroughly, and one thing thoroughly done is better than many things half done. Let any farmer undertake to learn all that his eyes can tell him of the nature and action of the things which come under his observation as he goes about his daily labors, and if he succeeds, he will have information of value for the most learned scientist he may meet. We need to cultivate habits of close and accurate observation. These alone would solve for us many mysteries, disclose to us many hidden values, and make us partners in labor and in reward, with those whose work is making its mark upon human life in lines that can never be effaced. Every one may not be able to determine the real value of the facts he has discovered, or to build a system of philosophy upon them, but there is no better way to acquire that ability than to come into familiar relations with the facts themselves. The order of work is this : First discover and gain possession of the facts, then weigh and measure them, then build with them. Every one may help in the first task, and then, and not till then, must it be determined who of them shall go forward and perform the others.

We must not, however, be too sanguine in our expectations of immediate pecuniary advantage from this work. It may sometimes seem to us, and it may be true, that others derive more advantage from our work than do ourselves. We can make no monopoly of our acquisitions. At best, we can but share them with every comer ; and after we have done our best, there will still remain many things, and perhaps the very things which most annoy and perplex us, which we cannot use or understand.

Concerning these things, I know of nothing better than to exercise faith and patience. And to aid us in this somewhat difficult exercise, I offer a few suggestions of a general nature, with which this paper will close. One of these has been already alluded to. We desire gratification, and the best service is sometimes anything but gratifying. Service has reference to our needs rather than to our desires. The sharp rebuke of a friend may be the most valuable service he can render us, but it will cut like a knife, and it may be a long time before we can appreciate its service or see its worth.

Keeping ever in mind the idea of service as the test of worth, we may come to see that the failures and disappointments of life do not prove the worthlessness of the hopes and purposes that never reached fruition. It may be that they rendered us a better service than if they had been fully realized. One who should see a large building in process of construction, if unfamiliar with the work, might think the scaffolding a very important part of the structure, and look with dismay to see it torn down. The scaffolding does play an important part in the building of the house, but the house once finished, the scaffolding is a deformity, to be removed. Our characters, into which all service received and all worth acquired, are finally gathered, are built as houses are, and much that is of service while the building is going up, is cast aside as worthless when the structure is finished. And the higher we build with house or life the more of scaffold we need. Doubtless we often fail to perceive the distinction between that which is temporary in its use, and that which is permanent.

No man can cherish a pure hope without being served thereby. It may fade away until he sees clearly that it can never be realized, but if he has drawn from it strength and patience, and elevation and insight, how shall he say that it has been worthless? So, too, of our purposes and plans. They may, or may not be realized, but their worth or worthlessness does not depend wholly upon that. A life is made noble by a noble purpose. A life is made broad by an ample plan. Plan may fail and purpose be defeated, but if they have done good service in building character, it matters little what their fate may be. Hopes, feelings, thoughts, plans, purposes,—all these creatures of the mind begin to work for us the moment they are born, and if good in themselves no matter how short-lived they may be, they cannot be without value. It is well to bestow a thought upon the difference between what may be called latent value, which turns upon capacity for service, and realized value, which depends upon service actually performed. It is not enough to know that a thing can serve us, we must actually enforce that service. That product which is intended for market must be sold, and that designed for use must be used, if they are to be worth anything to us. And with many things the period of service is so brief that we must act promptly if we would secure it. "Delays are dangerous," the proverb says. In practice, I believe very much of value is lost through delay. Where one man sells his product prematurely, ten men delay too long. And we many times lose the value of things by neglecting to use them at the right time.

Something like this is true also of what we are, as well as of what we possess. What are we worth, is a question of importance to each one of us. We must point to the service we actually render for an answer. Dormant power, and facilities unemployed will count for nothing, and none of us has any capital of this nature that he can afford to have uncounted. I think, and so thinking prefer to say it outright, that the full value of things can be realized, only when a religious element enters into life and work. I do not mean adhesion to any particular creed, or observance of any particular routine of religious exercise, but rather a recognition of the obligations of life and an honest effort to discharge them. Religion means right relations everywhere. Looking inward, it manifests itself in self-knowledge and self-mastery. Looking abroad, it works out in recognition of all rights, and performance of all duties. Looking upward, it flowers and fruits in glad obedience to the Good Power which formed us and fixed our place, and ordered all our surroundings. Looking forward, it finds courage to face the mystery in front, with faith and hope, drawn from trust in an all-controlling power which works in love, and sees the end from the beginning.

To one thus furnished, and thus qualified, all values come. The title deeds to large estates may not be his. Stocks and bonds he may not possess, but he has a hold upon the real use and service of things, which can be acquired in no other way. He has begun at the right point to remove the unharmony and correct the maladjustment which are the main sources of worthlessness.

The one thing of most inherent worth, in all the universe, is man. When once his value is developed by bringing him into right adjustment, the rest will follow freely and easily. If I give any advice in this connection it must be that every one begins the great work of overcoming and eradicating worthlessness with himself. This part of the work no one else can do, and this, after all, is the principal part. Now I have to confess that these last few pages seem a good deal like preaching. Ought I to apologize for introducing them in this place? I don't like apologies very well anyway, and prefer, on the whole, to let them remain just as they are, a part of what I offer for you to consider, and to accept or reject as may seem to you wisest and best.

THIRD DAY.

The Convention met at 10.30 A.M., Vice-President BARSTOW in the chair.

The CHAIRMAN. Ladies and gentlemen, we have at Meriden an Industrial School for Boys, and at that Institution is a model farm, made so by its model superintendent. I have the pleasure of introducing to you this morning, Mr. L. P. CHAMBERLAIN of Meriden, its Superintendent, who will address us on Farm Labor.

FARM LABOR IN NEW ENGLAND.

By L. P. CHAMBERLAIN of MERIDEN.

Mr. President, Ladies and Gentlemen:

That was a very kind suggestion of your secretary which came to me one day in October last, by which this paper upon Farm Labor in New England has been prepared, and though, in the selection of one to discuss so large a subject, he may seem to you to have for once discounted his own discretion, in one respect, at least, he has acted in accord with that wisdom for which he long ago became proverbial. The suggestion came to me full fledged, for it included the topic, broad enough to employ the best thought and pen at his command, but in its essential features, simple enough to be intelligently understood by us all, and so practical that it touches the personal interest of every one who tills the soil, whether he is an employer of others' labor or sows and reaps his own fields.

It not only relates to muscle as a force upon the farm, and a prime factor in its cultivation, but it includes also the force which precedes this, and counts the work of the brain of equal importance. It treats also of some of the problems, new and old, with which the farmer has to contend, and attempts their solution, and of the principles which underlie both theory and practice in agriculture. And not only this. It lies at the basis of all men's interests who dwell in these New England homes, because upon the success or failure of our work depends, to a great extent, the reward of labor. Toil binds men together in a common brotherhood, for from the beginning of human history till now the common lot of man has been that of a laborer.

Mankind as a whole toil in obedience to that great law which we call necessity; or to state the same fact in terms which I think more honorable to man and more just to his Creator, labor has been made one of the prime conditions of human happiness. Idleness is a foe to humanity in every stage of its existence, and in every condition. Ease is a crown to be won by toil, and he who refuses to labor has no right to call himself a man; so I shall assume that, since labor of some kind is indispensable to human enjoyment, it is therefore honorable, and that somewhere there is a work for every man to do. Fortunately under our form of civilization every one is free to choose his own occupation, subject to the single condition that it shall contribute to the welfare of society. In all this latitude of choice he may easily find that employment which is best adapted to his capacity and his taste, and no man may undertake to interfere with his choice. Nor has any one a right to disparage the service which he performs, if it be such as society is in need of, no matter whether it be by the pen, the sword, or the plow, in the coal-mine, the manufactory, the counting-house, or the pulpit, at the anvil, or the bar. Muscle and brain are of equal importance in the affairs of men, and the work they do should be equally honorable. But, tell me, are they? Has not public opinion placed the one under its ban, and exalted the other to the chief seats in its synagogue? Is fidelity as sure of recognition in the garb of the coal-heaver, or the hod-carrier, as when attired in broadcloth? To ask such questions is to suggest their true answers.

Agriculture has been in the long past one of those employments which, though it supplies to the world the greater part of the food on which its life depends, and absorbs the thought and muscle of the majority of men, has yet been regarded as menial, and almost degrading. Men have turned away from it, in choosing their life-work, with a feeling of commiseration for all those who could be satisfied with such drudgery. But on the other hand where in the wide range of human labor is the occupation which so stimulates thought and investigation, drives men to study the relation of cause to effect, and suggests so constantly the presence and power of natural forces and laws, as that of agriculture? It arouses and sharpens all the mental and physical faculties, and urnishes ample room for their highest development. It is also imperious in its demands upon the hand and brain, and puts a pr ce upon success which only the diligent, the devoted, and the persevering can pay. It is a science, and to-day employs much of the best thought of the world, and to all who seek to know its laws, and to explore its hidden processes, it presents the broadest fields, and discloses the profoundest depths. It is, too, an art. Genius and skill nowhere else find such opportunities for their full employment as when they direct the culture of the soil.

Every farmer in New England should be an enthusiast, for he holds the right of sovereignty over a part of this solid earth, and is commissioned to make it bud and bring forth fruit, not thirty or sixty, but a hundred fold. He is a co-worker with nature in her most charming and most wonderful realm, and if he has ears to hear may learn from her own lips the secrets of her economy. Chemistry has already unlocked for him many of the mysterious and hidden truths of a generation ago, and wins from this field her grandest triumphs. And yet that within half a century there has been a growing distaste for the cultivation of the soil, and a steady depreciation in the quality of New England farm labor, cannot be denied.

There are some here to-day who remember the time, running back from the opening of the war through a quarter of a century, at least, when these hills and valleys were cultivated by those who were to the manor born, and who thought it no dishonor to enter the service of others for wages. Who left the family hive, reluctantly it may be, as fledglings are sometimes pushed from their nests, when their service was no longer needed there, or would command fair wages elsewhere; whose arms were strong and whose hearts were brave, and whose chief purpose it was to render to their employers a full equivalent for that which they were to receive. Heroes, in that they shirked no duty imposed upon them, and were faithful in every trust. They were content to labor from sun to sun, and never dreamed of our modern day's work of ten hours, and with muscle tough and trained to long endurance, could swing the scythe, the axe, or the flail with wonderful dexterity, and for their term of service identified themselves with their employers' interests with conscientious fidelity, thus adding new dignity to that labor which their fathers had made honorable, and left to them as their chief inheritance. That was the heroic age of muscle. Farm implements were few and rude, a single plow or harrow, and these such as would be denied storage room in our day, being required to do the work of our more complete and varied implements, each designed for some special use. And the rough work of these imperfect aids in farming were supplemented by hand labor to an extent quite impracticable now. Many of us can remember the annual tussle with the half turned turf of the potato and corn field, or with the newly seeded fields of clover so lodged and tangled as to have almost defied the mowing machine itself.

But this golden age of farm labor was suddenly terminated by the war. The young men of New England left their plows in their furrows, and sprang to the defence of the nation's life with the same devotion to duty which I have called heroic. Then began a marked decadence in farm labor, and a new era in New England agriculture. The demands of war were imperative, and recognized no claim upon the service of those who were able to perform its duties, but its own. The tide of human life poured forth from every city, town, neighborhood, and almost every family, to return only with decimated ranks to the various employments which they had left. Such a loss of labor could only result in a universal adoption of new methods by which human force could be made more efficient or dispensed with. And to the supply of this new demand human ingenuity addressed itself with surprising readiness and success. And in no department of labor was there a more complete revolution in methods than in that of agriculture. The ingenuity of man knows no limitations, excepting perhaps his necessities, and new forces and new applications of old ones quickly came to the farmer's rescue. Labor-saving machinery and improved implements of every sort found a market waiting for them, and almost before the iron had cooled were in use everywhere. Muscle as the prime factor of success in farming began to lose its supremacy and brain became the leading force, so that intelligence, more than physical strength, is now the chief requirement upon the farm.

There is no danger, however, that the hand will not be needed, as before, though it is being relieved of much of its severest labor. The danger lies in just the opposite direction. There is, I think, a growing tendency to depend too much upon the improved machinery upon the farm as a complete substitute for hand labor. Divorce muscle and brain, and we must pay the penalty of controverting a great law of nature which binds the two together. Both our own labor and that which we employ should be generously supplemented with improved farm implements, but there is a limit to the profitable employment of labor-saving machinery. I have seen men riding over their fields who could much better afford to walk, for the simple reason that their luxurious farm carriages were too expensive for their means. I do not forget that the quality of farm labor has depreciated to such an extent as to make such extravagances somewhat more excusable, for it is as marked as the diminution of skilled laborers. The farm labor market is now mainly supplied from foreign lands. This class of laborers are generally unskilled, and yet we have no recourse but to employ them and do the best we can with such labor. In very many instances their inefficiency is owing wholly to our different methods, but to teach them to do our work in our way is often discouragingly difficult.

This, then, is the dilemma in which the New England farmer finds himself. With unskilled labor alone available to him, and even this demanding a high rate of wages, with the rich and boundless West as his competitor in all markets, and with a soil now so worn as to require almost ruinous expenditures for fertilizing material, he is to manage so as to make both ends meet. The result is, he is on the alert to try almost anything which holds out a fair promise of relief from such a case, whether it be tobacco, or beet sugar, or (if it were not for the presence here of some for whose opinions upon most subjects I entertain the most profound respect, I would say) ensilage. The problem before him is not an easy one, but that it is capable of solution, I believe so fully that it is my firm conviction.

It must not be supposed that, with all our improved methods and our skillfully adapted implements, farming, at least in New England, can ever become a holiday affair. That "He who by the plow would thrive, himself must either hold or drive," is a truism I am not afraid anyone here will deny. What the labor which he employs lacks in skill and efficiency he must make up by a more intelligent application of that labor. He is not to adopt new methods, or to discard old ones, simply because they are new or old. He must avail himself of all possible helps, and be as willing to be taught as he is to teach. And among these helps let me suggest that the experience of others is one of the most valuable and most easily obtained. There has been in the past too little fraternity among farmers for the general good, but now, by means of the various agricultural publications, one of the very best of which is published in our own State, whose columns are devoted to the discussion of every important topic that relates to farming, by those who are, by common consent, qualified to instruct others out of their own practice, by the local farmers' clubs, organized for the special purpose of telling each others' experience in the common affairs of the farm, by the annual exhibits of the products of well directed cultivation, at our State, county, and town fairs, and by these annual meetings under the auspices of our Boards of Agriculture, where the most practical subjects are treated in the most practicable way by experts in each department, with now and then a notable exception, in every New England State, he may learn much that will help to avoid mistakes and to achieve success.

Let me mention, also, that new and perhaps most important help of all, as it is now directed, in our own State, by one whose conclusions have come to be regarded as almost oracular, and who has in his profession few if any peers—the Experiment Station. Here is where all combinations called fertilizers may be tested as by a touchstone, and their true value determined; thus guarding the farmer against imposition and fraud. This has already done much to rid the market of spurious compounds, and watches with vigilant eye over the farmers' interests. Many of you will remember how suddenly a fraudulent mixture—labeled "Special Fertilizer," and made in New Haven, I think—disappeared from the market after Professor Johnson's analysis of it revealed the fact that there was only ninety cents of value in a ton, which had been selling at fifty dollars. I venture the prediction that the Connecticut Experiment Station will soon become to us what the German Experiment Station is to Germany, the desideratum in all our purchases of fertilizers and feed.

But all these are only helps, and we must still depend much upon ourselves for the successful management of our farms. Let me not be misunderstood in my use of the term "success," for it has a broader significance in agriculture than the mere converting of labor and the elements of the soil into cash. There is a true and a false success, and sometimes the one is mistaken for the other. He who denies himself and his family the fullest enjoyment of the comforts, and, so far as a prudent use of his means will allow, of the luxuries of New England farm life, that he may amass wealth in bonds and stocks, may be, after all, the veriest spendthrift; for he has wasted time, and labor, and home delights to gain the poorest and meanest reward of human ambition. I count no man truly successful who has nothing better than bags of gold to show for his life of toil. He wins true success who makes human happiness spring up about him like the grass in his meadows, and converts his labor and skill into education for his children, refinement for his home, and joy for all about him, and has still a surplus capital for future days of need. And no ideal which falls below this is worthy of the New England farmer. He may and must emulate the sturdy but healthful economy of our fathers, which decreed that there must be no expenditures beyond the real necessities of the household, and asked for credit only when some sure source of equal income was distinctly in view. He must plan his farming with a keen eye to profit, both in his outlay of labor and material and in his selection of crops to be grown. He must act independently, not rejecting this because it is old, or adopting that because it is new.

There is a good deal of conservatism in agriculture that is blind and unreasoning, and there is also a radicalism which runs into all sorts of extravagance, both in theory and practice. I confess to very little veneration for anything simply because it is hoary, but I believe that in agriculture we may well take counsel of the past in many things. With respect to methods of culture, we cannot afford to adopt the old ones, but with reference to means to be employed we cannot afford to discard them as a whole. Let me instance one or two of the ways in which we can succeed best by following the good old way.

There is, or there seems to me to be, a prevalent error in respect to the production of material for fertilizing our farms. It is only a few years since the introduction of commercial manures, and many of us can remember the time when gypsum and lime were about the only manures used upon the farm which it did not produce. Since that time many different fertilizers have been put in the market, and now there are so many that are superior to all others that an enumeration of them all would fill a volume as large as the old family Bible. These all find a ready market, and hardly a farmer can be found who does not use them. That many of them are of great value to us there can be no question, and they are, I believe, essential to our highest success. But that they can profitably supersede our home-made manures I do not believe. The readiness with which they can be obtained, and the facility with which they can be applied, have led very many into their use as a substitute for the compost heap, which is becoming quite unfashionable. The question of labor in handling the heavy, bulky farm fertilizers has been decided against them, and the more convenient article has, on this merit mainly, come into common use. Now, the mistake is not in their use, but in the neglect of the supply which every farm can easily and profitably be made to produce. I submit that it is false economy to expend large sums of hard-earned money in this way, when an equally valuable article may be obtained at a much less cost, and even without feeling the expense at all. It has been said, and so often repeated, that "time is money," that it may seem like presumption to assert that on the farm this is not always true, but there are "odd spells" of time upon most farms which are not easily converted into cash, but may be utilized in shutting this floodgate of expense by making even the refuse of the farm a source of fertility and profit. The excuse for not doing this is, often, want of time; but if it is the true reason, then there is not sufficient labor employed. It is a poor policy which seeks to employ the least possible amount of labor to keep the farm running. Labor is, or should be made, the farmer's capital, and a stingy investment is sure to result in small dividends, or, more likely, in none at all.

Let me suggest another serious error, as I think, into which many have fallen in their desire to employ only the minimum amount of labor. It has been their practice for many years to depend upon the West for some of their supplies, especially for their corn, beef, and to some extent for their pork, and this upon the theory that they could not compete successfully in their production. In this, labor has been made a scapegoat, and sent forth with, not the sins, but the mistakes of our farming community.

That it is the better policy for the majority to produce all that is needed for home consumption of such crops as are adapted to our soil and climate, I am convinced, though I know there is a wide difference upon this question in the opinions of intelligent and practical men. Take, for instance, tobacco, as a special crop, to be exchanged for such as are needful, but which, it is claimed, cannot be grown at a profit. Time and material and skill have been lavished upon it; but what has been the average result of all this expenditure, but to impoverish both the pocket and the farm?

Or, if it is objected to this, that tobacco is not a safe crop, and therefore not a fair one to represent the theory of special farming, let us take the potato, which is perhaps one of the most reliable, so far as climatic influences can affect it. And what would the result have been if any considerable proportion of the farmers of Connecticut had for this year depended upon it for their income? At the present low prices how would they have been able to exchange their surplus so as to leave a balance at the end of the year on the credit side? The fact is, no crop that can be grown with fair success when the conditions are favorable, is safe as a specialty, for the reason that the exceptional years are too frequent, when from apparent or hidden causes the producer realizes little or no profit. So, then, it seems to me fair to repeat the proposition that the average farmer should practice mixed farming, and by this I mean that he should produce a full supply for his own necessities of such crops as are adapted to his soil, wisely selecting for the market those which in a series of years, have been proven to be most reliable and profitable. I well remember a remark once made by a skillful farmer with whose practices I had opportunity to become quite familiar. When expostulated with for planting a small part of the field with beans instead of corn, "My son, if you raise your own beans you have them," thus closing the argument, and stating in a nut-shell the true New England policy.

But not only with respect to these matters which I have considered, but in the entire farm economy, the question of labor comes in to dictate our theories and direct our practices. Why then the laborer himself should receive so little true consideration from those who employ him upon the farm, I am at a loss to explain. It would seem, in numerous instances, as though he was from the beginning to the end of his service nothing more than a free slave, a drudge, to be fed and lodged, and worked to the limit of his ability. As though the idea that he could or would appreciate kindness, and requite it with more willing and efficient service, was only an impracticable theory, at least for those who would employ his labor at a profit. I have known farmers who would subject themselves to any amount of discomfort, rather than have those in their employ enjoy an hour of leisure, who always planned an amount of labor wholly disproportioned to the number of men employed, and thought it shrewd management. But the wisdom of such a policy was absolute folly, and resulted in loss instead of their fancied gain.

There ought to be between the employer and the employed the most cordial sympathy, and the most complete community of interests, and there must be in order that the largest profit may result from the relation. Fortunately there are many employers who understand this, and treat those in their employ with true consideration, sometimes from the motive which is spanned by dollars and cents perhaps, but often from genuine impulses of sympathy with those who are by necessity their servants. I hope you will pardon me for introducing, just here, a bit of my own experience, for as a hired man I became intimately acquainted with representatives of both classes which I have described, though I wish to speak of only one, and would gladly forget the other. It was my good fortune once to be employed by a farmer who was, to my mind, an ideal employer, agriculturist, and gentleman. He carried on a large business and by his skillful management won the admiration of his employees, and by his kind regard for their comfort won their devotion. His keen judgment of men's labor enabled him to adjust the matter of labor and help with great accuracy, so that everything moved on from spring to autumn with systematic regularity and finish, such as I have never seen elsewhere. And the service required for this was almost as much a pleasure as a task. There was no grumbling about overwork, though now and then there was occasion for all hands to crowd into one day the labor of two, for rainy days were often days of absolute leisure. I remember we were told one morning in April, "Well, boys, as it rains too much to work out of doors, I think we will sow a little plaster," and though it rained steadily and fast several tons of plaster were sown in the forenoon, while nothing was required in the afternoon, and both the service and the leisure were enjoyed. Now if such treatment of farm help, and such a skillful adjustment of it to the needs of the farm, could become the rule rather than the exception, there would be less aversion to farming as an occupation. Let the example which I have given be copied by the farming community, and farm labor would soon become attractive, and farming at least more profitable.

I readily see that some of you may think me too censorious in my treatment of this subject, but I hope all such will allow me to mention one more defect in our system of farming, which seems to me more radical and universal than any of which I have spoken. It is our want of thoroughness in cultivating these New England hills and valleys, which, at the best, are difficult to coax into that fruitfulness which makes farming a profitable business. The blame for this is oftenest laid at labor's door, but really the trouble lies in a mistaken policy, which, instead of concentrating our labor and material upon an area that is wisely adapted to both, broadcasts them over so wide an acreage that thoroughness is out of the question. Now, it is true upon the farm as everywhere else, that what should be done at all should be done well. No more land should be cultivated than can be made to yield a full crop, whatever it may be. Here is a specialty which all may safely adopt. There are many farmers in Connecticut, to-day, who own so much territory that they can give only a small fraction of it any care at all, and who would be enriched if they would give up their titles to a large portion, though the consideration be a very small one. I verily believe there is no poverty so harrassing as that which overtakes him who, by the possession of more land than he can occupy, is made land-poor. Fortunately, the number of such unwieldy farms is decreasing. The census of 1850 shows that the number of farms in Connecticut was 22,445, while in 1870, using the same authority, the number was 25,508. The average size of these farms at these two periods shows that the increase in number was due mainly to the division of the larger ones, and while I cannot quote definite figures for 1880, I am sure that the work of disintegration has been even more rapid during the last decade. This is hopeful, for it asserts the fact that the unprofitable ambition to own large farms is giving place to a true and more intelligent ambition to test the productive capacity of smaller ones. In conversation with one of the most successful gardeners whom I know, not long ago, I asked him how many acres he cultivated. He answered, about fifteen, and, as I said to him, that is enough for one man to care for, his reply, as significant as unique, was, "My dear sir, you can raise more upon fifteen acres than you will upon twenty-five." He understood the secret of success. Quite a number of years ago, there appeared from the pen of one of Connecticut's most charming authors, himself an amateur in farming, a little book, entitled, "Ten Acres Enough," and though, like Noah's dove, it found no resting place in the convictions of the farming community, it still was the herald of a better, because more thorough, system of culture for these half-starved fields of ours, and, no doubt, awakened inquiry upon this vital subject.

I know a mechanic in a city of New England, who, having lost his health, thought he might regain it by outside employment, and purchased two and a half acres of land in a rich farming district, just outside the city, for that purpose. It was a rough and unpromising little farm at first, but, having erected some cheap buildings, purchased a team, and hired a man, he went to work with a will. His capital was small and his first outlay soon exhausted it, but he invested his own labor and that of others until the rocks and bushes were removed and the soil ready to return dollar for dollar in wisely-selected products. In a short time he was free from debt, and after paying expenses, was able to count his profits in large sums, so that his neighbors who owned large and well-appointed farms admitted the fact that his profits exceeded theirs. Imagine, if you can, the time when a system as thorough and intelligent as his has become the rule, rather than the exception, all over New England.

And why not, instead of thus taxing our imagination to sketch such a millennium, begin to realize it at once? Instead of forty bushels of corn per acre, which is about the usual amount grown, we should double the average; and instead of one hundred bushels of potatoes as an average, there might be two or three hundred grown. The cash prize offered by the Massachusetts Agricultural Society, a few years ago, for the best acre of potatoes, was awarded to a man who reported a yield of more than five hundred bushels, of marketable quality.

A farmers' club, not long ago, applied to me for some improved varieties of corn, as a wealthy gentleman had offered a large cash premium for the best acre grown by any member of the club. I sent them half a dozen varieties from which to select, and the trial began. There were several competitors, and the result was a surprise to all. The minimum yield reported to the committee of award was ninety bushels, while the maximum was one hundred and seventeen and a half bushels, and the next below, one hundred and thirteen and a half bushels. But better than the profit and satisfaction which resulted from this new departure, was the influence of such an example upon that entire farming community, which will never again be satisfied with their former methods. I am so fully convinced of the importance of a more thorough system of cultivation upon nearly all our farms, that I am inclined to believe it is to become the chief agency in lifting New England agriculture to a higher plane, both of honor and profit.

Mr. President, I have spoken of a few, and only a few, of the topics which have presented themselves to my mind while considering the broad and vital subject of farm labor in New England, and trying to treat it in a practical and common-sense way. Perhaps I have already said enough, but there is one phase of farm labor on which I will venture to add a few words. I mean farming as an art. The word art, I am aware, is not often associated with farming, but it is surely worth inquiry whether farming may not and ought not to be made an art, and whether the farmer ought not to work in the spirit of an artist. We are perhaps apt to think that art is reserved for only merely ornamental and æsthetic purposes. But if this be so, has the farmer no need of the softening, cultivating influences which art can give? If any one is disposed to doubt the propriety of connecting the idea of farming with the idea of art, let me remind him that Max Müller, the great philologist, has derived the very word art, from the Latin word which means to plow. He says: "As plowing was not only one of the earliest kinds of labor, but also one of the most primitive arts, I have no doubt that the Latin word *ars*, and our own word art meant, originally, the art of all arts, first taught by the goddess of all wisdom, the art of cultivating the land."

The farmer, then, has an original right to regard his occupation as an art, and, if it be an art, it deserves the treatment of an art. By this, I mean that the farmer and the farm laborer is bound, if he honors and respects his occupation, to conduct all its operations with a due regard to the great artistic rules of proportion, harmony, and finish. Shakespeare says, "There is an art which doth mend nature," and this is the art which I would commend to farmers and farm laborers. It applies to all farm labor, the lowest as well as the highest, to the building of a stone wall, the setting of a wooden fence, the running of a boundary line, the digging of a ditch, the planting of an orchard,—in a word, to all the items of labor which make up the work-day life of a farmer. It costs no more to do all these things well, with proper regard to symmetry and correct design, than to do them hap-hazard, in the slovenly, careless manner we so often see. And while it costs no more, it adds directly to the value, the money value, of a farm, if all these things are done artistically.

But I will not put this duty on the sole ground of *pecuniary* advantage. I would have the farm laborer work in the spirit of an artist, because the eye and heart of man were made to delight in the fitness and harmony of all outward objects. The simplest farm labor, that most primitive art of plowing, as we all know, may be done so as teach all our own youth valuable lessons in the duty of doing all things in the best possible manner. The lot and life of that farmer who has felt no sense of taste in farming is needlessly hard and uninteresting. No man need be so rude and untaught as not to take pleasure in a smooth and well-laid field of grain or grass, in a trim, well-kept yard or garden, in preference to the shabby, neglected, forlorn fields and enclosures which present no sign of cultivation in the great art of agriculture.

But the life of the farmer is not wholly in the field. The sense of art, of which I now speak, will find expression in the home of his family, and hired laborers, and in the buildings which shelter his stock and his crops. Here art will concern itself to secure health, comfort, and entertainment for man and beast. Here art and true economy go hand in hand. The "stitch in time" that "saves nine" is the dictate of art as well as economy. How much of sheer waste to the farmer comes every year from the want of that taste which is offended at the sight of a fallen fence-post, an unhinged gate, or a loose clapboard. To be artistic is to be truly economical. The cultivation of such a sense of art not only dignifies and exalts labor; it leads to all the forms of cultivation in household ways of living, and in literary tastes and enjoyments. The newness of our country, the struggles with nature which are incident to the life of new countries, have doubtless kept our farmers hitherto from giving due attention to this phase of farm labor, but I think the time is come when American farmers, New England farmers, Connecticut farmers, can no longer use this excuse for unkempt, untidy, wasteful, careless, and inartistic modes of farming.

I am told that the best farming countries of Europe present a great contrast in all these particulars to the greater portion of our own. Travelers tell us of the enchanting views which burst upon them as they descended into Italy from Switzerland or France. One who has recently witnessed the scenes which he so graphically describes says: "The vast fertile plains of Lombardy lie at the foot of the Alps like one vast, well-kept, well-ordered garden—not one foot of waste land—the wide fields of wheat intersected at regular distances by rows of mulberry trees, which in turn are connected by grape-vines, the whole forming a scene, not only of matchless beauty, but presenting a specimen of skillful husbandry and the closest economy of agriculture, such as almost no other land can equal, where art and utility join hands, and where beauty of landscape vies with richness and value of production."

And all this is the work of a peasantry, the like of which America nowhere presents. The farm laborers of New England, Heaven be praised, are not peasants, but proprietors, tilling, in a majority of cases, their own acres. Surely it is, then, our duty to maintain in the highest degree, not only all the great virtues of industry, honesty, frugality, and temperance, but to adorn and beautify our work and our lives by the art which lightens labor, adds to our wealth, and lifts our lives to higher and more spiritual regions of thought and action.

The CHAIRMAN. If any gentleman has any question he would like to ask, Mr. Chamberlain would be very happy to answer it.

QUESTION. I would like to ask if the report which the gentleman has given us of the crop of potatoes is the highest yield he has seen stated?

Mr. Chamberlain. No, sir. I have simply instanced that as one case. I have seen instances of higher production reported since that time. I have seen as high as 700 bushels reported. There is one point which I would like to bring before you in regard to this trial, and it bears directly upon this question of labor. In conversation with this gentleman, who lives in a town adjoining the city of Worcester, I asked him his method of cultivation, and in describing it he said: "Those potatoes were hoed only once;" and he gave me a little advice upon that point. He says: "It is not only a saving of labor to hoe but once, but it is by all means the best method to secure a large crop of marketable potatoes." He says the ground needs constant stirring and cultivation with horse-power; that you need not expend any more hand-labor than is required to simply hoe the potatoes once. He says, if you hoe more than once, you are causing every plant to form a new set of roots every time you hoe it, and the result is, you get a large quantity of small potatoes at harvest-time.

Mr. Jennings. What was the method of cultivation of the corn that yielded 117 bushels per acre?

Mr. Chamberlain. I am very sorry that I cannot state the method of cultivation in detail. I have it at home and intended to bring it with me, thinking it might be of service here. I will state it as near as I can. The variety of corn was the White Vermont, as it is known with us in Meriden. It is a kind of corn that has been recently re-introduced here, having been originally produced in Connecticut. The method of cultivation was about this: The autumn previous, the land, which was turf, was turned over and sown with buckwheat. In the spring, there was put upon this acre of ground twenty horse-loads of stable-manure. The ground was then cross-plowed, and ten loads of composted night-soil spread upon the surface, which was all the manure that was used upon the acre. I would say here that the same treatment was given three acres in the field. At the time of the award, the committee were asked by the grower to measure off from one end of the field an acre, and they did so. The requirement of the test was this: On the first day of January, 70 pounds of ears were to make a bushel of shelled corn. This was the basis of the award which gave the grower 117½ bushels. I myself shelled 70 pounds of ears, which gave me a bushel and four quarts of corn. Now, if you will take a pencil, you will see in a moment that the actual product of that acre was 131½ bushels. This bushel that I shelled I took from the crib, and it was no more than an average bushel.

Mr. JENNINGS. I am a good deal interested in this question of corn. You will see on the table, on the other side of the hall, a variety of corn called the Chester County Mammoth, and, according to the best measurement we have been able to make, it yields 117½ bushels of shelled corn per acre. That has been produced this past season, and with no reference whatever to a premium, with common cultivation, as corn is cultivated by the best cultivators in that part of the State from which I come, the town of Westport. There are other varieties of corn on the table, and some yield nearly as high as that; but that is the highest. There are some varieties there that I think are marked between 80 and 90 bushels to the acre, and it is raised, as I remarked, under the common method of cultivation, with, of course, a good deal of manure. I cannot give the details, but this corn that I speak of as yielding 117½ bushels to the acre was manured heavily with stable-manure, turned over in the spring (perhaps a week before planting time), the land marked out in rows four feet apart each way, and then a small portion of phosphate put in each hill, and a little sprinkled around, say three or four inches from where the corn was planted; then the seed was covered, and received flat cultivation all through the season.

Mr. SCOVILLE. At what stage did the cultivation of those potatoes cease?

Mr. CHAMBERLAIN. Mr. Warren told me that, previous to hoeing, he probably cultivated his potatoes four times with an ordinary cultivator. When the potatoes were about ten inches high, he hoed them, which enabled him to make quite a hill about the potato; then they were left. There were very few weeds to trouble him after the hoeing, and what few there were he said were easily eradicated by hand.

Mr. WETHERELL. What would be the difference whether the soil was stirred with a hoe or a cultivator? You say he hoed but once, to prevent small potatoes, and yet kept on stirring the soil with the cultivator. What would be the difference?

Mr. CHAMBERLAIN. In level culture, it would be about the same. These potatoes were grown upon the system of hill culture.

Mr. WHEELER. I would like to ask Mr. Chamberlain if hoeing once even was essential to the production of a good crop, or if hilling up the ground around the plant at all was necessary to produce a good yield of potatoes?

Mr. CHAMBERLAIN. I would not insist upon it. I am not experienced in the plan of level culture of potatoes. I have not any fault to find with it, or any criticism to make upon it. I think very much depends upon the character of the soil which you cultivate. I do not think, as a rule, that it will answer for me to adopt a practice simply because another man has adopted it, but I must judge for myself what my soil is and what it requires in fertilizing and in cultivation; and it seems to me that my soil is better adapted to hill culture; whereas, in some other soils, I have no doubt that level culture is the best.

Mr. SEDGWICK. In this connection I would like to say that I saw this fall, in Monmouth county, N. J., a field of forty acres of potatoes that never had a hoe put into it. A new variety of potato was planted, and a square rod in the center of the acre was measured off and the potatoes dug, and the yield of that rod was at the rate of 720 bushels per acre. The potatoes took the first premium at the New Jersey State Agricultural Society's exhibition.

Mr. West. Is it not an exception to the rule that hired men are made drudges?

Mr. Chamberlain. I think perhaps my description of the treatment which hired men receive is a little strong for the average farmer, and yet I think it is true, in the majority of cases, that there is not that effort to identify the farm laborer and hired man with the interests of his employer that there ought to be, and which might profitably be made. I think there is more or less of the feeling that they are not members of the family, and that they are not to be treated as such. If they are absent from the farm a day, or even an hour (in some instances), it is taken out of their wages. Now, I think that is very poor polic I think there should be everything done to bring about an identity of interest between the farmer and the men whom he employs. I think it will be responded to, in a great majority of cases. Of course, there are exceptions; but I think that simply as a matter, not of humanity, but of profit, this should be done in all cases. I have felt the force of the other course in my own experience, and very keenly too. I could not feel that interest in my employer's work that I could in the case which I have instanced, because it was not possible for me to do so.

Mr. West. I have had a great deal of experience with hired help; I have had good help and poor help. I make my help a part of my family, but I have had men who took no interest whatever in my work. I think the gentlemen will agree with me that they have to work harder than any help that they hire, and, when the day is done, the hired man feels that his time is his own. In my experience, I have had but very few conscientious hired men. Good hired help in the section where I am, is an exception.

Mr. Wetherell. With regard to labor on the farm, I think one of the difficulties, and one of the most serious, is the number of hours that men hired on a farm have to labor as compared with the hours which mechanics work. I have heard a good many young men say that they would not engage to work on a farm, where they would be obliged to work twelve or fifteen hours a day, if they could find anything else to do. On the other hand, the farmer says he does not want any ten-hour help about his premises. A farmer on one of the best farms in Worcester county said to me, "It is exceedingly difficult for us to get labor on our farms such as we want." I think I may allude to one point that the lecturer made. He asks us, "Why does this want of sympathy exist between farmers and farm laborers?" He told us at the outset (which I think is true), that a large proportion, at least, of farm laborers, is made up of foreigners, unskilled laborers, and some of them speaking so that the farmer himself can hardly understand a word that they say. "But," said this farmer of Worcester county, "we are obliged to hire such laborers, in the market offering themselves to serve as can find employment nowhere else. When they have tried in all the factories and all the shops everywhere else where the ten-hour system prevails, and they can get nothing to do, as a *dernier resort*, they come and hire out to the farmer." Perhaps in a few weeks or months after the farmer has hired him, there is an opening for him to go where he desired to go in the first place; he leaves the farm the first opportunity he has, and hence, this farmer said, "we have to take our help from those who can get nothing else to do, and just as soon as they can, they will leave us." I think there is a good deal of truth in that remark. I am of the opinion that the ten-hour system is at the bottom of this whole difficulty which we meet on our farms. But you know we cannot introduce the ten-hour system upon the farm. We cannot milk our cows twice inside of ten hours to advantage. We have other work that we cannot do to advantage in that time. How this difficulty is to be overcome I do not undertake to say, but that it exists, I know. I think every farmer here has realized it; if he has not, he will.

Then with regard to the feeling existing between the laborer and the employer. I have had experience similar to that of the lecturer. I was brought up on a farm by a well-to-do farmer, and when the boys got big enough, so that they were not all wanted on the farm, some of us went out to work. I was the oldest boy, and of course my services were worth more than that of the younger ones, and it was my lot to labor with other farmers who wanted to hire help, and I remember two distinct instances in my experience. There were two men, both of them large farmers, who had the reputation of being very hard men to work for. In both of those instances I found them the best places where I ever worked while I worked out on a farm. One of them was the most particular man about his work that I ever saw. He would not have a man mow in his field unless he could mow to suit him. He would put him in the bush pasture to cut bushes, before he would have him mow in his hay field, because, as he said, he would "poison the grass." This man displeased a great many men who worked for him. The other man was said to be a very hard driver of his help. I found no more difficulty in the latter case than the former. I found them to be excellent men and as sociable as any man could desire in the position I occupied. I had no fault to find with either of those men.

There is one other point to which I wish to refer, to which the speaker alluded, and that is the subject of growing tobacco. I suppose there are tobacco growers in this town. I might perhaps differ from our friend's statement in regard to that matter. I believe it is the farmer's duty and privilege to find out what crops he can grow on his farm whereby he can realize the best returns in money, as every farmer must have a money crop to pay his bills, or something that he can depend upon as a specialty in farming. I agree that mixed farming, to a certain extent, is desirable, but I say with regard to tobacco, that if a man finds that he can raise on a piece of land a crop that will sell for two or three, or five or six times as much as any other crop that he can raise on the same land, I should think it a very strange thing, if he is a smart man, if he does not raise tobacco. It is said that tobacco exhausts the land. I have heard that so many times that I want to refer to it. I neither chew it nor smoke it, so I am not speaking in that connection, but simply refer to it as an economical question. When it is said that tobacco exhausts the land, the south is quoted to substantiate that statement. I have taken some pains to investigate this matter, and I know what I am saying, and I say that the farmers in Massachusetts who have grown tobacco for many years, have not found that it exhausts their land. One man in Hadley, told me that since he had grown tobacco as a staple crop on his farm he had been able to keep nearly double the number of neat stock that he did before he raised tobacco.

Mr. CHAMBERLAIN. Will the gentleman allow me a moment. He certainly misunderstood me if he understood me to say that tobacco was an exhaustive crop upon the land on which it is grown. I did not intend to state that. The impression I meant to convey was that the farmer was apt to devote his attention exclusively to the tobacco crop, to the neglect of other portions of the farm. I do not believe that the tobacco crop ordinarily exhausts more of the elements of growth than the corn crop.

Mr. WETHERELL. What I was coming to was this, that the farmer who grows tobacco can grow better crops of any other kind that he produces than those farmers about him who do not pursue this method of cultivation.

Mr. WEBB. Will the gentleman answer one question? How much experience has he had in raising tobacco, and is he talking from experience?

Mr. WETHERELL. I have had no experience in raising tobacco. (Laughter.) I will ask the gentleman the question: If he should tell me that a sewer was a muddy hole, what would he think of me if I should ask him if he had ever crawled through one to know it? (Laughter and applause.) If a man does not know anything except from his own experience, his knowledge must be very limited. (Applause. Now, you understand clearly, I am not a tobacco grower. My farmer attempted it in one instance and it was an utter failure, for the reason that the frost destroyed the crop, and for no other reason; but he did not dare take the risk again. But, as I was remarking, I think the gentleman will not deny that he said it exhausted the pocket.

Mr. CHAMBERLAIN. I said it exhausted the pocket. I would not be understood as saying it exhausted the farm itself.

Mr. WEBB. And he is right.

Mr. WETHERELL. I should expect that from the gentleman who endorses it. I want to say in answer to that, that I do not know of any business in which a man was ever engaged, whether mercantile or farming, where the pocket has not been, at times, exhausted. Tobacco is not the only crop that does it. I think that is a false issue. Therefore I believe in leaving the farmer alone to select that crop which he thinks best for his farm. I think a farmer who selects that crop because it is best, if he uses the same economy in growing that crop, that he would if carrying on other branches of farming, will be successful. I do not know how it is in your State, but I have known a good many men, who, finding the growing of tobacco an exceedingly profitable business, bought horses and carriages, and indulged in all sorts of extravagances, and failed because of that, not because tobacco raising was unprofitable; tobacco was simply the incident that led to it. I was employed by a gentlemen a few years ago to go through the Connecticut valley in Massachusetts to ascertain the best and most successful methods of growing this crop. I visited the best and most experienced farmers in that section, and I prepared a manual that was published on that subject; I will relate one fact in connection with that matter, and that will end what I have to say now. The manual was considered a success. Well, at a meeting at Northampton of the Hampshire and Hampden Agricultural Society, one of the Northampton farmers took occasion to say, wanting to hit some of the agricultural writers whom he saw at the reporter's table, that agricultural writers wrote a great deal that they did not know anything about. I replied to this gentleman by saying, "You have just remarked that such and such a book was the best manual you ever saw on the subject of tobacco growing. That manual, sir, was written by one of the agricultural editors whom you have just been denouncing as men who write on what they do not know anything about." The result was, the gentleman came to me, took me by the hand, took me away from the hotel where I was stopping, and took me home with him. He thought that was a good retort on me for what I had said with reference to him. I will only say, in conclusion, that I think the lecture was an exceedingly able one ; it was full of points that can be discussed here. I have alluded to two subjects, and would like to allude to others if I had not already occupied so much time. I hope that if a man has not had any experience, his mouth will not be necessarily shut; because, if a man can relate only his own experience, we shall get tired of personal experience pretty soon.

Mr. WEBB. I will not go far out of my way to go through a mud hole, but I have traveled in one journey eight thousand miles without going across a bridge, and of course have crossed some mud holes. The thought never suggested itself to my mind to crawl through a sewer, but I have had some experience in raising tobacco for several years. I do not condemn the raising of tobacco if the farmer finds it profitable. I think that the only way for a farmer to raise it and to raise it profitably is to make it a specialty, and not own too much land. The suggestion I would make to my friend is, if he wants to know how it is himself, to buy 200 acres and raise this curse, tobacco, and it will not take but a few years for him to find out all about it. After I had been raising tobacco for several years, there came a high wind and blew my tobacco-house down, and I have had thanksgiving ever since, for the reason that the tobacco crop, unless the farmer will draw manure from other sources except from the farm, will invariably exhaust the other products of the farm. If he has a large farm, it will take him too long to get around in rotation to keep it up in a proper condition. A man who has but three or four acres can make a specialty of it, and can make money by raising tobacco, and use all his manure for it, with the exception of the small quantity which may be necessary around the house. Under such circumstances, it will do very well for a man to raise tobacco, but a man who has a large farm cannot do it unless he neglects a large portion of his land, or obtains manure from other sources than the farm.

Mr. Hoyt. I would like to inquire of Mr. Chamberlain or any other gentleman if he has had any experience in cultivating corn or potatoes with a smoothing harrow after planting?

Mr. Chamberlain. I have had no experience with that, although we have a smoothing harrow. I know there are gentlemen here who are well qualified to answer that question, for, in conversation with them last evening, they told me that was their method.

Mr. ———. I cultivate my potatoes and corn both with a smoothing harrow. I cultivated last year my potatoes when they were up four or five inches high with a smoothing harrow, and with advantage. But let me say one thing. I cut my potatoes, and plant but one eye in a place, so that there are not four or five eyes together to send up sprouts, and if the smoothing harrow strikes a sprout it does not do much damage.

Mr. Wetherell. Then that method does break them off sometimes?

Mr. ———. It will break off some.

Mr. Hoyt. I cultivated my corn this year twice in that way, it was not affected by the drought, and I had a good crop.

Mr. Hyde. I have had no experience in raising tobacco, but most of us have had some experience in raising potatoes. I want simply to say, that the best crops of potatoes that I have ever obtained have been raised by plowing greensward about three furrows, then manuring in the hill, dropping my potatoes, and turning a furrow again upon the potatoes. This turns all the manure underneath. I then never have occasion to hoe or cultivate but once, and I have never found it inconvenient or destructive to the crop. The weeds that remain will be very few, if any. I have raised as high as 600 bushels of potatoes to the acre in this way, without any fertilizers. I plant my potatoes in drills rather than in hills, because we turn over the furrow.

The labor question has been spoken of. That is a problem, and I hardly know how it can be settled. Farm help is not, as every gentleman knows, what it was twenty years ago. It is constantly changing, and our work is now mostly done by foreign laborers. The question of making this class of laborers a part of our familie is a difficult problem to solve. Whom does the farmer employ for his help to-day? Is it the class of men whom he would employ twenty years ago—men whom he wants to take into his family? Why, it has been said, and I think very justly, the farm laborer is often a foreigner, perfectly ignorant of the business which we entrust to him, and probably of the domestic relations. It is a very grave question whether a man wants to hug one of them to his bosom as a companion.

The CHAIRMAN. I have some figures which I would like to give to this meeting at this time, showing what can be done by thorough cultivation. Learning some three weeks ago that a gentleman in New London had been very successful in raising celery, I wrote him asking him to send me the figures so that I could use them at this meeting. He had not time to give me the figures back of year before last, but he has done the same thing for some six or seven years. In 1882, he raised on an acre and a quarter of land 150 bushels of potatoes, which he sold for $112.50, and 5,000 bunches of celery, which he sold for $1,800, making $1,912.50. He paid out for labor $50, and for fertilizers $70, making $120; leaving for his own labor $1,792.50. In 1883, he raised 200 bushels of potatoes, which he sold for 70 cents a bushel, making $140, and 60,000 celery plants, which he put up in bunches, making 12,000 bunches, and sold at 18 cents a bunch, which he sold for $2,160, making $2,300 as the result of the products from that acre and a quarter of land. He laid out the same sum for labor and fertilizers, leaving him this year as pay for his own labor $2,170.

Mr. Hyde. I move that this little body of agriculturists all unite in raising celery!

The Chairman. I did not refer to this to show that everybody should go into the business of raising celery, but merely to show what thorough cultivation will do on a small piece of ground.

Mr. Hyde. Pardon me; I understood it precisely.

Mr. Chamberlain. I would like to make a single statement with regard to the production of the two acres and a half of which I spoke by the mechanic in the city of Worcester. One of those acres was devoted to the cultivation of strawberries. The variety chosen was the Jucunda. This was a few years ago, and the product of that acre was 1,800 quarts. This shows what can be done with a little land as well as the figures which the Chairman has just read. Now I want to ask every farmer here if there is not, aside from the profit of such cultivation, a satisfaction in achieving such results that it is well worth while we should all enjoy? Are these results such as are easily attainable by us? I tell you nay, but every man can double or treble the product of his farm in this way, and this is a step which we must take if we would bring up the agriculture of New England to the position which belongs to it by right. (Applause.)

Mr. Scoville. I would like to ask the gentleman if every farmer should appropriate two acres, or even one acre, to the production of such enormous crops as he has stated, where he would find a market for them? Waterbury is not a very large market.

Mr. Chamberlain. I think Mr. Scoville has made one very good argument against special farming, which I do not advocate.

Mr. Fenn. The speaker commenced to give in detail the method of culture of the crop of corn which had produced

$117\frac{1}{2}$ bushels to the acre; he did not finish it. Being interested in corn culture, and desiring to obtain the best results for the labor expended, I wish he would finish it. I should like to know whether the method adopted was hill cultivation or flat cultivation, or how it was done.

Mr. CHAMBERLAIN. The method of cultivation in that respect I should think was about an average between the two extremes of level culture and ordinary hill culture. The soil was a strong black loam, and I think that perhaps the grower adopted a very wise method in the treatment of his own crop; not that it will apply to all cases. I think you will see by the statement which I have already made that this corn crop was not excessively fertilized; twenty loads of barn-yard manure being used and plowed under, and ten loads of composted night soil being used upon the surface — no fertilizer in the hill. I remember that in his statement he said this, "I cultivated this corn a number of times and hoed it only twice." Beyond this I do not know that I can make any further explanation.

QUESTION. How was it planted?

Mr. CHAMBERLAIN. It was planted three feet and a half each way. He left four stalks in a hill. This, of course, was in competition, and he adopted one little plan that was not made public. In order to secure every hill, he went over this field one night with a solution of Paris green in order to prevent the cutting of any of this corn by the worm. I presume that his competitors had no knowledge of this, and did not try the same experiment.

Mr. FENN. My reason for asking the question was this: Many of those present will remember that Dr. Sturtevant has advanced the theory of root-pruning. The old-fashioned method was to plow deep and make a large, square hill at the last hoeing, which was, in effect, a system of root-pruning. That system I used to follow, the same as my forefathers, but for the last three or four years I have adopted flat cultivation, and little or no hilling, and I have had better results; and for the past two years my corn has stood the droughts (which we all know have been very severe) very much better than with hill cultivation.

Mr. Augur. There is one point in regard to this labor question, which has been so happily handled this morning, to which I would like to refer, and which, perhaps, has not been fully developed; that is, the hours of labor on the farm. In my earlier years, I was accustomed to extended hours of labor, almost from sun to sun, but more recently we have fallen back on the system of ten hours, and when we hear the whistles of the factories in the neighborhood, we by common consent stop. The question is, whether it is not better for farmers generally to adopt systematic hours of labor, and when we do labor, have our men work continuously, and feel that it must be continuous, well-directed labor? I really believe, that on the whole, it will lead farmers to be more systematic, to have their plans better laid, and that we shall accomplish quite as much, and perhaps with more satisfaction to our help and to ourselves.

Question. Can you quit work at six o'clock in haying time, every day?

Mr. Augur. Of course, there may be some times when it is impossible.

Question. Do you keep up the ten hours in winter?

Mr. Augur. In winter, we should hardly make that.

Mr. Wetherell. I would like to ask Mr. Augur a ques tion: Suppose a man has a dairy of forty or fifty cows; can he milk them twice inside of ten hours?

Mr. Augur. I will admit that there would be a difficulty there.

Question. I wished merely to ask the question if, at this season of the year, when the days are short, he kept his men at work until the whistle sounded?

Mr. Augur. I suppose not, but I think we can approach nearly the system of regular hours by beginning work earlier than farmers sometimes do, and continuing it later.

Mr. HYDE. I should be very glad, as a farmer, to secure men from whom I could get ten hours of work every day throughout the year. I fail to get eight in the winter. I find the men who go to the mill go two hours before I get my men started even to do the chores and the milking; and it is so at night. Our hours of labor in the factories are longer, perhaps, than they are in some districts. Our mills have been successful, and they are running twelve hours. I should like to see the farmer who is going to get up at four o'clock, get his breakfast, and be out at his work by six o'clock, and have but thirty minutes from that time until he comes back to the house at seven o'clock at night.

Mr. SEDGWICK. I would suggest to the last speaker, that if we paid our hired help as well as the manufacturers pay them, we could get as good a class of help. In a nut-shell, the whole thing is this: We cannot get good men to work for us on our farms, or we do not get good men to work for us, because we do not pay them as much as they can earn elsewhere. If you will pay a man just as much as he can get in a hot and stifling factory, he would be glad to work for you on the farm. There is no difficulty about it; it is only a question of wages. That being so, is it not more profitable for the farmer to pay his men as much as the men are paid who work in the factories, and have his work done in a systematic way—so many hours a day? I know that when I work on the farm, I can get as tired in ten hours as I want to get; and I can do as much work in ten hours, steady work, as I ought to be expected to do in fifteen or sixteen hours; and if my men will give me ten, good, square hours as a day's work—as they will do if I pay them as much as they can get elsewhere, it is enough for any man to do. I am aware of the fact, that in harvest time and haying time, we may have to make longer days, but if we pay our men by the month, so that they will get good wages, or, if you like, pay them by the hour for extra work, and they will be glad to stay and help you. We hire by the day in harvest time; why not, when you have to make a long day, pay according to the number of hours? I have done it, and it worked well. Pay your man well for every hour he works, and he will be glad to stay until nine o'clock, if necessary. Give him twenty cents an hour, and if it is a rainy morning when he comes on, tell him to wait till the shower passes by. If you don't want his services, when a shower comes on in the afternoon, take out your watch and put down his time. Pay him twenty or twenty-five cents an hour, and he will be glad to do it.

One other point. What do you want to board your men in your family for? A hired man can board himself cheaper than you can do it, and you have all the trouble and annoyance of having a sweaty, perspiring man at your table, when you don't want him. If you have company, you can't have such a man as that at the table with them, and you feel sort of disagreeable about it. If he is not one of the kind of men you want around all the time, you can pay him eight or ten dollars a month more, and he can board himself, as I say, cheaper than you can board him. I think that can be demonstrated without any trouble.

Mr. Wetherell. I want to ask one question with regard to the laborer boarding himself. Take the isolated farms of New England, with only one hired man, perhaps half a mile or a mile from any other house, where are such laborers going to board, or how is a bachelor going to board himself?

Mr. Sedgwick. I admit that there are circumstances which may alter the rule, but for the ordinary farmer who employs three or four men, it is cheaper by far to have tenement-houses, and let his men live in those tenement-houses.

Mr. Wetherell. Such are not ordinary farmers.

Mr. Sedgwick. I think a majority of the farmers in these towns are men who hire from two to three men in the course of the year, and a good many of them have tenement-houses on their farms; if not they ought to have.

Mr. Webb. This question is a very important one. It is one which has given me a great deal of trouble. I have traveled a great many miles a good many times, and taken more risks in going about the purlieus of New York and around Castle Garden to hunt up men, than I ever can among the Indians. Therefore, I feel a deep interest in this question. It is suggested that we pay our men two dollars a day. We may do it a short time in the haying season, but we are speaking of general farm labor. If we agree to pay too high wages, how are we going to pay them? Where is the money coming from? I go to the store with a load of potatoes, and say, "Do you want any potatoes to-day?" "Yes." "What are you paying?" "Sixty cents," or "fifty cents a bushel," whatever it may be. "Well, I can't do any better; you can have them." "I want to buy some sugar and coffee; how much do you ask for your sugar and coffee?" He tells me, and I have to pay whatever he asks. We are working for our masters. You cannot put it in any other shape, when you come down to it, for we cannot put a price upon our goods, nor can we make the price of the goods we have to buy. Therefore we must do the best we can, and each individual must be governed by his own circumstances, and by his own business. How is the dairyman, who has a large amount of milk to deliver every day, which involves a great many chores, and a great deal of work, going to make his hours of labor the same as those of the farmer who pays no attention to the dairy? Therefore, the only way for us to do is to do the best we can, and let each and every individual study out the best way to treat his hired help, and get the best help he can. And I guess about as good a rule as you can find would be to "do as you would be done by." (Applause.)

Mr. HYDE. I have a single remark to make in regard to the criticism of my friend over on the right (Mr. Sedgwick), that if we paid higher prices we could obtain better men. That is true. But my friend, also on the right (Mr. Webb), asks who is to pay them? It is just as pertinent inside the house as it is out. If we will pay men and pay women enough, we can get such help as we want. I had the pleasure of receiving a little order from the better-half of this gentleman, and I sent that little order to a manufacturer of ours, who is employing help who make from $1.00 to $1.75 a day. They are a nice lot of girls. Any gentleman or lady here would be very glad to get such help inside their house to do the work. But where is the farmer who could pay $1.00 or $1.75 a day for domestic help? The best operatives in our mills get from $1.25 to $2.50 a day right along. What class of help are you going to hire from them? Any of them seek shelter in the mills, heated with steam, rather than take out-of-door exercise.

Mr. Gold. What does this mill help have, at the end of a week or month to show, after they have paid their board and expenses?

Mr. Hyde. Many of the girls and women who work in the mills will have from $12 to $20 at the end of the month.

Mr. Sedgwick. Mr. Webb struck the key-note in this thing. The question of farm wages here in New England is really determined by the law of supply and demand. He says he goes to market and says, "What will you give for potatoes?" "Fifty cents a bushel." "I will take it." He takes it because he cannot get any more. The man looking for work comes to the farmer and says, "What will you give me a month? "I will give you $18.00 a month and board." "I can't take it; I can go right down to Waterbury and earn my $1.75 and $2.00 a day. I can do better; I will go to Waterbury." That is what is draining our farms of the best men we have. It is because the manufacturer can afford to pay more than we can; and until the farmer can step up and pay as much as the manufacturer, he has got to have a poorer class of help.

Mr. Bill. This matter of help had better be left to us farmers to make just such arrangements as we can. One year, a number of my men, who were living in my houses, and in small places around me, who were dependent on their daily labor for the maintenance of their families, said to me: "In future, we shall work in no other way than upon the ten-hour system." I submitted to it that year, and they came up in the morning, pulled out their old Bungtown watches, and sat around on the logs until they were ready to go to work. They ran my farm that year, but I made up my mind that it was the last time they would ever run it, and it was. (Applause.) I said to them, open and above board, during that season, that I should never submit to the ten-hour or the eight-hour system upon my farm again. They said to me the next spring, when they found I had got new help, that they were all going to change their politics, and they were going to change their religion. I cared not for that; I run my own farm. I said to the men whom I hired, "What do you want for six, eight, or twelve months, beginning at a reasonable time in the morning, and leaving off at a reasonable time at night?" They told me; I hired them, and from that day to this I have run my own farm. There has been no hour time upon it. If I had a quantity of hay down in the mowing season that it was necessary to secure, I never heard a grumble from those men. If I worked them beyond the time that farm laborers should be worked, I always paid them. If they did not work more than an hour beyond the usual time, they always got their pay for it, and I have never had any trouble in keeping from six to thirty-five men right through the season, just according to the requirements of my business. They leave me to regulate the work, and I try to regulate it for the interest of the farm and the interest of the farm-laborer. (Applause.)

Mr. Gold. When the question comes up with regard to ten hours upon the farm, comparing it with ten hours in the factory, and the farmer says he cannot get time enough in ten hours, let us bear in mind the varied character of farm labor; that it enables a man to bear the strain during a certain portion of the year, of more than ten hours a day. It is varied in its character. It carries him into the field. There is an open-air excitement about it. He is not in that worn-out physical condition of men pent up in shops, and he can stand fairly more hours of work than those men. The farmer does not show that he has been exhausted by this extraordinary labor that you call upon him to perform in the harvest season, and the average time of labor upon the farm during the year is not greater than the average in the shop; and men who are fairly treated in the inclement season of the year, and in bad weather, with regard to short hours and getting things all snug before night, never complain, according to my experience, when, in the harvest field, in the busy season, more is expected of them.

Mr. Sedgwick. Most of your work is done in summer time, and you hire your men for four, six, or eight months. Taking the year through, I admit that there are no more hours of labor upon the farm than in the factory; but taking the average time in which the farm labor has to be done, how will it compare then?

Mr. Gold. They receive more wages, if they are hired for the busy season of the year.

Mr. Scoville. Times are very much altered in regard to labor. I did not raise roots years ago, because I could not afford to hire men to do it. Now, since we have got mowing machines, there is nothing for the men to do in the morning. My men have an abundance of time to attend to it, having little to do in the hayfield until ten o'clock, and sometimes not until noon. I have been in the habit of paying more than the manufacturers could. I pay my men seventy-five cents a day, for the year, and board, which is equivalent to fifty cents a day. That is $1.25 a day.

Adjourned to two o'clock.

AFTERNOON SESSION.

The meeting was called to order at two o'clock by Mr. Barstow, who said:

This afternoon we are to have a lecturer who has had large experience in city and country life, who can tell us much that it will be useful for us to know. I have the pleasure of introducing to you Dr. BOWEN.

THE HEALTH OF THE FARMER AND HIS FAMILY.

BY DR. G. A. BOWEN.

At the very top of one of the heavy undulating hills that abound in the northeastern portion of the State, is my little farm. From near the door of the house the observer can behold a landscape almost startling in its beauty. Cultivated farms, with their neat white dwellings embowered with trees, stretch away on either side. A heavy wooded slope, miles in length, forms a dark background to the Senexet meadows which lie below, through which winds a silvery stream expanding into a beautiful lake, which mirrors upon its surface the sky and surrounding objects. Should another observer on Round Hill at the north, look down the valley, his eye would behold the same landscape, its sand dunes and meadows, its wooded slopes, the winding river, and picturesque lake; so would another observer located on my friend Bartholomew's hill in Pomfret, and looking upwards from the south; but should the three come together to compare what they had seen, their descriptions would vary so greatly as to cause one to think that they had viewed totally different scenery, but the only difference would be in the stand-point of the observer.

These series of winter meetings have long been held, at which I have heard the lawyer define the legal points of farming as a calling, the business man has given his views as seen through his mercantile eyes, and various scholars have presented the scientific aspect of its numerous details. Now, by invitation of the secretary of this Board, I will present the views that I take of it, judging it from my particular stand-point of observation, which is a medical one, and I know that it will differ as greatly from much that has been presented, as would the descriptions of those who might view the landscape that I have described.

Physiology and hygiene teach us that perfect health, robust and vigorous, can only be obtained, and maintained, through the instrumentality of nourishing foods, pure air, bright sunlight, and long periods of undisturbed and refreshing sleep, together with suitable mental and physical exercise, living in accordance with nature, and not with the dictates of fashion, for an artificial existence. Where and in what avocation can these conditions be so completely carried out as upon the farm? for here is raised the major portion of the foods that support human race, and the production of them compels the tiller of the soil to pass the working hours of the day in the pure air and invigorating sunshine, exercising his muscles by carrying out the dictates of a previously exercised mind. The work of the farm compels no labor during the hours of the night, hence sleep, "nature's sweet restorer," need not be interfered with. The farm, then, possessing all the requisites for health, should give us the strongest, soundest, and most vigorous and long-lived class in the community; and, judging by conditions, by *a priori* reasoning, the farmer should be a model of manly health, and beauty, tall, and sinewy by reason of air, food, and exercise, deep-chested, and full-blooded. His frame should be an illustration of physical perfection, disclaiming all knowledge of disease, and his face a fitting crown therefor, made perfect by thoughtful and intelligent observation, study, and reasoning. To this class should the artist look for his example of a Hercules, or an Adonis, and not to the prize ring and circus. To repeat, the conditions for this physical perfection, the means that lead to it, are in greater perfection on the farm than in the office, store, or work-shop. But, we ask the question, is the dweller on the farm the most healthy of the race? Alas, no. The doctor's gig and tired horse are too often seen at the farm-house door. The patent-medicine man makes his regular rounds, and the agricultural journals have every available space occupied with advertisements of a multitude of nostrums, showing that there is a demand for them, while a glance at the farmer's face tells the story of his sufferings from disease.

I entertain the belief that the conditions of health or illness are mainly within the control of every individual, if he has the knowledge necessary to so govern it, excepting some few hereditary taints for which he may thank some ignorant ancestor. But even these he can greatly modify, and that farm life should give a greater freedom from ills than any other business or calling, but that the farmer is not as free from disease as the possibilities of his life will allow of. This controlling of disease is particularly practicable here in Connecticut. The soil is generally well drained, and the climate, though fitful and severe in its changes, is on the whole salubrious, and there are no obstacles beyond his reach to which he must submit, as there are in some sections of our own land and abroad, excepting the one instance of malaria, which has appeared in some localities, but happily that is now on the decline. Neither are there any special diseases to which farmers are liable by reason of their calling, as are shoe-makers, painters, chemical manufactures, hatters, etc., who constantly run the risk of receiving lead, mercurial, arsenical, or other poisonings, but the manner of their living does induce a long list of diseases possible and common to all who disregard nature's laws, which, in retaliation, inflicts upon them diseases which it should be a disgrace for any one to have who controls his time, his premises, and the composition of his diet, as does the farmer.

I do not propose to trouble you with a long list of hygienic laws, neither to descant upon the origin of disease, unless it may be to discredit the argument by which I have been often met when speaking of man's power in restraining ailments. That it came hand in hand into the world with death when Esq. Adam and his wife ate the Baldwin apple in Eden's orchard, and that consequently mankind must be ill at times as a punishment for that sin, and hence the physician a necessary evil, to this I will only say that theology, which is a theory of man, does not agree with physiology, which is a fact of God. I have a higher idea of God's beneficent nature than to think that he delights to inflict the tortures of bilious colic or rheumatism on a fairly good man, or an angel of a woman, simply because of that little pomological incident. I prefer to believe that the afflicted persons took a bite at the apple themselves when presented by the serpent of lust or pleasure.

Let us go to the matter at once, and take up the objectionable features of the farm. And now put aside for awhile your views of a farmer's life, and look upon it with me and from my standpoint. We shall find that the average farm-house is far from perfect in its sanitary conditions. Living as I do in a house constructed more than a century ago, has caused me to notice and change many glaring defects, and perhaps for this reason I may have observed others more closely. And these are the principal faults that I have found to influence the health of the occupant. First, viewing it from the exterior, we notice the entire absence of shade, or its superabundance. No home is quite complete without the aid of trees and shrubbery, which serve to cool the fervid heats of summer, and screen as well from the wintry blasts, besides lending a cheerful cosiness to the place, which makes it truly a home. But how often are all of these purposes changed by a want of thought regarding their positions. They are frequently placed so as to completely shade the house, rendering its air damp and unwholesome from the mould and decay silently going on, which as silently but as surely extends to the minds and bodies of the inmates; for in a decaying house there will be decaying bodies, and in such how can there be any thing, so to speak, but mouldy and decaying minds? Put trees near the house, but not so near but that the sun will shine upon it sometime during the day, giving it the benefit of its chemistry. Let its light in through the windows, and not obstruct it by shrubs. They are for ornamenting your grounds, and not for burying the dwelling in seclusion and gloom. Besides their appearance is greatly enhanced by standing by themselves, or artistically grouped in positions away from the house, and not immediately under the eaves. If it is desired that a bare wall should be covered, or a doorway porch made shady and attractive, vines can be used to far better advantage. The sun can penetrate their light foliage enough to dry it, and their numerous rootlets, by which they cling to their support, will absorb moisture rather than harbor it, giving the full object desired by shade—a cool, dry atmosphere.

We may also notice that a desire for convenience—having things handy as it is termed—has in many instances been made an excuse for laziness, or shows gross ignorance on the part of the owner—and one is fully as reprehensible as the other—in the grouping and arrangement of the out-buildings. The barn with its cattle-yard, the pig-pen and poultry-house, the privy and the well—all seem to be striving to show the most sociability for the kitchen door, filling the air with ill odors, and the soil with filth and fever germs, to be carried into the well with every permeating rain. In this day of general reading it is scarcely necessary for me to call attention to the fact that typhoid fever in the country can, in nine cases out of ten, be traced to the use of impure well water, made so by the proximity of sink-drains, cesspools, privy-vaults, or the leachings of manure-heaps. Boards of Health all over the land are calling attention to these facts, medical journals are filled with such instances, while every physician can recall the memory of hearths made sad and desolate by disease, which he knows entered in at this unnoticed door. Mind you, farmers, I do not tell you that your wells are all contaminated, for I know that nothing will raise one's resentment quicker than to be told that their premises are unclean, but I would advise you to have an eye to them all the same when you get home, and if you can then view them from the stand-point that we are now occupying, sweep them away as you would a murderer or seducer who was trying to rob you of the fair members of your family : for pure water is as necessary to good health as morality is to godliness.

In speaking of the out-buildings let me call attention to the quite general fault on New England farms, at least those outside of the immediate precincts of villages, and if I use the English language without clothing my ideas in obscure and general terms, know that it is because I desire to be plainly understood. I allude to the situation so frequently selected for the privy, oftentimes in the corner of the yard or garden, in full view of passers-by on the highway, and the "men-folks" at the barn, thus completely prohibiting its use by every modest-minded person, who necessarily waits for the mantle of darkness to screen them as they pass thither, and thus by postponement laying the foundation for an habitual state of constipation, which in its turn undermines the digestive organs, and brings permanent ill health. For obvious reasons this is different in towns and cities; therefore this diseased condition, which is so fearfully prevalent in the women of the country, is scarcely known by their sisters in the city. For charity's sake, for decency's sake, let this state of things no longer exist.

The interior of the farm house as a general thing has about as many objections, when considered as aids to disease as the exterior. New England houses, as a rule, I have found to be well ventilated, excepting perhaps certain portions. This is not due so much, however, to the ingenuity of the builder, as it is to the force of the wind, which will not be kept out. A principal exception is regarding the cellar, and oh, farmer, if you are not guilty of the other omissions that I have pointed out, I am afraid that you are here, for it does seem to me that the accumulations of the produce of the farm that are stored therein must make miniature Washington markets of them all, and you know that the odors of that have gone reeking towards heaven for years past.

Cellars as a rule are not well drained, and are consequently damp, are all more or less dark, thus precluding cleanliness, giving rise to the very conditions best adapted to the propagation of disease germs. If one will have a cellar under the house, have it thoroughly drained, and its walls and floors cemented; with an outside drain around the house to prevent the saturation of the soil, it may in that way be kept dry. The cellar should be partly above ground to allow of windows to admit of air and light. To one who contemplates building a new house, I should say have no cellar at all, but drain the spot selected, which should be, if possible, on a rise of land. Sink the trenches for the foundation, throwing the earth to the interior; carry the foundation well up; ventilate the space between the ground and the floor, and arrange the store room in some convenient extension or ell of the building, where, with double walls and windows, as much warmth can be secured as in a cellar, and a saving of fifty per cent. of the construction bill, to say nothing of the ease of storing productions in such a place.

The most important room in a house is not, as the first thought might suggest, the parlor, the kitchen, or the sitting-room, where the leisure time of the family is spent, but it is the room occupied for sleeping, where at least one-third of the twenty-four hours should be passed in the non-resistant condition of sleep, the time the system is most prone to receive disease; for we know that when awake every function is on the alert against it and labors to throw it off. A healthy sleeping-room is an airy one, where sunlight can be admitted during the day, lending its healthful influences in purifying its walls and furniture, which become contaminated by the breath and exhalations of the occupants. It should be a room free from noxious exhalations from the ground, and that can be well ventilated with pure external air. For these reasons it should be located on an upper floor of the house, where the necessities are more easily realized. This is a teaching of sanitary science that is much more honored in the breach than in the observance. It is safe to say that two-thirds of the Connecticut farmers, when they retire to-night, will do so to a room on the ground floor, on the north side of the house, and immediately over the cellar. One window is closely screened, the bed placed against it, precluding its use, the other opens upon an almost grassless corner of ground, made rank and noisome by the shade of an apple or other tree, intensified by the addition of a rampant growing grape-vine, making in summer a capital place for the boys to dig their bait when they go fishing, and in winter a reservoir for ice cold air, conducive to pneumonia and rheumatism. Why not use the best and most cheerful room in the house, instead of stealing away to such a place resembling the penance cell of the criminal. The best room in the house is not too good for the farmer. He owns it, and by his day of toil has earned a further right to its comforts and benefits; and I firmly believe that he would not only feel happier, brighter, and stronger for it, but also that his "doctor's bill" at the end of the year would be far smaller.

There are but few farm-houses constructed so as to be heated by a furnace, which is perhaps as well, for the stove dealer has not yet given us one adapted to general use, that will supply a healthful atmosphere. A cheap air-tight stove is too frequently depended upon to warm the sitting-room; it has the advantage of warming the room quickly, but at the expense of every particle of moisture that the room contains, similar in this respect to the furnace. The long winter evening is passed in this baked and drying atmosphere till the brain feels dead and inert as a consequence. The inventor of the air-tight stove has a colossal sin to answer for. There is a large variety of stoves that will give a cosy, attractive appearance to a room, and at the same time fill it with a moist, agreeable heat, more akin to the air of summer, and why the air-tight, with its baneful properties, should have become so popular, is more than I can understand. Allow me here to say that warming an upper room with the heated and vitiated air of the room below it by means of a register, is a false economy; better bring the stove pipe through the ceiling, and into a drum which will utilize the heat which otherwise escapes into the chimney, and which will give a temperature sufficient for all purposes for which such an upper room is used.

These healthful arrangements for the lighting, heating, and drainage of the house should never be objected to on the score of expense, as I have repeatedly heard them. No argument from me is necessary to show that vigorous health is of more importance than dollars and cents. But really these sanitary measures are far less expensive than the old way of living. The saving of the items of expense of one illness alone would be enough to re-arrange the whole place for a complete sanitarium. All that is required is a little thoughtful consideration, a little brain-work, all of which is within the power of him who successfully tills Connecticut soil.

Thus we see that we can plan for the better arrangement and healthfulness of the home. Will not the same discriminating thought show that there are weaknesses in the list of the farmer's food supply, and its method of preparation? Is his diet a perfect one for the labor required of him? and is the boasted New England cooking the best method of rendering available the nutritive properties of that food? Without attempting to show the scientific classification of food, and all its details, which is an extensive study in itself, we will pass at once to the character of the food supply of the farm, and we find that nowhere else is there such a variety presented for the selection of any one man, or class of men. The beef, veal, mutton, lamb, pork, poultry, and egg supply of the whole country is produced of course upon the farm; it belongs to the farmer, and he can make his selection from it before it leaves him. So also with regard to grains, and vegetables which render the city markets so attractive. The long list of meats, vegetables, and fruits, and the products of the dairy that are shown by some farms is simply astonishing. Lists that will show a complete food, possessing all necessary elements required by the demands of the system. In addition to the articles mentioned, some of the more modern farms can show their carp and trout ponds, still further augmenting the list. So then we see that the farmer can have the best food of the land. Does he make use of it for his table? No, he sells it. I know that he must have cash to meet his obligations, and that it must come from the products of the farm, which is business-like and right. But would it not be well to divide things a little, instead of selling all the meat products except pork, would it not be better to dispose of a portion of that, and retain some of the others, thus giving a variety to the diet? The cash returns for an average of years would be the same, and the satisfaction and welfare of the family greater. But some one says, my farm does not show such an array as has been enumerated, so I am counted out. But can it not be made to produce more of a variety than it does? A little systematic planning here will tell. Sell less hay, or better yet, none at all; put in more cattle and sheep, and consume it at home, thus maintaining the fertility of the land, the plethora of the pocket, and having the satisfaction of "a good square meal" at regular intervals. Cannot the garden also be made to yield more of a variety and support? Perhaps I had better not speak of a farmer's garden. You will accuse me of being too personal. I have noticed that some farmers appear reticent on the subject of their garden, which has led me sometimes to think that they did not have any. The farmer does not eat vegetables enough; potatoes are the only ones that he habitually indulges in; if he raises others he markets them, and confines himself to the unvarying round of pork, potatoes, bread and pastry.

Comparing the farmer's table with that of European countries we must admit that he lives even far better than they do; but comparing New England cooking with that of many other countries, and sections of our own not necessarily agricultural, we can see wherein the housewife could practice better economy, present a greater variety of food more suitable to the wants of the system, and served in a manner more agreeable to the palate. The French and German housewives could teach their Yankee sisters many culinary arts and devices that would improve the healthfulness of the prevalent methods. Cannot the latter be taught that pork to garnish or season a dish is sufficient, and not so portion it as to make it one of the leading articles of the meal? That the frying of all articles of food, either meats, vegetables, or pastries in lard, not only spoils them, but supplies to the system an inordinate quantity of one element which will arouse in it an abnormal action to expel it? And that fruits are much more wholesome eaten naturally with their appetizing acids, than when presented swathed in a tough or soggy crust of pastry, the acids neutralized or changed by sweetening and heat? And finally, why will she present her family with pie for breakfast, pie for dinner, pie for supper, and pie between meals whenever any of them are hungry? The everlasting diet of pie has become a leading characteristic of this people, so that the Yankee away from home can be detected by his devotion to it, as is the German by his to beer. The endless variety of pies that an ordinarily endowed farmer's wife can make is a matter of wonderment to one foreign to the section, while the list of a really talented pie maker would compare favorably in numbers, I believe, with the stars of heaven. The mysteries of the New England pie would severely puzzle the united talents of a New York detective, the chemists of our experiment station, and the best investigating lawyers of the star-route trial. The combination of lard, sugar, and spice is enough to ruin the digestion of a more than ordinarily active ostrich; therefore, it is no surprise to us to find that it has this effect upon our farmer, and that he is frequently found to be a confirmed dyspeptic, showing it in his form, his face, and most of all in his disposition.

One of the chief drawbacks to healthfulness on the farm, far greater than the environment or dietetic arrangement, is the unceasing and laborious toil to which the occupant subjects himself; labor that is too heavy for human muscles to be employed in, and devoting to it so many hours of the day that it effectually deprives him of all recreation and amusement, up early in the morning, laboring for an hour or perhaps two before he partakes of food, treating in this respect his brute beasts better than himself. The breakfast is eaten in haste, washed down with hot coffee, and the rush of work commences again. The bright hours of the morning have no beauty for him for he has no time for their enjoyment. A short halt at noon enables him to catch a hasty dinner, and while the team more leisurely enjoy theirs he performs the midday chores, putting the muscles of his limbs in active motion before those of the stomach can grasp their load. The weary hours of the afternoon pass slowly away, but still the toil is not over, chores again demand attention, and it is far into the evening before the day's work is done. Is the sleep that follows such a day of toil a restful one? It is heavy and lethargic, and brings no elasticity back to the muscles or buoyancy to the mind. I know full well the strain and tension that human muscles are capable of, their endurance is wonderful, and with proper food and suitable intervals of rest and relaxation with quiet sleep, it can be kept up for long periods of time, and the subject of it improve in health and strength, usually accomplishing more in the end than he who devotes himself to incessant toil. But prolonged muscular labor will wear out the body, which is like a machine; it must stop for repairs, for cleaning and oiling. A machine properly run will last for years, and so will the human body, but the engineer will tell us that if a machine is run at the highest rate of power that it is capable of, it will go to pieces almost at once. We can easily see now why the farmer is so often a confirmed dyspeptic; food received by a tired body cannot digest, it becomes an irritant, and the various organs of the body rebel, and the same treatment long continued makes in time a chronic rebellion—like a Spanish republic. We soon find that the system is failing, because not properly nourished. It cannot act on the defensive against disease; the door is open and it is sure to come in some form, breaking the man down both physically and mentally. Insanity is one of the frequent results of this course of life. You have something more than my word for it, for statistics of insane asylums, life insurance companies, and like associations show it the country over. Think of it, insanity produced upon the farm, the place of all others supposed to be and capable of being the most conducive to good mental health. Yes, it is even so. Let me quote from an authority* appearing in the last report of the Board of Health of this State, who says:

"As a prolific source of insanity, and results injurious to health and constitution, next to alcoholic intemperance comes 'intemperance of work;' that intense, unremitting application which leads to mental and physical strain, directly conducing to insanity or systematic defects which may appear in succeeding generations." And again the same authority says: †

"There is much corporeal overwork, particularly in the agricultural districts. Severe and constant manual labor leaves little time for cultivating the cheerful and better sentiments, or that education which contributes power and stability to mind and character. Years of constant drudgery combined, as is quite commonly the case, with innutritious food, improperly selected or poorly cooked, are so destructive of vital economy that exciting causes, harmless under other circumstances, are sufficient in these to derange the mind. The frequency with which insanity breaks out in farmers' families best illustrates this."

Now Mr. Chairman and gentlemen, I am the last person in this State to raise my voice against labor. I recognize the dignity and

* "How can we escape insanity," by Chas. W. Page, M. D. of Hartford Retreat. Page 192. † Page 196.

importance of it both in theory and in my daily life. But I do protest against this prostitution of his vital forces by the farmer to so low an object as the mere accomplishment of work; it is both unnecessary and unreasonable, and beneath the manhood of one who is created in the image of God.

It is not the health of the farmer alone that claims our attention to-day, but also that of his family. First the farmer's wife, what is her status as regards health? She does not take as high a stand as her husband does; facts carry out what the natural supposition would be. Her labor is as incessant and of a far more vexatious character, is performed within doors, free from the exhilarating effects of air and sunshine, and she receives less stimulus from her surroundings; add to this the bearing and rearing of children, and labors that she is obliged to perform when the functions of her system require rest, and one can readily see that it must rank lower.

It has always been an enigma to me why any woman would marry a farmer. You may in turn express surprise why they will a physician, but they do both, inscrutable as it may seem. I have known the farmer to select his wife as he would a mate for his horse, for the amount of labor that she can perform, freely questioning with his neighbors if she were able to keep her whiffletree even with his, as they drew the burden of labor, tender regard and love having a subordinate place. Think what the farmer's wife does for him when he brings her to his dwelling and she commences the fulfillment of her duties. From that time on she does for him and the hired men, the cooking, the washing and mending, makes many of her husband's garments and all of her own, and those of the children as they successively appear, attends to the dairy, and on some few farms feeds the pigs and poultry, and lugs in wood and water for the household purposes. Is it any surprise that nature soon exhausts herself and the woman dies? Did you ever think how many among your own acquaintances are living with their second or third wife? Compare it with the converse and you will be surprised at the different results. What killed the woman? The certificate of her death filed with the town clerk will give the scientific name of the disease that was the immediate cause, and at the funeral the minister doubtless said that it was one of the mysterious dispensations of Providence. But I tell you that back of it was the toil of years, cheered with but few comforting words and sympathies; broken down before her time that the mortgage might be paid, or the little fund in the bank increased. Where was the comfort of her life? Did she go anywhere? Did she see friends? Did she have books and opportunities to read them? Was her mental capacity increased, and her life made progressive and better fitted for an eternal hereafter, by the years that she spent as that man's wife? Forbid that it should ever be repeated, and yet it is to-day, at this very hour, thoughtlessly, perhaps, in many instances, but nevertheless as effectually. Life's early dreams and hopes, the accomplishments learned in maidenhood, even ambition itself is swallowed up by the mighty maelstrom of work that ruins their health, inflicts keen suffering, and finally demands life itself—work that should have been, much of it, performed by men. There is a ray of comfort here in the fact that the American farmer is far ahead of the European in his ideas of woman's work, for there, in addition to her household and family cares, she is expected to labor much in the fields, take the entire charge of the herds and flocks, even to the shearing of the sheep. But there she is better fitted for it, for her brain is smaller and her muscles larger. The time is soon coming, I trust, when woman's work on our farms will be lightened. The churn and the cheese press will be banished from the house as the spinning wheel has been, and thus a heavy burden lifted. I see no reason why so much of the farm work should be brought into the dwelling, as is now the case; it is as unreasonable as it would be for the blacksmith to bring his work into the family circle.

There is a bright picture in the children of the farm. They are the robust and vigorous little specimens that one would wish to see. Strong and well developed, possessed of inquiring minds and happy dispositions, with good digestive powers, assimilating their food well, and consequently laying the foundation for future mental and physical strength, presenting in the sum total quite a contrast to the children reared within the limits of the cities. This is just what we should expect from the premises that we have assumed for free exercise within the limits of their strength, performed in the open air and sunshine. The food largely composed of milk and fruit, and the long periods devoted to sleep, are just the conditions for perfect health. The city-reared child shows more refinement in form, features, and manners, but that of course comes from its different associations. That the physique and nerve power of the country child is greater is proved by the death-rate, which is so much larger in towns than in the open country. I have often been surprised at the contrast of the physique of the two children in my journeys to and from the cities. The young people of the country are larger in frame and muscle than those of the city, but at this period of life the city-reared have gained in nerve power, and the energy and endurance that comes therefrom, while the country-reared seldom gain much beyond the age of sixteen years. This I attribute almost wholly to the difference of food, a trifle to the mental training they receive, and somewhat to the fact that they represent the survival of the fittest, the deficient ones having died in childhood. It was this nerve power that enabled the city-reared soldiers to eclipse in courage, hardihood, and vigor, those reared in the country, as was repeatedly witnessed during the late war.

There are two advantages that town residents have over the dwellers on the farm. First, the ease with which personal cleanliness is attained, the introduction of hot and cold water to all parts of the house, and the general bath-room, presenting mighty factors that the farm cannot; and on this I need not enlarge, for you must all recognize its importance. And second, in the stimulus and animation that comes from contact with fellowbeings, which gives more keenness and vigor of mind, and life to the individual, qualities that are always appreciated by the physician. I do not mean the strain that comes from the turmoil of business, for that is overwork of the mind—worse than overwork of the body—but the social inter-communion that can only be had where there is an aggregation of numbers. The amusements that are offered have a tonic effect upon the mind as powerful as that of iron upon the body. They not only amuse, but they are educational, and all that tends towards that end tends towards a better condition for health. As a class, in city or country, our own land or abroad, the educated ranks are the most free from disease—a fact that speaks volumes. The isolation of farm life prevents a deal of this neighborly interchange, this polishing of the elbows, as it is termed. Amusements are of rare occurrence, and the meeting of neighborhoods infrequent, and thus a habit of non-sociability is formed, which is apt to degenerate by degrees into a condition of melancholy with all its unpleasant effects, not only on the subjects, but on their associates as well.

We see but little of intemperance on the farm—not nearly as much as in former years; hence the farmer does not in his illness have to contend against its baneful influences, and from wounds and surgical operations he promptly recovers. Cider-drinking, which many do not class with intemperance, has been an unmitigated nuisance and a curse to the whole of New England; but now that apples are considered to be worth, at the lowest estimate, twenty cents a bushel to feed to stock, the temptation to make the surplus fruit into cider is much less. The excuse for making it for vinegar no longer exists, for a blear-eyed, suspicious-looking individual, having a little manufactory in a side-street in the city, will make more so-called pure cider vinegar in one night than a large farm can produce in a year, and can sell at double the profit. Therefore we think that dollars and cents will help to solve the temperance question as much as the reformer. "Whisky vinegar" has certainly been the means of improving healthfulness on our farms, if it has taken away a source of revenue.

In a careful survey we find that the farmer and his family are afflicted only with ills common to all humanity, and not special to the calling. As it is at present even, the farm is the most healthful place for living. but not nearly as much so as it can and should be made. Did you expect to hear from me complicated formulas and remedies for these diseases? I know of but four, simple, efficacious, and within the reach of all, and, moreover, specifics for most complaints. They are as stated at the commencement of this paper: pure air, proper food, suitable exercise, and rest. Should you need to go beyond them for aid, do not try to be your own physician, and dose yourself with unknown nostrums, and remedies advertised to cure all diseases. Neither accept in that capacity your neighbor across the road, or the woman whose only recommendation is her industry in gathering stores of roots and herbs during the summer, and now seeks a use for them. Go to one who is qualified by nature, education, and experience; if he is a skillful physician he will guide you to health again with but little medicine, but with much of that which is harder for many to take, good advice. He will tell you of nature's laws, and show you wherein you have violated them; go back to them, and follow them, study them well, and you will agree with me that she is the best physician.

I have made but brief mention of the various causes for illness that are recognized as pertaining to our subject. The planning of grounds and buildings, ventilation of rooms, the selection of food considered from a scientific standpoint, the art of cooking it, the physiological effects of labor, growth, and development, the prevention of disease, etc., etc.; are each subjects for volumes, rather than a short dissertation of this character, which can only be considered as an incentive to practical self-examination and reflection, and not as a finished treatise. From early associations which have become dearer with mature years, I have learned to appreciate the blessings of farm life. I would gladly see them increased, as I believe they can be, till the farm will be looked upon as a complete sanitarium, and the farmer and his family as examples of that physical perfection which alone can baffle disease.

QUESTION. Is there a cellar under the house in which you live?

Dr. BOWEN. Yes, sir; built there more than a hundred years ago. I would gladly fill it up if I could.

Mr. SCOVILLE. Will you tell us of the advantages of open fire places?

Dr. BOWEN. They are excellent methods of heating a room early in the fall, or in the spring; they are excellent for ventilation; but I do not regard them as giving complete heat, nor uniform heat. They are very pleasant to look at. I keep three open in my own house yet, but as for heating, they certainly do not meet the requirements of the case. I think there are other forms of heating apparatus that, upon the whole, are better.

Mr. ——. I do not want to advertise any stove dealer, but I would like to know what description of stove will give a summer heat and not dry the atmosphere in the room. I would like to buy such a stove, if I can find one. I use a common gas burner, and always put a tea-kettle upon the back of it during the evening, and night, and that furnishes considerable moisture in the room. There are plants in the room, and I think it is an advantage to them.

Dr. Bowen. There are a number of stoves that give good heat, and that are cosy and attractive in appearance. If you use coal, there are numbers of those that are exceedingly attractive, and almost as pleasant as the old-fashioned fire-place. Have you ever noticed how pleasant it is to go into a room where plants are growing? It is the moist atmosphere from which the oxygen is not entirely burned out, that renders them so attractive, and makes them so luxuriant. Whenever plants will grow luxuriantly in winter, there you will find a pleasant atmosphere to breathe. You will notice that the atmosphere of the kitchen is almost always more pleasant than that of the sitting room. That is because there is water on the stove ; the kettles are boiling almost continually, which renders the air soft and mild.

Question. Tell us about grates in a sitting room.

Dr. Bowen. They are something like the old-fashioned fire-place—after the same pattern ; perform the same office.

Question. Are plants growing in a room conducive to health, or otherwise?

Dr. Bowen. There is a general opinion, that as soon as a person becomes ill, you must take out every plant that is growing in the room—banish it as you would the disease itself, if you could. I have often wondered a little that this should be so. When you consider that in summer our windows are open, the air is laden with the perfume of flowers, leaves are all budding and performing their functions,—we never move away from the climate and go north when the leaves appear,—I do not see why we should banish plants from the sick room. Any plant, however, which has a heavy perfume is perhaps objectionable ; but there is no objection to a growing plant ; on the contrary, I should say that it would be a benefit. If you consider that the office of the leaves of plants is to absorb carbonic acid gas, which is exhaled from the lungs, you will see that a plant is rather a purifier than otherwise. (Applause.)

Question. Is it hurtful to eat just before retiring?

Dr. Bowen. Yes, sir, and no, sir. (Laughter.) That depends a great deal upon the patient, if you will allow me to use the word. I have very often recommended persons to take a light repast before retiring, the idea being to give the stomach a little excitement to start its peristaltic action ; get the nerves started, so to speak, in that direction, and thus relieve the brain. I think, as a general thing, it is better for an ordinarily healthy person to retire on an empty stomach.

Question. Would you prescribe food to excite peristaltic action ?

Dr. Bowen. I don't know how it can be brought about in any other way. There must be food there to start it.

Question. Is not peristaltic action going on in the intestines constantly, in a state of health ?

Dr. Bowen. To a certain, limited degree. It is greatly increased soon after the stomach receives its burden.

Question. Does it not take from two to four hours for digestion to take place in the stomach ?

Dr. Bowen. As soon as the stomach receives its load, there commences a grasping of it, and very soon peristaltic action commences, which is communicated to the intestines almost at once. It is for this reason (you will excuse me for speaking so plainly), that the call of nature should be attended to soon after breakfast. It is more prone to take place at that time.

Mr. Hubbard. I wish simply to direct attention to the question of ventilation of cellars, for, as a matter of fact, we have to use them, more or less. I hardly think many of us, even if we should happen to build a new house, would follow the advice of the speaker, and dispense entirely with a cellar. It is a fixed institution, I think, in the New England farm-house. What I wished to ask was, if it was not entirely practical so to ventilate those cellars, and care for them, that they should not be sources of disease? I live in an old house myself, which has a chimney stack in the center, starting from the ground; it is quite a walk to go around it. In the cellar there are two fireplaces, with flues extending into the chimney. Originally, there were seven fireplaces in the different stories of the house, communicating with that one chimney-stack; a number of them are closed up now, but the two in the cellar remain open, and my impression is, that those fire-places so ventilate that cellar that it is not a source of disease. My opinion is, if you should build a new house, and have the chimney start from the cellar, with an open fireplace there, connected by a flue with the chimney, it would afford such perfect means of ventilation that the cellar could be kept pure, sweet, and clean, and would not be a source of disease to the family above it.

Dr. Bowen. Beyond a doubt, any cellar could be made so perfect in all its sanitary arrangements by proper ventilation, either externally, or by means of a chimney, as to prevent the evil of which I have spoken. It matters not which method is adopted, but perhaps ventilation by reasons of the chimney would be as easily carried out as external ventilation. But there will be certain exhalations from the vegetables that are stored in the cellar, and from the ferment that is going on in your cider and vinegar barrels. In this dark place, there are accumulations of filth without your being aware of it, a few vegetables are left at the close of the season which have escaped your observation, and in various ways there comes a taint in the air which I have perceived, and doubtless Mr. Hubbard has, very often, of which it is very hard to get rid.

Mr. Hubbard. Still, I think this open flue carries it off very thoroughly.

Dr. Bowen. I have never visited your house, and do not know how that is. It is hard work to get rid of it in mine. I think if a man was going to build a new house, and he would construct a store room in some hill, where he could back his team up and load or unload, as the case might be, he could make that as warm as a cellar, and his produce would be much more easily handled; he could shut it away from his living rooms entirely, and I think his health and that of his family would be better for it. I am sure it would not cost half so much as it would to dig out and stone up a cellar.

Mr. E. L. Johnson of Newtown. I understood the doctor to say that he thought people living in cities and villages had an advantage over the farmer's family in conveniences for cleanliness, in the way of bath-rooms, hot and cold water, and the like. I should beg to disagree with him there. I think there is not a farmer in Connecticut who cannot obtain all those conveniences in his own home about as well as they are had in the cities, either by bringing water into his house from a spring that he may find properly located, or, if he cannot find that, by taking the water from the roof of his house into a tank on the second floor, or in the attic, and by means of pipes convey the water to different parts of his house—I speak from experience. A few years ago, I overhauled my house, and I asked my wife which she would rather have, a parlor well-furnished or conveniences for bathing, etc., for I had not the money to spare to furnish both. She said she would rather have the water.

Dr. Bowen. A very sensible woman, sir. (Applause.)

Mr. Johnson. I think she is, I thought so before I married her. (Laughter and applause.) I looked about in the vicinity, and on a neighboring farm I found a spring that was so located that I could take the water into the second story of my house. The spring was sixty rods away from me. I bought the spring of the farmer, paying him thirty dollars for it, and he gave me a deed of it, the same as he would of any piece of property. I laid my pipe and brought the water to the house. We started the water running on Thanksgiving Day, 1874, and there has not been a moment, from that hour to this, when that half-inch pipe has not run full of water, and we have a tank on the second floor that is always full. Pipes from that tank run to the kitchen stove, where we have a boiler, and the hot water goes to the sink. We have a bathroom, so that when I come in from hoeing corn, plowing for rye, or any other dirty work, instead of going to a pond, a quarter of a mile away, as I used to do, or taking a wash-tub into an out-house, I go into the bath-room and have all the conveniences and comforts for a good bath. Of course these things cannot be done without some expense, but I consider it the best investment I ever made. It cost me about $600. I would not have that bath-room taken out of the house to-day for three thousand dollars. (Applause.) Now, there is not a farmer here who cannot do that thing; and, if there is any one here who has not the ready money to use in that way, my advice to him is (perhaps it is not worth much) if he cannot raise the money in any other way, and does not feel that he can run in debt for it, to look over his farm and see what piece of ground he can best spare from it, find a purchaser and sell it, and use the money to bring water into his house, and see how much comfort it will add to his own life, and how much it will help the wife in her work; but, as a matter of economy, there will come times when you can see that it will pay. You can sometimes dispense with the services of a hired girl in the house if you have these conveniences—I know that from experience. My wife, with the assistance of a little girl of fourteen, has done our family work through the summer. We have a family of from six to eight and ten through the year, and she has done all the ordinary housework of the family, my boys and myself helping about the washing Monday mornings with the washing machine—which I consider very proper. Having water so convenient, she has been able to do her own work, and do it with a great deal more comfort than she could if she had a hired girl and was without these conveniences. If you cannot find a spring in or near your farm have a tank put on the second floor or in the attic, and have the conductors on your roof arranged so that the water can be carried to that tank, and then you can have a bath-room of your own, with hot and cold water, just as you find in the Scovill House, or any other well regulated house in the country.

Mr. Rogers. I think that very few farmers give attention enough to the matter of small fruits in relation to health.

I come from a part of the country in which small fruits are abundant. Mr. Hale, in his paper yesterday, said that one-quarter of an acre was sufficient for a farmer's fruit garden. If you have a very large family you will find, very soon, that half an acre will not furnish you fruit enough. It is said by the doctor that malaria prevails in some portions of Connecticut. Now, the acid of fruits is one of the preventives of malaria. I think that if fruits were more eaten, and the acids of fruits, there would be less sickness. As I came up from Bridgeport to this place, I was struck with the absence of fruit gardens, and knowing, from experience in my own family, that our doctor's bills are very much less when we have fruit—I think the eating of fruit is conducive to health. A great many are apt to think that there may be less acid in some fruit because it is sweet or because sugar is used on it; but the fact is, that all fruits contain more acid than many realize. For instance, the currant is said to be a very acid fruit; the blackberry, in reality, contains more acid than the currant. And so sugar does not do away with the acid, it simply disguises the flavor.

The doctor also said that many men married their second and third wives. Well, if you had larger fruit gardens, you, probably, would not have to have but the one wife! (Laughter and applause.) My wife will not cook a pie or the least pastry in the summer. She has fresh fruit enough on the table three times a day. In my own family, we use from sixteen to twenty quarts of strawberries a day, and my children, five and six years old, will eat from three to five pounds of grapes every day during the grape season, and the healthiest period of their lives is when they take the most fruit. So, if you do not wish to have second and third wives, and do want healthy children and reduced doctor's bills, plant more small fruits. (Applause.)

Mr. Blot. It takes a great deal of time and labor to cultivate fruit. It is very well for the man who means to devote his time and money to the raising of fruit, but every farmer can raise vegetables. We know that all the Arctic expeditions that have been sent out of late years have been saved from scurvy by vegetables, and it is easier and cheaper to raise vegetables than fruit. The great trouble with farmers is not that they do not raise fruit enough, for they can find plenty of wild fruit, but I think if they would raise a greater variety of vegetables, they would profit by it more than by raising a greater variety or a greater quantity of fruit.

Something has been said about eating in the evening. Farmers, in the Eastern States especially, eat as if they were natives of Kamschatka or the northern part of Siberia. If you were to tell them to take a tallow candle for supper they would laugh at you. What else do they do? They eat pie-crust made of a mixture of grease and a little flour; the less flour the better they like it. If they were to take fruit and vegetables, and good, wholesome bread and butter, or meat, they would consider that very heavy and hearty food. It is a great deal easier to digest a beefsteak, well-cooked, than it is a piece of pie-crust. That the doctor will admit, I have no doubt. I was not brought up on a farm, but I have been a farmer seven years. I take my breakfast in summer at half-past five or six o'clock, dinner at twelve, supper at seven, and tea at midnight. (Laughter and applause.)

Mr. Webb. I should not think the gentleman would have any time to take anything else!

Mr. Augur. I would like to ask Dr. Bowen whether he considers it allowable to have water, which is used for drinking purposes, brought in lead pipes, and, if not, what he would advise?

Dr. Bowen. I suppose there is no objection to bringing water in lead pipes if there is a continuous flow of water. But if the pipe is partially emptied at times, or wholly emptied, so that the interior of the pipe becomes oxidized, then you will get lead poison. Block-tin pipes, I suppose, are better.

Mr. ———. I would like your opinion in regard to the privies which are now located in all our public houses; whether they do not cause a great deal of malaria?

Dr. Bowen. They cause a great deal of disease from sewer gas, as it is termed. It is a thing against which the city physician has to contend more than any other one source of disease, probably. All our hotels are subject to the same conditions.

Mr. Wetherell. Is that a necessity, or is it owing to the want of good plumbing and care?

Dr. Bowen. Generally it is owing to the want of sanitary plumbing.

Mr. Norton. I would like to say a word in regard to lead pipes, with which I have had some experience. I was gone from here for ten years, living at the west, and before I had been here a year, after my return, I was attacked with dreadful distress in the pit of my stomach. The doctors did not seem to know what it was, but I had those spells every little while for two years, until my hands were paralyzed, so that I could not hold a cup to my lips or cut up my own food. I had been drinking water from a lead pipe, and I attributed my trouble to that. I have given up the use of it entirely, and driven a well for my water.

Mr. ———. Will you allow a practical plumber to say a few words on that subject? I have worked at the business for twelve years, and have had considerable experience. I have worked at both city and country plumbing, and have given the subject a good deal of attention and thought. I have never known or heard of a case of lead poisoning occurring in a city. I find that some of the healthiest cities in the world, that have the lowest rate of mortality, are supplied entirely by lead pipes, and the water is used for cooking and drinking purposes. Those cases that occur in the country are almost invariably cases where the water was conducted from springs, and the pipe had been disused for some time before the lead poisoning occurred. Lead pipe will certainly oxidize, and, after the pipe has been disused for some time, this oxidation dries on the inside, and when the water comes through again, it is liable to carry along some pieces of it, which occasion lead poisoning. I never knew a case to occur under any other circumstances.

Mr. Johnson. The matter to which Mr. Augur alludes is a very important one. I will say that we should be very careful not to use water which has remained undisturbed in a tank; that is, where the flow is stopped in the pipe. There is a constant flow of water from the spring, to which I have referred, to my house, and a pipe from the tank takes the overflow to my barn-yard and waters my stock. There is sufficient overflow from my tank every day in the year to water fifty or seventy-five head of cattle.

Mr. Webb. I wish the question box might be opened.

QUESTION BOX.

Question. Can the raising of sheep be again made profitable by farmers clubbing together, whose farms join, and employing a sheep-tender or shepherd, with a shepherd's dog? In such case it would not make much difference if the fences were poor, or if there were not any, as the sheep would be led or driven about by the tender. A pen or shelter for the sheep at night, and a cabin beside it for the tender and his dog, would be needed. In Scotland, a shepherd will easily take care of five hundred sheep. Is it not possible that in this way many of our worn-out farms in Connecticut can be restored?

Mr. Webb. I would like to say one word. That question has been discussed, I believe, at every meeting for several years past, and the only way I can suggest or think of, is to shut up the tramps and kill the dogs. I believe then we can keep sheep.

Mr. Crofutt. I do not agree with our friend at all. I believe there is a way by which our sheep can be protected. Our lands are well calculated for sheep, and here they are spread out before us in Connecticut. What is the trouble? Dogs! Why not stop them? Some say, "kill them." No, don't kill them. I have a dog that I would not want to spare; a little Scotch Skye, that picks up the paper and brings it home to my breakfast table. There are a good many more like him. What is to be done then? I can look back sixty years, when sheep were kept in the woods, and they would run all summer, and in the fall they were brought in and put under shelter. Why cannot the same thing be done now just as well as then? Oh, the dogs! What is to be done? I can tell you. Dogs now are allowed to run at large. They are taxed; they are property,—which is perfectly right. I have no more right to kill my neighbor's dog than I have to kill his horse, if I understand the matter right. Those dogs must be cared for in some way or other. Make a law, then, that those dogs shall be broken. I have broken a good many dogs. I will tell you how I did it. Take a dog six months old; let him go into a field, and he will always chase the first thing that he sees run. If he attacks a sheep, whip him severely. I never saw one that molested a sheep a second time.

Mr. SCOVILLE. The plan of breaking dogs did not work with me. I have kept a flock of sheep for sixty years, and never had more than one or two killed during that time. A year ago I put a young dog into a stable about ten feet square, and put in three large bucks and they went at him and pounded him until he wasn't anything but jelly; I thought they were going to kill him, and I flung him out into a field where there was a flock of sheep, and the first thing he did was to put for them! (Laughter.)

Mr. BILL. I want to say a word in favor of sheep culture. I believe that mixed farming pays the Connecticut farmer to-day better than special farming. In my opinion, it is best for the farmer to keep stock, to keep sheep, to keep anything and everything upon his farm that he may think will pay. To-day, or this year, perhaps raising lambs and selling them will pay better than anything else. Next year, it may be that raising Devons will pay better than anything else. The way in which I have managed since I have been carrying on my farm has been to keep a little of everything. In that way I manage to hit it somewhere ; and that is my advice to you.

Now, sir, in relation to farmers clubbing together and keeping a shepherd to watch their flocks, it will not pay in this stirring section of New England ; but it will pay the farmer to fence his out pastures and pasture them with sheep. That will bring back our old pastures to the condition in which they were when I and many others of these gentlemen present were boys. To-day, those pastures have run up to brush in many sections of our State ; they are running down ; the tax that is paid is small for such land, but if farmers would rise early in the morning, if they have no other time, and fence their land, and keep sheep, they would find it would pay, and it would materially enhance the value of those pastures. They would be worth a hundred per cent. more and produce that amount beyond what they are now producing.

Then with regard to the dog. I come here as an advocate for the dog as well as the sheep. A few years ago, when the legislature passed the law that is now on the Statute book in relation to dogs, I remember a question put to me by our secretary when we were before that committee, while I was testifying. He asked me if I was there in the interest of dogs or of sheep. I told him I was there in the interest of both. I keep my shepherd dogs and they pay me as well, comparatively as my sheep. Only day before yesterday I gathered my sheep from the hills in separate flocks, and worked from early morning up to the time I left for this convention with my shepherd dogs, and I did more than half a dozen men could have done. I set them to gathering the sheep together to bring them home, and it only required myself with them to gather them in. Now, we have a law to-day to protect our farmers who are raising sheep, by which the towns are compelled to pay every dollar of damage that is done by dogs. And who pays this money into the treasury ? We pay it ourselves. I pay it on my dogs. If I have any damage done to my sheep by dogs, I do not go to the owner and say, "You must give me 25 or 50 per cent. of the damage done ;" I go to the town, and get every cent of it from this fund that we have created throughout the State for this purpose. [Applause.] Now, I say that there is not a man in this room who cannot go into sheep culture and make it pay, and every cent of damage he sustains by dogs will be handed back to him ; there is no loss. You build up your land, you make it profitable, and it is the best business you can go into separately on your land or in connection with other farm interests and stock raising. [Applause.]

Mr. John Webster. I am a keeper of a few sheep. I am probably not as conversant with the culture of sheep as my friend Mr. Bill, but this season there have been dogs among my sheep three different times. Last June I had five killed. One of them was a full-blooded Cotswold buck, and the others were ewes. Subsequently to that, dogs got among my sheep again and broke the leg of one of them ; they did not do a great deal of damage that time ; but lately, they got among them again, killed two and maimed some four or five others. I claim that if we farmers could go into the culture of sheep, it is the most profitable animal we have in Connecticut. I am not so friendly to dogs as Mr. Bill. You get a flock of full-blooded sheep that you admire and think a good deal of, dogs get among them and chase them about and perhaps kill some of them ; suppose those that survive are not injured at all, are they as valuable as they were before they had this excitement ? I tell you, gentlemen, no. Suppose I go to the treasurer of the town in which I live and carry my bill for that Cotswold buck that I owned — you could not buy one to-day for twenty dollars. They do not feel disposed to pay twenty dollars for a sheep. They will say many times, "we will go to raising sheep if we can get twenty dollars a piece for them." I am perfectly disgusted with our legislation on the subject of dogs. If we could go into the raising of sheep, the State of Connecticut would be worth thousands of dollars more than it is. I was up in Vermont last June, and looking out of the car windows, I saw the hills alive with sheep ; som of them were so steep, that it seemed to me if the sheep should make a misstep they would roll down; no cow could get a living there. Sheep can live in the State of Connecticut. We have a great deal of pasture land which is not worth a row of pins for cows or cattle, but sheep will live there and flourish. I wish we could have in our legislature representative farmers who would take more interest in sheep, and let the dogs go to Tophet.

Mr. Bill. My friend Webster speaks of sheep being worried. The present law not only covers cases where sheep are killed or maimed, but also provides for the payment of damages where they are worried; so we are secure in that direction. We can recover from the Treasurer of the town for worrying.

Mr. ———. Why cannot we have a law that will compel every one who owns a dog to keep him upon his own premises, the same as any stock? It seems to me that would be a reasonable kind of law.

Mr. Gold. The beauty of the question-box is, that if you are not interested in one question, perhaps you will be in the next. What is the cause of water-core in apples? Is there any known preventive?

Several Voices. No.

Question. What is the best thoroughbred breed of cows for the dairy farmer to keep?

Mr. Wetherell. If for butter I should say the Jersey; if for cheese, I should say the Shorthorn, or the Ayrshire.

Mr. Scoville. For profit on the farm and to raise nice cattle and sell them, I should say the Devon.

Mr. ———. For the last twenty-five years, I have owned from six to twenty-six cows, and I find just as good cows among Devons as any other breed.

Question. Which is the best stock for a dairy farmer to keep, thoroughbred or crossbred cows?

Mr. Scoville. If I wanted to obtain the greatest quantity of milk, I would take the crossbred.

Mr. WETHERELL. When they ask from $300 to $500 for a Jersey, if you have profit in your eye, I think you better stick to the crossbred.

QUESTION. What is the best method of reclaiming a bog meadow ?

SEVERAL VOICES. Ditch it.

Mr. HUBBARD. There is not, of course, any definite or explicit answer to be given to that question. It may take a man several years to study out the best way, but I do not think there is a bog meadow in the State of Connecticut that ought to be let alone. You may not see at once, you may not see in a year, you may not see in four or five years, just what to do, but the fact is this, that these bog meadows contain elements of fertility that have washed down from the hills, gathered there, and been preserved there by being saturated with water for generations, centuries—no one knows how long. There is a great deal of fertility stored up in bog meadows, and they ought not to be passed over without consideration. If a man has a bog meadow on his farm, let him go to work and study it until he finds out what is best for it, and then go to work and do it.

Mr. WETHERELL. The shortest way is to take the water from it, without any reflection, and when you have got the water out of it, plow it and raise a crop of oats or potatoes, and then seed it down to herds-grass and get your crop. I have tried it, and the first crop of potatoes after draining the swamp paid me for all the labor that it cost to drain it.

Mr. HYDE. I would suggest sending our boys down to the Storrs School to study this subject.

Mr. SCOVILLE. I have six acres of bog meadow, and my plan has been to dig the ditches about thirty feet apart, three feet deep, eighteen inches at the top and sixteen at the bottom, and lay two round stones, the size of a small loaf of bread, and cover it with stone—I would rather have round stone than flat—and then pack around it, filling it with earth from my hill land within eight inches of the top. I have got miles of such ditches on my place. I get two tons to the acre, and from my best hill meadows I get less than a ton. In one case, I ridged a piece in the old-fashioned way of raising corn, pulled out the bogs, and planted with corn the very first year; when the corn came up it looked well, but the first time we undertook to hoe it, we could hardly break the soil. I told my hired man that he might have half the corn that grew there for half a month's work. In June there came slight rains, the field was nothing but muck, but I got a large crop of corn. In the fall, as soon as the crop was off, I smoothed off the ridges and sowed it to oats and grass; the oats came up as high as that chair and fell down flat, so I got hardly any; but the grass seed took very well, and that piece produced over three tons to the acre.

Mr. Bill. I don't believe I can tell this company what it is best for them to do if they have got bog meadows, but I can tell them what is best to do with them if they have got $30,000—make cranberry meadows of them.

Mr. West. My idea of a bog meadow is something that is saturated with water. I have in mind a piece of swamp or bog meadow near me that was drained by open ditches, which was worthless for agricultural purposes up to that time, but which now produces large crops. Two years ago the owner raised large quantities of squashes upon that piece of ground, while upon upland his crop of squashes was an utter failure. Last season, a portion of it was planted with onions and other crops, with good results.

Mr. Hale. Three years ago, we commenced on a small portion (perhaps an eighth of an acre) of a piece of land that we had drained and made so dry that it was almost useless for purposes of cultivation, and carted on sand from a hill only a few rods away and dumped it a little in a place; in the spring, we plowed it in, and the benefit was so manifest that first year that, last season, we laid tiles all through those open ditches, and filled them up with sand, and put sand all over the field. We spent all our leisure time, last winter, on about a quarter of an acre of land, and put on nearly four thousand one-horse cart loads of sand. The draining of the lot, putting on the sand, and everything, has cost us between four and five hundred dollars; but the land is worth to us, and will pay us interest on, more than a thousand dollars. It is the most valuable piece of land we own for growing crops of any kind. We have had several crops on it this season, in small patches, but, of course, its special value to us is in the plant business, for it grows a mass of fibrous roots on our plants, which are really very valuable. I say, if you are going to drain a swamp, don't get it too dry, but if you do, put on sand, which will make it damp.

D. B. Hotchkiss, of Prospect. David M. Hotchkiss had, about fifty years ago, three acres of peat swamp which lay adjacent to a gravel knoll, and lay so that it could be drained. It was ditched by one ditch laterally and three the other way, about, I should say, eighty feet apart. The ditches were about three feet deep, three feet broad on top and sixteen inches at the bottom—broad enough for a man to stand in and shovel. The soil was so soft that you could stick a rake tail down its full length in any part of it. This land lay nearly level, and after the ditching was done, they went on with a bog cutter which cuts the bog, most of them, and the balance were cut by hand. The bogs were gathered into piles and, after drying, burned. The surface of the ground was plowed, ashes spread on, and then a crop of oats raised. The next year a crop of potatoes was raised, and then the field was sowed with herds-grass. The land before ditching was worth, perhaps, fifteen dollars an acre. It paid in six years the whole cost of ditching and labor, besides interest. That land for thirty years was in good condition. Now it has gone back, because the neighbor below us did not want us to dig into his land deep enough to drain it.

Question. What is the best kind of grass seed to sow on a reclaimed bog meadow ?

Mr. Scoville. Timothy, red-top, and orchard grass.

Question. What is the best method of irrigating or lessening the effects of drought?

Mr. Hale. Thorough cultivation.

Mr. Ayer. My friend Mr. Bill talks about his losses in cranberry culture. Go with me across the Connecticut river to the towns of Saybrook and Essex, and you will find people who will tell another story in regard to cranberries. Some of them have made good profits, and will make them year by year. So has our friend from Bristol, Mr. Norton. So I do not think that because the locality of our friend Bill is so marked a failure in cranberries, every locality would fail.

Mr. Bill. I did not suppose that this convention would hear from me again to-night; I hoped that I might have something to say to-morrow, but when my friend there, who came from the town of Saybrook, just opposite from where I reside, but who has gone into the northern part of the State, and who knows no more about the town of Saybrook that he was born in, or about the way the cranberry was cultivated, than the man in the moon, undertakes to talk about cranberries, I want to say that there is not a man there who has got back a dollar of what he has invested. The only cranberry bog in that town is D. C. Stevenson's. He has got $30,000 invested, but he does not get $30.00 worth of cranberries a year from that bog. When he talks of cranberries down about the mouth of the Connecticut river, I will say that I know more about that than he does; I have put my money into it, and he has not. You go into the town of Essex; there was a cranberry bog west of the village that at one time paid a dividend, but to-day it is nothing but an open common. I would not reach down upon this floor and pick up a crushed peanut and give it to the owners for that bog, or take it as a gift. I have been delegated here by a higher power than this convention to stand up in the presence of the farmers of the State of Connecticut and say to them, "Never be fools like myself and put your money into worthless bogs expecting ever to get back a dollar of it again in cranberry culture!" I have heard about that little bog of Mr. Norton's up in his vicinity. I have understood that it did pay a dividend, but it did not pay but one. Dikes are not put around the mouth of the river, as Solon Robinson said they could be, and the bogs utilized, and every acre made to pay the interest on $1,000 or $1,500 a year. It is a great mistake. We read of these things in the papers and take them in; we think they are so; but I tell you it is all moonshine. I don't care where you invest your money, you can put it into any other kind of property, and although it may not be worth a dollar, it will be worth as much as a cranberry bog.

Mr. Ayer. My friend was talking in the same line that I was. Perhaps I was not understood. When we talk about draining marshes next to salt water, as his were, I say it is impossible. I say D. C. Stevenson failed for the same reason there in Essex, next to the river; but when we talk about land back from the river, where there is a proper chance, as Mr. Norton has, if anybody says that cranberries cannot be raised there at a profit, I know to the contrary. My friend Bill is right, and so am I.

Question. How about ensilage.

Mr. Wetherell. The secretary of the Vermont Dairy men's Association came to Boston a few days ago, after attending the meeting of the Massachusetts Board of Agriculture at Lowell, and inquired of the leading butter dealers in Boston, who sell the best commodity of that kind that is sold in that market, and every one of those butter-dealers told him they did not want any ensilage butter; they had tried it, and they did not wish to have any more brought into their stores. I wish to add, simply, that some of the condensed milk factories, as I understand, refuse to use milk for condensing purposes that is made from cows that are fed on ensilage. The preparation of ensilage is nothing new. It was known to the ancients, as it is known to us. If they found it a good thing, how is it that it dropped out of use until recently? I do not believe that ensilage, for making butter or dairy products, is at all to be desired.

Mr. Russell, of Orange. I have a silo that I filled, and I am feeding from it now. There is no odor from the ensilage that is objectionable. My stock are eating well, and are doing well upon it. I think I could convince any one of that fact if they should see them.

Mr. Chamberlain. This question of ensilage is a very important one. There are gentlemen all over this State who have invested large sums in building silos and in growing material to put in them. I am not an advocate of ensilage; I cannot speak from experience; I believe, however, that it is easily demonstrable that it is not the best way of producing animal food. I think it can be shown by figures (which do not lie, it is said) that the same amount of material for food may be obtained by allowing this corn to mature. Ordinarily, especially for a crop of corn for ensilage, the land is prepared as well as is necessary for a matured crop of corn, and I think I could demonstrate at any time, with a little time to prepare figures, that it is not a profitable investment; and yet there are gentlemen here who would disagree with me entirely. I wish that this question of ensilage might have a fair discussion in this convention. Facts are facts, with regard to ensilage as with regard to everything else. Men have carried their stock through the winter season with apparent success upon ensilage, and notwithstanding the extravagant statements that have been made by some pioneers in this sort of work, I believe there is something in it. Other men's opinions are better on the subject than mine. If they will give their experience, I, for one, should very much like to listen to them.

Mr. Augur. I have had no experience whatever with ensilage, but very recently I heard Dr. A. M. Shew, of the Connecticut General Hospital for the Insane, make this statement in regard to their silos and the way in which they filled them. If I mistake not, they put in some twelve or fourteen hundred tons—for their silos are very large, and they have a large stock of cattle. He said they had two steam-engines running at the same time cutting the corn. It was filled in very rapidly, and the silo was closed and weighted very perfectly, so that when the ensilage was cut there was no disagreeable odor whatever. It was very like opening a can of fresh fruit. In regard to the effect on the cows, he said that after feeding their cows with ensilage for three weeks they found, by actual weight, that the quantity of milk had increased forty per cent. (Applause.)

Mr. Skilton. I remember reading some account of the analysis of ensilage by Professor Johnson, and he remarked that his analysis of a certain amount of ensilage and the same amount of dried corn showed that there was as much good feed to be obtained from the dried corn as from the ensilage. It was his opinion that there was no benefit in this ensilage; that farmers might as well dry the corn and feed it dry. That is my opinion also.

Mr. Rundel, Superintendent of the Industrial School. The gentleman who last spoke is right in one respect. I do not think we gain by any change in the nutritive qualities of ensilage, but we do gain in this respect,—that it is a hard matter to cure a heavy crop of corn fodder well, but we can put it into a silo and be sure of saving it all. My experience has been that ensilage makes good feed and produces good butter.

Mr. Myrick. Mr. G. M. Washburn, of Lancaster, Mass., who has had nearly forty-five years experience, makes the point, that putting green corn or green clover into a silo, when it was wet, is the cause of a great deal of the foul odor in ensilage, and Mr. Hoyt (whose ensilage smelled so badly) stated to me before he went away, that his clover was put in on a wet day.

Mr. Steele, of the Philadelphia "Press." It may be worth while to state, as against the remarks of the gentleman from Boston with reference to the opinion of Boston butter dealers, that some of the butter which sells in the New York market at the highest price, alongside the Darlington butter, is made from the milk of a herd of Jerseys that is fed exclusively on ensilage, with a little grain, of course, but no hay whatever. And, more than that, they have been fed on ensilage during the summer as well as the winter.

Mr. ———. I heard the question of ensilage discussed at the meeting two years ago. It is well known that large quantities of sowed corn are raised in Litchfield county. It is very difficult to cure that and have it come out in good condition, it is apt to be mouldy. But it can, if put into a silo and cured properly, be made good feed for stock. I have fed some of it this winter, and my cattle are doing well on it, and the milk I get from the cows is sweet and good.

Dr. Foote. I would like to ask if any gentlemen in this room who has a silo has found any trouble with his butter? Before building my silo, I went around and examined various silos, and I found that, universally, those who had silos liked the result which they obtained from feeding the ensilage. The difficulty all comes from those who give hearsay statements. I was told by a friend connected with the New York press that Mr. Miles had lost two horses from feeding ensilage. I saw Mr. Miles and asked him about it, and he said, "It is true I lost two horses, but they had not eaten a particle of ensilage. I was feeding it to my other horses, with my other stock, and they all did well upon it. I took a pair of horses and drove them very rapidly, left them standing out in the cold, they took cold and died. They had never eaten any ensilage."

Mr. Scoville. I would like to inquire why fodder is any more nutritious after being put into a silo? What is it that adds to its fattening qualities, or to its value in any way as food for stock? It goes through the process of fermentation in the animal just as well without the silo as with it. The breath of the animal will show that.

Gentlemen speak about its being very difficult to cure sowed corn. It is the easiest thing in the world. Drive a stake into the ground every third row, put your corn around it, tie it there, and it will stand perfectly straight, and will be just as bright next March, except a little on the outside, as it is when you put it up there. I know it to be so. I have raised enough in one year to keep twenty-five head of cattle clear through to April. I think that is less trouble than it is to make ensilage.

Mr. Rundel. You get no additional nutritive quality, but your cattle will eat stalks and everything where it is ensilaged. I have not been able to cure any where it matured so that my cattle would eat everything.

Mr. Bill. Will it pay? That is the point that should come before this meeting. Look at the first investment in building a silo; then look at the great expense of cutting up that corn, or clover, or whatever you cut up to pack in that silo. Look at the machinery which you are obliged to have after you have built your silo. It costs a great deal to transport that material. Now take the other side of the question. In the fall of the year, when your corn has become ripe and ready to cut up, what does it cost the farmer to put his men at work to shock that corn? It remains in those shocks a reasonable length of time, and the weather cures it ready for husking, and the stalks to be deposited in the stacks. My stock are subsisting to-day more than one-half upon that corn-fodder. Now take the meal that will come from the corn from each one of those bundles of stalks, feed that to your animals, and how sleek and fat they will come out in the spring! And how much more profitable it must be, taking the expense into account, to cut that corn up, give them the well-cured stalks, and the poor hay that is cut on those bogs in cranberry meadows! How much better it will be for the stock, how much cheaper for the farmer, and in how much better shape would his stock come out in the spring!

Mr. Myrick. In confirmation of Mr. Bill's remarks, and in reply to our friend who inquired if there was any one who had had experience with ensilage who was dissatisfied with it, I would state that there is in this paper ("*The New England Homestead*") a short article giving an unfavorable view of ensilage; the first one, I think the record will show, that we have received. With the Chairman's permission, I will read it. The article was written by Frederick Conant, of Middlesex County, Mass.:

"I have filled a silo twice with corn and rowen, but do not propose to fill it again. The rowen I consider good, but the corn I consider not as good as meadow hay, and I stand ready to risk any money that cattle fed on corn ensilage alone will grow poor and dry up on it. I fed it to dry cows with two quarts of bran one month, and then gave them five quarts. They lost flesh, never looked plump, and went without drinking for days at a time. Folks come to my barn now (I am a cattle trader) and make the remark that my cattle look better than they used to, and I know it without being told. I built a double silo, costing me about $700 in time and money. I consider it about so much money thrown away. Talk about its making a farm richer! It will make the land poorer, for the reason that it makes poor manure, and if 100 tons of ensilage are raised it takes all of that manure and more to raise the next 100 tons. Farmers in this town have not averaged 15 tons of ensilage corn per acre. It takes the best of land and the highest of manuring to raise 25 tons. Those who don't believe it had better try it. A small silo that would give the cattle one feed a day would be good—just about as good as the same amount of apple pomace, and I think no better, if the pomace is sweet. It is all heavy, hard work putting the corn in the silo and getting it out, costing me nearly $1.50 per ton for the getting in. I have sold cows the past two winters that gave after leaving me from one to four quarts more milk, which I suppose is a credit to me, but rather expensive. One cattle trader told me last winter that I had lost more than $200 on the sale of my cattle by feeding ensilage, as my cattle never were full and plump. I think there are but four silos in this town—two of them are empty, never again to be filled. It is my candid opinion that in less than 15 years silos in this country will be no more. There are a few men who have made money by getting the farmers to build and selling them cutters for $75 or $100 apiece, and corn seed for $3 to $4 per bushel. They have made their last dollar out of me, and I am still able to pay my debts, but feel mighty sore to be fooled so. I have said nothing about the manner of building silos, for if a man is silly enough to build, let him do it as he thinks best."

Mr. Scoville. We put twenty-five hills of corn in a stack. Those stacks yield a bushel of ears of corn. When we come to husk it, it makes three good bundles. Now, if you should feed, as Mr. Bill has said, one of these bundles of stalks to each animal, and then divide the bushel of corn among three, your oxen would be too fat to work, and your cows would be far too fat to give milk.

Mr. Rundel. I asked a gentleman who resides in one of the largest milk-producing sections of our State in regard to silos, and he said that while he thought they were good things, those who bought milk had refused to take it if it came from those who fed ensilage; consequently, he said, they had no more use around there for silos. It seems to me that the question resolves itself largely into this: If they do not want our butter, if they do not want our milk, that is produced from ensilage, what is the use of it for us? It resolves itself right into the question proposed by Mr. Bill, "Does it pay?" You may talk about it, and around it, but it will come right back to that question—Does it pay? If we have a good market for our butter and milk, if people will buy them and give a good price for them, then it may be all right. But if they do not want our butter or milk made from ensilage, then we have no occasion to fill our silos.

Mr. Sedgwick. In conversation with Maj. Alvord of Houghton Farm, this last spring, he told me that they had tried a series of experiments at that place in relation to ensilage. They took ten cows, all of them giving about the same quantity of milk, and fed five of them on ensilage, and five on good meadow hay—giving the cows that had ensilage all they would eat. The milk was carefully weighed and tested, and the product churned separately. It was found that while the ensilage increased the product of milk, the longer it was fed, there was a decrease of fatty matter in the milk, until there came a time when the cream from that milk would not make butter. He says that the experiment which they made satisfied them that ensilage alone was not a profitable food, although, to be fed in conjunction with something else, it might be.

What is there in ensilage to make it a valuable food? If you look at the analysis of it, you will see that it is worth less than brewers' grains, and the Board of Health have prohibited the sale of milk made from brewers' grains. We know that it has the same alcoholic smell and taste. And when the question of labor, the value of land, and the cost of handling this mass of stuff, are taken into consideration, I think it may well be doubted whether it is a paying thing.

Mr. J. Bronson of Ohio. I have listened to the discussion this afternoon with a great deal of satisfaction. I am not a resident of this State, but I am a native of this town. I have fed sowed corn for thirty or forty years, and I never have heard any one say that the milk that came from sowed corn was not good; on the contrary, it was considered the best milk that was ever sold to any factory; and I certainly think, from my own experience, that cattle fed on sowed corn will thrive and look better in the spring than if fed upon any other feed that you can give them. I use a horse-power and cutter, and cut up my sowed corn and corn-fodder fine. In an hour, I can cut a ton of stalks, and cut them not over half an inch long. Sift on a little wheat bran, and your cattle will thrive, and when you let them out, they will kick up their heels and do well.

C. H. Cables of Thomaston. We cure our sowed corn by cutting it and allowing it to lie on the ground a week or more. If it is a dry time, and we have no rain, we bind it up in large bundles, larger than ordinary rye-straw bundles, and stack it in stacks of from thirty to fifty bundles, binding it in the center and on top, and allow it to stand until we want it. In the winter, we haul it on a sled to the barn as we need it, and the inside is apparently as good as when it was cut. We never have any mouldy corn. Some parties have said that stalks make very poor milk. So they do, if fed alone, but if we give our cows a quart of meal a day, we find they will give more milk, and give a good quality of milk.

Among other things, we have fed cabbage to our cows, and we have found that we can make more milk on cabbage than anything else we have ever fed. It does not flavor the milk, but we are pretty careful not to feed any decayed leaves. I will not say that we can make good butter on cabbage, but we can make good-tasting milk, and have not heard any complaint from our customers.

We cut our corn by the use of a Jersey bull, who works nicely in summer or in winter. We use him in a horse-power.

Mr. Bill. I remember when this matter of ensilage was first started. It was like fire, and it seemed to me it was going to sweep the land,—and it has partially,—before we could get a reaction. I saw into it the first time that it came up in the meeting, and battled it. I believed it was my duty to do it. I regarded it as another cranberry operation, or *morus multicaulis* operation, or sorghum operation. I see that only a portion of the farmers of Connecticut have gone into it, and expended $300, $500, or $800, and it may deter others from doing it, until they investigate the case further. It has been an interesting subject to bring before the meeting, and information has come out that will be beneficial to the farmers of the State.

Question. What is the proper treatment of an animal that has a weeping eye, or a film growing over the eye? What will remove the film?

Dr. Bowen. It is quite a general practice to blow a little powdered burnt alum into the eye. A better practice, and one not quite so harsh, is to sponge the eye with a solution of borax—about four grains to an ounce of water. Before one attempts any remedy, he had better investigate the cause of the film, and ascertain whether it comes from a wound that the animal has received, or from some injurious feeding. It is very apt to come from the latter cause. I think farmers are apt to overlook that very important consideration in the health of their animals. They do not look sufficiently to the feed. We see it more often in dogs that are getting too high feed. I have seen a film over their eyes to such an extent that they would be almost totally blind; and yet, by a little simple starvation, they brightened up in a few days. The same thing may occur in our cattle.

QUESTION. What would you do if an animal got something in its eye?

DR. BOWEN. You will have to look very carefully into it.

MR. ———. I had a horse, some three years ago, one of whose eyes would be closed for a day or two and would weep. I bathed it with lukewarm water, that was the only thing I could think of, and the best thing that I could do. I supposed something had got into it. It got well, apparently, but in about a month it came on again, I consulted a veterinary surgeon about it, and he said it was ophthalmia. He gave me a lotion of sugar of lead and sulphate of zinc, I suppose, and I used this lotion whenever the trouble came on. The horse is now blind. I know of several horses that are apparently going through the same difficulty. I would like to know what will cure in such cases.

MR. GILMAN, of New Hartford. I had a horse one of whose eyes became blind. I called in a veterinary surgeon, who recommended blistering. I applied the blisters, and the horse has been perfectly sound for two years. I blistered six or seven times, the thin film came off, and the eye discharged. The same man told me that before two years the horse would be perfectly blind, but there is no appearance of it. The blisters were applied in the hollow right by the side of the eye.

The Secretary read an invitation from Booth & Co. to visit their works at nine o'clock to-morrow morning, which the Convention very cordially accepted.

Adjourned to evening.

EVENING SESSION.

The evening meeting was called to order at seven and a-half o'clock, by Mr. Barstow.

Mr. Gold. Col. Wilder, the venerable President of the American Pomological Society, at the last meeting of that society, presented in his address the importance of a revised system of nomenclature of American fruits. The confusion that has arisen, and the discredit that some varieties labor under from the absurd names by which they are designated is such that he thought it worth while to make it a particular point in his address, and that subject was taken up by the convention. Committees were appointed, and resolutions prepared, which were adopted by that convention, recommending a uniform style of nomenclature, and the rejection of synonyms. They recommended rules for the exhibition of fruit before that association, and exhibitions generally.

In answer to that appeal from Col. Wilder, that Association has published a circular containing those recommendations, and an extract from that address, copies of which have been sent to associations like ours and kindred societies throughout the country, with a request that we would take such action as we deem expedient towards endorsing that movement.

It is desirable that we should take some action in accordance with the request of this honorable Society, and in support of its venerable president on this subject, and I here present the circular.

AMERICAN POMOLOGICAL SOCIETY.

At the recent meeting of the American Pomological Society held in Philadelphia, Mr. J. B. Rogers of New Jersey, made the following motion, which was unamimously adopted: "That the Secretary of this Society be instructed, at an early day, to send copies of our rules and the portion of the President's address referring to the names of fruits, to all kindred societies in America."

W. J. Beal, *Secretary*, Lansing, Mich.

Marshall P. Wilder, *President*, Boston, Mass.

The rules adopted, and the portion of the President's address referred to in the vote, are as follows:

Rules of the American Pomological Society.

Section I. Naming and Describing New Fruits.

Rule 1.—The originator or introducer (in the order named) has the prior right to bestow a name upon a new or unnamed fruit.

Rule 2.—The Society reserves the right, in case of long, inappropriate, or otherwise objectionable names, to shorten, modify, or wholly change the same, when they shall occur in its discussions or reports; and also to recommend such changes for general adoption.

Rule 3.—The names of fruits should, preferably, express, as far as practicable by a single word, the characteristics of the variety, the name of the originator, or the place of its origin. Under no ordinary circumstances should more than a single word be employed.

Rule 4.—Should the question of priority arise between different names for the same variety of fruit, other circumstances being equal, the name first publicly bestowed will be given precedence.

Rule 5.—To entitle a new fruit to the award or commendation of the Society, it must possess (at least for the locality for which it is recommended) some valuable or desirable quality or combination of qualities, in a higher degree than any previously known variety of its class and season.

Rule 6.—A variety of fruit, having been once exhibited, examined, and reported upon, as a new fruit, by a committee of the Society, will not, thereafter, be recognized as such, so far as subsequent reports are concerned.

Section II. Competitive Exhibits of Fruits.

Rule 1.—A plate of fruit must contain six specimens, no more, no less, except in the case of single varieties, not included in collections.

Rule 2.—To insure examination by the proper committees, all fruits must be correctly and distinctly labeled, and placed upon the tables during the first day of the exhibition.

Rule 3.—The duplication of varieties in a collection will not be permitted.

Rule 4.—In all cases of fruits intended to be examined and reported by committees, the name of the exhibitor, together with a complete list of the varieties exhibited by him, must be delivered to the Secretary of the Society on or before the first day of the exhibition.

Rule 5.—The exhibitor will receive from the Secretary an entry card, which must be placed with the exhibit, when arranged for exhibition, for the guidance of committees.

Rule 6.—All articles placed upon the tables for exhibition must remain in charge of the Society till the close of the exhibition, to be removed sooner only upon express permission of the person or persons in charge.

Rule 7.—Fruits or other articles intended for testing, or to be given away to visitors, spectators, or others, will be assigned a separate hall, room, or tent, in which they may be dispensed at the pleasure of the exhibitor, who will not, however, be permitted to sell and deliver articles therein, nor to call attention to them in a boisterous or disorderly manner.

Section III. Committee on Nomenclature.

Rule 1.—It shall be the duty of the President, at the first session of the Society, on the first day of an exhibition of fruits, to appoint a committee of five expert pomologists, whose duty it shall be to supervise the nomenclature of the fruits on exhibition, and in case of error to correct the same.

Rule 2.—In making the necessary corrections they shall, for the convenience of examining and awarding committees, do the same at as early a period as practicable, and in making such corrections they shall use cards readily distinguishable from those used as labels by exhibitors appending a mark of doubtfulness in case of uncertainty.

Section IV. Examining and Awarding Committees.

Rule 1.—In estimating the comparative values of collections of fruits, committees are instructed to base such estimates strictly upon the varieties in such collection which shall have been correctly named by the exhibitor, prior to action thereon by the committee on nomenclature.

Rule 2.—In instituting such comparison of values, committees are instructed to consider: 1st, the values of the varieties for the purposes to which they may be adapted; 2d, the color, size, and evenness of the specimens; 3d, their freedom from the marks of insects and other blemishes; 4th, the apparent carefulness in handling, and the taste displayed in the arrangement of the exhibit.

T. T. Lyon, South Haven, Mich.
John A. Warder, North Bend, Ohio.
J. J. Thomas, Union Springs, N. Y.
C. M. Hovey, Cambridge, Mass.
P. J. Berckmans, Augusta, Ga.
Committee.

Extract from the President's Address.

In former addresses, I have spoken to you of the importance of the establishment of short, plain, and proper rules, to govern the nomenclature and description of our fruits, and of our duty in regard to it; and I desire once more to enforce these opinions on a subject which I deem of imperative importance. Our Society has been foremost in the field of reform in this work, but there is much yet to be done. We should have a system of rules consistent with our science, regulated by common sense, and which shall avoid ostentatious, indecorous, inappropriate, and superfluous names. Such a code your Committee have in hand, and I commend its adoption. Let us have no more Generals, Colonels, or Captains attached to the names of our fruits; no more Presidents, Governors, or titled dignitaries; no more Monarchs, Kings, or Princes; no more Mammoths, Giants, or Tom Thumbs; no more Nonesuches, Seek-no-furthers, Ne plus ultras, Hog-pens, Sheep-noses, Big Bobs, Iron Clads, Legal Tenders, Sucker States, or Stump-the-World. Let us have no more long, unpronounceable, irrelevant, high-flown, bombastic names to our fruits, and, if possible, let us dispense with the now confused terms of Belle, Beurre, Calebasse, Doyenne, Pearmain, Pippin, Seedling, Beauty, Favorite, and other like useless and improper titles to our fruits. The cases are very few where a single word will not form a better name for a fruit than two or more. Thus shall we establish a standard worthy of imitation by other nations, and I suggest that we ask the co-operation of all pomological and horticultural societies, in this and foreign countries, in carrying out this important reform.

As the first great national Pomological Society in origin, the representative of the most extensive and promising territory for fruit culture, of which we have any knowledge, it became our duty to lead in this good work. Let us continue it, and give to the world a system of nomenclature for our fruits which shall be worthy of the Society and the country,—a system pure and plain in its diction, pertinent and proper in its application, and which shall be an example, not only for fruits, but for other products of the earth, and save our Society and the nation from the disgrace of unmeaning, pretentious, and nonsensical names, to the most perfect, useful, and beautiful productions of the soil the world has ever known.

Mr. Rogers. A committee was appointed by the American Pomological Society, at their meeting at Philadelphia, to revise their rules concerning the nomenclature of the fruits.

After discussion, the rules proposed by that committee were adopted. Those rules give the society the right to revise and change the names in their catalogue, where they are improper, and provide for naming fruits and the rules for the exhibitions of the American Pomological Society, in order to see if sister societies, agricultural societies, State fairs, and County fairs will adopt the same rules; the intention being, if possible, to assist judges and exhibitors in giving the right names to fruits. As an illustration, the new white grape just introduced to the public by Mr. Moore, called the "Francis B. Hayes," is under that rule, styled the "Hayes Grape;" the synonym, "Francis B. Hayes;" the intent being to shorten names where too long. I think if any one in this room has ever been called to the unpleasant duty of a judge at a flower or fruit exhibition, he will appreciate the need of some such regulations. Take, for instance, some of our apples which have forty, fifty, and sixty names, and some of them purely local. The intent of the rules with regard to exhibitions is three-fold. First, to have the fruit exhibited under the right name; secondly, to educate the exhibitor in the right name; and thirdly, that persons wishing to use the name may know that the name is rightly placed upon the fruit.

With these few remarks, I will leave the matter to the Convention. I hope that Mr. Augur, the Secretary of the Board, and other gentlemen here, will give their views concerning the matter.

Mr. WETHERELL. Being a member of the Massachusetts Horticultural Society, as well as of the American Pomological Society, I was conversing with Col. Wilder on this subject only a few days ago. He said he hoped it would come up at this Convention, and hoped that action would be taken thereon. I will simply add to what has been said, that on the first Monday of December, the Massachusetts Horticultural Society adopted these rules. I understand that the Michigan Pomological Society has done the same, and I think Col. Wilder told me of several other societies that had also adopted them. The movement seems to be one in the right direction, and I hope the pomologists here will coöperate as far as they can.

Mr. HYDE. I fully accord with what has been said with regard to the difficulties encountered at the exhibitions of our societies and agricultural fairs in having so many different names applied to one kind of fruit, and I trust that this Convention will endorse the rules which have been suggested by the Pomological Society.

Mr. AUGUR. I was present at the meeting of the American Pomological Society where these rules were very thoroughly discussed, and it was unanimously felt that they were wise. There are a great many names that are long, containing two or three words, which are difficult to write, and it makes trouble for nurserymen, and the whole matter would be greatly simplified by adopting these rules. I think the pomologists throughout the country were of one opinion, that it was a wise thing to do. We here could not do a better thing than to endorse what President Wilder, Mr. Lyon of Michigan, and the leading pomologists of the country so strongly urge. I should very heartily favor a resolution endorsing the action of the American Pomological Society.

Mr. HYDE. I move that this Convention approve the suggestion of Colonel Wilder, the President of the American Pomological Society, in his address at Philadelphia, and that the rules of the American Pomological Society upon the subject of nomenclature, and the exhibition of fruits be approved by the Convention and commended to all the Pomological and Horticltural exhibitions in this State.

This motion was adopted unanimously.

The CHAIRMAN. The lecture this evening is on the Educational Influences of the Farm, and I am very happy to introduce to you Prof. W. H. BREWER of New Haven, who will now address us on that subject. (Applause.)

THE EDUCATIONAL INFLUENCES OF THE FARM.

BY WM. H. BREWER, PROFESSOR OF AGRICULTURE IN YALE COLLEGE.

The hope of a nation is in its youth, and therefore the most important business of a nation is the education of the young. This is particularly so in a republic like ours, where not only the wealth and prosperity of the country, but the stability and very existence of the government is in the hands of the masses of the people, rather than in the care of a special ruling class.

In the growth of this nation, the four chief factors in the production of its greatness have been, respectively; first, the race or stock of its early founders;—second, their sentiments and traditions regarding religion, morality, and education;—third, our system of land tenure with its facility of acquisition and transfer and simplicity of title, which makes it as possible for any one to own real estate as to own personal property;—and, fourth, the social, political, and intellectual status of the farmers.

The last of these four factors has not been the least. My belief is that without it, the progress of this country would have been but little better than has been that of Mexico, the Central American countries, or those of South America.

Throughout all our previous history, by far the most of our capital has been invested in farming, the most of our labor has been expended on farms, the most of our population has lived on farms, and a great majority of our more eminent men have spent their childhood and youth, wholly or in part on farms, getting there an essential part of their education.

It is not too much to say that up to the present time, the men educated in childhood or youth on farms have had the leading part in making this nation what it is, in shaping its political destinies, giving it its intellectual stand, and in developing its material wealth.

During the whole Colonial period, and during the first century of the republic, the great majority of statesmen in our legislative halls, came from farms, the Declaration of Independence and the Constitution of the United States were written by a farmer, who, when he had finished his official work for the nation, returned to his farm where he spent his declining years, where he died and is buried. Washington too, went from his farm to lead the armies of the struggling colonies, he was recalled from his farm to be our President, and set the example of retiring, not to a pensioned palace, but back to his own farm where he lived and died, and where his bones rest.

I once took much pains and labor to look up the history of the childhood of all the presidents of this republic. Of a few I could get no information, but at least fifteen out of the twenty-one presidents of the United States have either been farmers (or planters) themselves, or the sons of such, ten of this fifteen were the sons of farmers on small farms, and four of them, indeed, I might say five, were on new or "pioneer" farms in their boyhood, actually helping in the arduous and toilsome work of subduing the wilderness.

In all that relates to the intellectual, political, and social condition of farmers, the history of this country has been exceptionable; nowhere else has actual farm-work been so respectable.

This is not the place to enter into the causes which brought so large a proportion of our population on farms, and made farming more respectable than in other countries; the *fact* will not be disputed, and I have elsewhere* discussed the causes.

But a profound change in our population, both as to stock and occupation, has lately been going on very rapidly. Immigration is diluting the nations' blood, the industries are rapidly changing, and the numerical proportions of people living in the country, and in the cities are also rapidly changing.

The applications of science and the fertility of invention have revolutionized the industrial arts and changed the methods of commerce and trade, wealth is produced much faster than ever before and is being invested in other directions than in land and agriculture. War does not destroy so much, nor pestilence waste so much, so the world is rapidly growing richer. Along with this, cities and villages are growing in population much more rapidly than the agricultural towns, and a relatively smaller and smaller proportion of the population is being occupied on farms.

I need not here discuss the why and wherefore of all this; it is a great social movement wider than our own land, it extends to all countries with a civilization like ours, and it is inevitable that it must go on. It is a part of the progress of the age. Until lately, pestilences and the difficulties of transporting food pre-

* Tenth Census of the U. S., Vol. III, Agriculture, Cereal Report, p. 134 (514).

vented the rapid growth of cities and limited their size. Now, sanitary science makes it possible to check pestilence, and steam transportation makes it possible to carry food half way round the earth. Famines are always local, and formerly each nation, indeed each section, lived more independently of others than now. Telegraphs and steam have made distant countries neighbors, and all the world kin in a way our fathers little dreamed of, and a fruitful year in America may prevent a famine in Europe; while war, that other great curse, is becoming less and less a destroyer. So, cities and towns will continue to grow, and will breed a larger and larger proportion of our population; they have their own special facilities for the education of youth, which facilities have been enormously increased and improved within our time, and the relative importance to the nation of town and country population is rapidly changing, both in a political and social sense.

Heretofore the vast majority of our youth, I may say very nearly all, had at least some country education, and by far the largest class, as a class, had some experience on a farm. Hereafter that may not and probably will not be true. It is no longer true in New England, and the educational influences of the farm have therefore a new importance, to both those who are interested in agriculture and who are interested in education.

But then, anything relating to the education of youth is ever fresh and ever new, because it ever has to do with a new generation of men and women.

The subject of my lecture is not a new one to me. I was born and reared on a farm; all the associations of my childhood and all the traditions of my ancestors for several generations related to the farm; so I speak from experience in that direction. I am now a teacher, and have spent more than twenty-seven years teaching; first in academies, then in colleges, which have had among their pupils both country and city youth; so I can speak from experience derived from that source of observation. As an American citizen, interested in the history of our beloved country, I have studied the influences which have shaped its progress and which have moulded the lives of our most eminent men; so this part of the subject has long been a subject of study. As Professor of Agriculture for many years, the influence of farm life on the intellectual status of the people has naturally and necessarily come within the province of my professional study. Lastly, but by no means the least item, as the father of a family of children now growing up in a city, the subject comes very closely home to me.

Whence come the men now most prominent in the affairs of state, or in the business of the country, or in the realm of literature and science? What has been their education? This is a never-finished subject of discussion, and when any man comes prominently in front of his fellow men for any quality that makes men great, questions as to the influences which moulded his early life are immediately asked. The newspapers tell us about him; teachers and writers tell us what schools he attended. Prominent men die and their biographies are written, or at least, a sketch of their lives is given in the current newspapers, so there is an abundant literature from which to draw our conclusions.

Moreover, numerous special investigations have been made, as to the origin of the leading men in particular cities or in special vocations. I need not repeat statistics here, because all point to the fact I have already asserted, that thus far the great majority of our most successful men have come from the farms, or had at least a part of their education there. The successful business men of our large cities, successful engineers, statesmen, professional men, have come largely from farms. As a student of science, I have long noticed that a large proportion of our more eminent scientific men had a country experience in their childhood. Here a religious paper compiles statistics of successful men in one city; there a secular paper gives notes of the successful men of another city, and all point to the same fact.

Now, all this seems to me only the natural result of the laws of education. The more we study the facts, the more striking they appear, and the more vividly we see why they are; the facts are but the result of natural laws pertaining to the development and growth of the race.

I have stated elsewhere and in another connection the underlying facts, but I may repeat some of them, in substance at least, for our use in this special connection.

The progressive element in a country like ours, and indeed in any country, is in that portion of its population which is neither very poor nor very rich. This is the social stratum in which originates the most of that quality of mind by which mankind has made its greatest achievements, all that kind of intellectual power which manifests itself in literature, art, discovery, invention, in business sagacity and social reform; and our agricultural system has been eminently adapted to breed and develop this class.

For the conservation of political institutions and the creation and preservation of material wealth, it is best that as large a proportion of the whole population as is possible own real estate, particularly their own homes, and this our system of land tenure and land ownership encourages. For peace and the suppression of warlike impulses, as well as for thrift, it is best that as large a proportion of the population as is possible be at work for themselves rather than for hire, and for this our system of farming furnishes the opportunity. It is also best for the race that as large a proportion of the population as is possible have facilities in their vocation for the education and rearing of families in virtue, intelligence, industry, and thrift.

For such education, no other industrial occupation is so eminently adapted as farming, as this vocation is carried on in the most of this country. In no other vocation is there exercise for so great a variety of faculty and so varied exercise for the judgment as on a farm growing a variety of crops, producing domestic animals, and using the latest machinery and labor-saving devices. Here the child has a greater variety of object-teaching than can possibly occur in any other common form of home life. Here there is so much he must see that interests him—crops grow, animals are reared, so many natural laws and natural phenomena are related to the daily work; the seasons have more significance than merely heat and cold, and the weather more than merely pleasant skies or gloomy days. In no other vocation can the child be so trained to habits of industry without detriment to his health or intelligence, no other place so well adapted to sound education for intelligent citizenship.

The great advance in human knowledge during the past hundred years has been in the direction of the natural and physical sciences, and the utilization of this scientific knowledge has led to the wonderful growth of the industrial arts and all kinds of manufactures, and is the real source of the recent enormous increase in the material wealth of the world. Because of the beneficent applications of science, human wants are better supplied, human life lengthened, comforts increased, and happiness promoted.

Now, this great advance in knowledge, this revolution in methods by which ends are gained, has been largely brought about by the use of what is sometimes called the "laboratory method" in education; or, as others are pleased to call the simpler phases of the same thing, "object teaching." To illustrate what I mean: no instruction in the science of chemistry reaches its full value without a laboratory for practice, where the student must *do* as well as think while he is trying to unravel the mysteries of nature. Actual experiment has been an essential factor in solving the problems of nature. Before the use of the telescope and instruments for accurate measurement, astronomy remained merely astrology, and was the handmaid of superstition. Then, too, chemistry was but alchemy, and experiment was more in the direction of magic than a search for truth. Physics remained where the old Greeks left it, a collection of so-called philosophical deductions, until the experiments of Galileo began a new era in that science. Medicine and the healing art were mostly empyricism and quackery. Modern science has bettered all this, science based on experiment as well as observation, where doing as well as thinking is an essential part in the method of education. Experiment, suggested and directed by intelligence; experiment, often laboriously performed. In this way science has grown, and with it all its beneficent works, increasing man's comforts, aiding his arts, lengthening his life; robbing pestilence and famine of most of their terrors; adding to the wealth of the world; and spreading civilization and Christianity. Hence we have chemical laboratories, physical laboratories, biological laboratories, physiological laboratories, botanical laboratories, etc., where youth can be taught and knowledge advanced, experiment and study going on together, reading along with observation, *doing* something while we are thinking of the why. This is "the laboratory method," now such a feature in modern education, so rapidly growing, and maintained at such enormous expense. The world is just seeing that this is the great modern idea in education.

But this is only a phase of what every farmer's boy enjoys. This in a sense has been the regular way in which the American farmer's boy has been educated.

The farm is a stupendous laboratory. Here the learner is brought in contact with the *things* as well as the words of the world; he sees the processes and phenomena of nature, and the vocation is a continuous succession of experiments directed to some end. The child on the farm learns how to work, how to do, how to question nature by experiment, how to adapt means to ends, how to plan work in order to reach desired results. Before the farmer's child has learned his A B C he has begun to experiment with nature in directions the city child reaches only in later years, if indeed he ever does; and these actual experiments go along with opportunities for observation such as the ordinary city child rarely has, and usually never has.

I was grown to manhood, yes, older than that, before it even occurred to me that many children in our great cities became large enough and old enough to be found in the schools who had never seen the sun rise, nor set; who had never seen the moon except when high in the sky, had never seen it creep up from the distant horizon, large and bright and round; indeed, whose only idea of the horizon was the houses that shut out the view from every side. Children in the schools that did not know that potatoes grow in the ground and apples on trees, that butter was made from milk and milk came from cows, and so on through that curious list of facts which have been brought out by investigation in late years as to the actual knowledge possessed by young children in the great city schools. My attention was turned to this some years ago, and I picked up some most suggestive information, but I never made any systematic investigation; in fact, I never had a chance to. But that has lately been done with great ingenuity and labor, and with most instructive results. To those of you who may be interested in this part of our subject, I commend an article by Prof. G. Stanley Hall, on "The Contents of Children's Minds" (*Princeton Review*, May, 1883, p. 249). However interesting this subject may be in this connection, I have not time to follow it further, suffice it to say, that it is the opinion of scientists that many of the fancies and sentiments which go with us through life are the composite impressions stamped on the brain in very early childhood, shaping our thoughts and influencing our beliefs and doings all through adult life.

In this, country life and country scenes play a part greater than has heretofore been thought of. It is found by teachers in city schools, that with the children of cities, a few days in the country often has an eduational value beyond a term in the best of schools. Even as a basis for a literary career, it is an experience, if not essential to success, is nearly so. I question if a great poet or vivid writer could develop entirely in a great city, and without some country experience, no matter how great his native genius. I know of none who has not had some country experience in childhood. Many, like Burns and Whittier, were born and reared upon the farm. Others have either been in small towns, or so situated that they had abundant country experience. Thoreau was born on a farm, his parents soon after moved into a village, but it is said of him, that he drove his mother's cows to pasture, and like Emerson, he did it barefooted. Longfellow, and Holmes, and Bryant, and Irving, and Cooper, and the host of our best known writers, either spent a part of their childhood on farms, or where they had abundant opportunity for observation and experience in country life.

I have already said that at least fifteen of our presidents have been farmers, or the sons of farmers, and had spent all or a part of their childhood on farms. Of the childhood of some of the remaining six, I have no information whatever. But all of them of which I have any data respecting their childhood, if not actually on farms, were amid rural surroundings; some lived in small towns, with farms almost to their very doors; others were the sons of country professional men (as is the present president), and thus they had the advantage of a country education in childhood.

The same fact holds good of most of our most eminent statesmen who have not become presidents. To enumerate them would be to make a long list. Daniel Webster, the son of a small farmer, spending his childhood days on a little farm, and the nights of his boyhood studying by the firelight, seems to us a wonderful picture; it would be vastly more wonderful to picture him as the son of a man living on a small salary, or with moderate wages as a workman, in a great city, the boy by day in some crowded city school, and his evenings in the street attracted by the lights and the sights of the city. No! great men do not come in that way, and this is not a mere accident, it has its foundations deep down in the laws which govern the development of human intellect.

It has long been noticed that the greatest business men in our cities come from the farms, or get a part at least of their early education there. The two names now most often seen in the newspapers because of the great wealth associated with them, are of men who originated on farms, and small ones at that.

That so many prominent and successful business men begin their career as farmers, is often remarked, and is a well recognized fact. It seems to me but natural, and to be the legitimate result of the early farm education, and it also seems to me natural that so large a proportion of the town and city-bred should never accumulate much property.

Did you ever reflect on the great difference between the experience of country and city children in all that educates them in forethought and preparing for the future? in self-sacrifice to-day for some future good?—I question if you have, so let us contrast the early education of the child on the farm and the one in a city, in this matter.

The child on the farm sees the business of the father go on from day to day, as he of the city does not. He sees what it is, and why it is; it is very varied in character, and much of it of a kind that awakens his interest, and at a very early age he begins to take part in it, and becomes, as it were, a member of the firm. He feeds the chickens, and feels big to see them come at his call; he drives the cows; he watches the bars when grain or hay is being hauled, and so on; he has a sense of responsibility in the management of affairs, and he feels that the success of the establishment depends in part upon him; his own importance is correspondingly magnified, and along with it his sense of worth. He is not a nuisance, and made to feel it by his adult companions who wish he could be abolished along with other nuisances,—no,—he is a person of importance, a member of the firm, and helps run the business. As the chickens come at his call, or the cattle flee before his shout, as perhaps he brandishes a great whip when he drives them, he feels in his heart some of the satisfaction of command, like the centurion of old, "I say to this one go and he goeth, and to another come and he cometh, and to my servant, do this and he doeth it." He has an importance and a use and place in his home that the city child has not. The city boy is made to feel that he is at the bottom of the little social kingdom of the household, subject to all the grades above it. The country child is not; the domestic animals are below him, and serve and obey and fear him.

But more than this; all, or very nearly all the work of the farm he sees going on or takes part in, is for future and unseen results rather than for immediate and obvious ones. Every step is education in forethought, in making some provision for the future.

The ground is plowed, that it may be sown to grain, but even *this* is not an end; the seed is sown for a crop to be harvested long months ahead. It is a provision for a future want. The crop is carefully tended, not for to-day's dinner, nor to-night's supper, but for a distant harvest. The wood is cut and hauled, no matter if the weather be warm and fair, it is needed for the winters storms some months ahead. Even harvest is not the end; the grain must still be threshed. Potatoes are dug and stored for future use; secured with toil to-day, housed, where, perhaps in the way, and all submitted to as a provision for a future want. There is even much looking ahead still further. Fields are cleared of stone, fences made, drains dug, sheds built whose use is to be for long years to come. He sees animals anxiously reared which will require years of care before they have value for use. Orchards are set out which will not bear fruit for years; and so on through all the varied work of the farm, scarcely anything is for to-day, all the operations are for the future. All the toil, and exposure, and care, are for results that are not immediate and sure; they must be waited for, and even then are uncertain. Moreover, for much of this, it not only requires preparation long before for a successful result, but it also requires anxious and often laborious care continually during the interval; one continual looking ahead and providing for the future.

Perhaps the most prominent feature in this experience of the child is that this care and forethought is essential to success in all the details of the business, the farmer must toil to-day for a distant result, work now to supply a distant want not yet felt, present self-sacrifice for some future good, the actual value of which cannot be predicted until realized.

Nearly everything we enjoy he has seen thus provided for long before. The green corn at to-day's dinner, he knows where it comes from; he may remember that he was kept home from school a day to drop the seed in the spring, long ago to him. The butter on winter's buckwheat cakes, he saw it churned and laid down in the fall, he remembers when the hogs were killed and the pork salted down, when the apples were put in the cellar, and so on of much that is used. Operations indoors, and out, are all an education in prudent forethought, work to-day to provide for the future, to-day's wants supplied from labor long ago performed. He learned "to labor and to wait," long before the poet said it.

Now, contrast all this with the experience of the children in city families. What do they see or know of the business of their fathers, except in the most general way? They see absolutely none of the forethought required in the business, nor of the provisions for the future wants of the household.

The table is supplied by men who come daily, or at least, weekly. Milk is daily left at the door, while the child is yet in bed; the butcher and grocer come for "orders," and the day's meal is duly deposited in the kitchen. So far as the child sees, it comes daily without any serious forethought; to him it comes without either labor or previous care. He sees absolutely no provision for this long ahead; his father is at work at something else; the food comes to the door, and so far as he sees, it comes as easily and as certainly as the manna which fell from heaven.

The city cellar is no storehouse, filled months before by the toil of the family; what stores may be there are brought by some one else in a wagon and it is put into the cellar when father is away at the store, office, or shop. He is quite a large child before he knows the source or origin of the most common and essential things on the table, perhaps he gets his first idea of these in some short visit to the country. He gives no thought to the matter because there is nothing to suggest the origin or source; it makes no difference to him, and is no more strange that the sausages like the fish should be caught in the river or sea, or are made, in either case some one brings them to him ready made. The city child knows absolutely nothing of the toil through which all these necessities come, he sees nothing of the self-sacrifice by which these blessings have been bought. He hears often enough that everything is dear, but this falls on callous ears because he sees so much forbidden fruit which is denied him, he hardly knows why.

That the daily meal should come is to him as much a matter of course as if it came miraculously, like manna; he sees no more forethought required than if he were fed by the ravens. He sees nothing fail for lack of labor long months before. When he is stinted it is merely because his father or mother says they cannot afford it, a very unsatisfactory reason to him. Is it any wonder that he so often grows up without the instincts of economy and thrift?

Then too, if he gets money, all the surrounding temptations are for spending it for present and immediate gratification; no waiting for larger harvest by and by. The very toys in the shop windows are regulated by the season. Skates and sleds are everywhere in sight in winter when the temptation is to buy them. As a boy I saved eggs in the spring, and bought a nice sled in the summer for the next winter's coasting; it seemed the only natural way. In the city the sled would have been out of sight and out of mind, and some other temptation for immediate use been displayed in the enticing shop window.

Again, the incentives to saving and thrift are entirely unlike in the two homes.

The farmer's boy's first property is usually something of comparatively small value to begin with, but which grows and increases with his care, and *he sees it grow*. It may be some crop he plants and sees spring up and mature. More often it is some young animal which he sees increase under his care. If a calf, he watches its growing strength and size; the young, budding horns have a strange interest to him; he sees the beast waxing greater and more valuable under his eyes, and each evidence of growth is an incentive to renewed care and attention; and with its growth there is a personal interest in the possession, stronger than mere property interest.

How is it with the city child? He puts his pennies into a so-called "bank" where they accumulate, but do not grow. He must not even see the growing pile in the little tight box, because the temptations to spend are so many and so strong. He may shake the box and hear them rattle; that is all. So he keeps them —until Christmas. If he puts the money in a savings bank, he is told that the interest accumulates, but he does not *see it grow*; he merely knows it, as an intellectual conception; there is no personal interest in it other than that of mere property, and it requires much outside encouragement, and perhaps restraint, to prevent him from withdrawing it and spending it for some of the luxuries that tempt on every side. The country boy has a very different feeling towards his growing calf, or colt, or lamb. He does not want to sell it. It is endeared to him more than as mere property possession, he sees it still growing under his care, and is loth to part with it. There can be no such personal interest in any savings bank account as in the calf or colt the child cares for and feeds and sees grow.

I cannot follow this contrast further, but I have by no means exhausted this line of thought, each of you can call to mind other phases, and the more you study it, the more marked it seems, and the more you will see that the natural tendencies of a farm education is towards thrift, is to self-sacrifice to-day for a reward in the future.

Again, there is the education in habits of industry, which has been incidentally alluded to several times before. Success in life depends upon overcoming difficulties rather than in the avoidance of them, on industry rather than on genius, and the education of the farm is towards habits of industry. Even the small child can do something useful on the farm, not work made for him to keep him out of mischief, but something that needs to be done. And the most of this is not like the routine work in factories and shops —it is varied, interesting, useful, and healthful. In no other vocation can the child be so trained to habits of industry without detriment to his health and intelligence. This very work educates his sense of worth and importance, it educates him in accepting responsibilities, he learns early that the mere pursuit of pleasure is not the great aim of life, but that each person has responsibilities laid upon him and duties to perform.

In contrast with this, what can a city child find to do? I speak feelingly on this point—with house on a populous street, neighbors close on every side, a yard but a few feet wide, the only other range is the street,—what is there useful that our children can do? They cannot share with us our labors; there is no such round of useful, light, healthful labor they can do; what things we find for them to do are few and so painfully evident that the work has been contrived to make them do something, that its educational value is lost. Then, too, there is so much to distract; boys all around to entice away. There is so little that the child can do to help along the home work, he feels that he is in the way, that he is an expense, he is noisy, he is not wanted about—indeed, in these times, the country seems the only place where children are really wanted. There is no demand for children in the city; there is in the country. Only a few days ago I picked up a paper containing a long report of the operations of the Children's Aid Society of New York. I need quote but a single line, "over 60,000 homeless children have been placed in good homes in the country" —*good homes in the country*—could you find such "good homes" in the cities for 60,000 homeless and often vagrant children? *No*, unfortunately, the "good homes" in the city mostly, don't want any more children, they find it too hard to train up in industry and virtue those they already have. I speak with some experience and authority on this matter. I have spent part of this very week in the work of getting ready the temporary home for neglected children being provided for this county, under the recent law; I have before had to do with the dependent classes. In this State hundreds of poor, and vicious, and neglected children from cities have already been taken by small farmers in the country and reared to useful men and women; we don't expect to keep many of the neglected and pauper children in our new home; there is a demand for them, and that demand, luckily, is all in the country. I see farmers all the time taking children from the "poor-house" to bring up; very poor stock. They would not take as a gift a young cow or horse of such poor stock and low breeding.

This naturally leads us to the moral side of the question. The report I quoted, of the 60,000 homeless children sent into country homes, follows with the statement that "the fruits [of this work] are seen in the diminished number of petty thieves, child vagrants, and youthful criminals," etc. This is not the merely removing of city temptations to vice. We cannot make a saint of a sinner by merely removing the obvious temptations, the work is deeper than that. These children were placed where they had something useful to do, as well as good to learn; industry and education in thrift are the first elements in moral education. We have all heard who finds mischief for *idle* hands to do. Working in the shops and manufactories of great cities does not serve the same end. The routine life of such places is not so healthful either morally, intellectually, or physically.

And this brings us to the matter of health. How to check the child-mortality of large cities has been one of the great problems of civilization. As President of the Board of Health of a great city, I am continually brought face to face with this. I cannot follow up this subject here, but the country child has exemption from a host of physical dangers which beset the city child, and the education in matters pertaining to health are correspondingly unlike. This is an old question, and goes along with that of morals and of patriotism. An eminent authority has said: "The strength of the great armies of the world has never been made up of the inhabitants of large cities; in fact, except in a few rare instances, city people will not even defend their own homes when besieged by hostile forces; with them selfishness becomes stronger than patriotism."

And this opens up a new line of country education. It is here that patriotism is strongest, because a country home is so much more than a city house, and there is more loving self-sacrifice in the family relations. When we hear of some wealthy man doing great deeds of charity and benevolence we may assume that he is country bred. When we hear of a Cornell funding an university, or a Sheffield endowing a great school, we almost know that their boyhood must have been spent in the country. City-bred men rarely do such things. The immense sums contributed to charity, to the forming and endowment of schools and colleges, to the cause of missions, and the spread of Christianity and civilization, has been because so large a proportion of our population has had some farm education, and because our farmers have not been peasants.

This last item is a most important one in this connection. We have no peasant class to till the land, at least in the northern States. What "might have been," had a peasant class been established in the colonies, we can imagine from the condition of Mexico, where the peasant system of the old world was introduced, and where, consequently, we find the middle ages still perpetuated on the farms, middle-age tools, and middle-age intelligence. Because of this, too, our republic is politically what it is. We were not the only people who established a republic in the last part of the last century. France started one about the same time that we got our new constitution in running order. We know that it was a miserable failure. This is usually attributed to being founded on an unsound religious basis; but it was, too, on an unsound land and agricultural basis. The people must be fed from the soil, and the tillers of the soil of France were peasants at the bottom of the social scale, and at the bottom of the intellectual life of the people. No wonder the republic failed there. I am discussing the educational influences of the American farm, under the American farmer, not that of other lands where the fields are tilled by a socially inferior class. The relation of this to the permanency of our institutions is too obvious to need expansion here.

Again, the infinite variety in the methods and details of farm work educates the individuality of the child, and calls out and trains a greater variety of talent than any other one vocation can. The methods of the farm may be so varied, and yet successful, that there is a constant training of the judgment. In manufactures and trade, the larger establishments have great advantages over the smaller, and eventually crush them out. Not so in farming. Here all the principles of production are very different, and in no other vocation is the large and small operator on so nearly the same level. In mixed farming, the small operator has certain advantages ; the large operator cannot crush him out. As a matter of fact, wherever the laws permit free and cheap transfers of land, the tendency is towards smaller and smaller farms. Not only is this true in this country, it is so everywhere. Where we see small farms diminishing in number and the ownership of agricultural land increasing in average amount, it is where laws interfere with the free and cheap sale and transfer of lands, or else, where land has a social or political value, in addition to its agricultural value.

So, in this country, it is the small or moderately-sized farm, where mixed farming is carried on, that has the highest educational value. Farming on this scale (and, indeed, on any other) does not hold out the highest inducement to those whose ambition is for great wealth. Men do not become millionaires by farming, or so rarely that you could count all such in this country on the fingers of your hand—and it might be a mutilated hand at that. But it is a good vocation, one of independence ; and if the farmer rarely gets very rich, on the other hand, he rarely becomes very poor ; he may not gain a million, but you never hear of his failing and not paying his hundred cents on the dollar, unless he goes into some other business than farming.

Now, a word more on the intellectual phases of farm education. As a teacher, I have long marked the differences between city and country boys in the higher studies. The conditions of city childhood are those of excitement and distraction. The city boy is often sharp, quick ; he has a social polish the country lad often lacks, but he is usually not so diligent nor persistent. Country boys are greater readers; they have formed reading habits in the quiet of country homes; they have more knowledge of that which relates to nature; are keener observers of nature, and take more kindly to the study of the sciences.

The boy of the country does not live in excitement, particularly the excitement of "*a crowd*." He learns to enjoy the quiet pleasures of home. He is more alone, and learns to find sources of entertainment in himself. He is not so dependent on others. With the city boy, without "the crowd" and noise, the world is tame. "The crowd," "we boys," the dependence on others for pleasure, is a most marked feature. In winter his sled and his skates are useless unless as an element in "the crowd" or with other boys. No torture like that of being quiet or alone.

Now, we know what must be the necessary and inevitable effect of all this. *Study* is an affair of the individual, not of the crowd. The very "crowd" stimulates to idleness, incites to acts of mischief, drives study from the head and love of home from the heart.

The country boy may sit down and read undisturbed for the evening with the other members of the family. The city boy, if he tries, has scarcely got his book in hand before he hears a well-known signal from the street, from "the other boys." It may not be noticed by the parents from the other noises of the street, but to him it is a loud call to "come out with us." Is it any wonder that the book loses much of its interest, and that the education of the street more than supplements that of home? Consequently, the country boy, as a student, is as a rule more diligent, more studious; has a certain kind of persistence often lacking in the city boy; is greener in his ways, but has more general knowledge, because he is a greater reader. I have known a boy old enough to think himself a young man and sufficiently schooled to be in college who confessed that never in his life had he read a book before he entered college.

Then, too, the sports of childhood in country and city are sufficiently unlike to be an important element in education. The boy of the city is earlier and ahead of him in the country. The country boy learns to fly kites after he has learned to make them. He of the city buys his kites when much younger, and gets through with that sport before he learns to make one; and so of a host of things; and he calls the country boy "green" who enjoys sports at an age when he has passed that sport by. The city boy is ever discounting the future, to his disadvantage. He is attempting things before he is capacitated for their best enjoyment, or fitted for their best influence.

Again, the ample space and room of the country for the sports of childhood, as contrasted with the city streets, affects the growing mind in a great variety of ways. There is one that has interested me much, which I have never seen alluded to, but which I have thought much of. I will merely hint it briefly.

The child is the undeveloped man, and there is an element of savagery in him, certain of the savage instincts of the race that come out strongly. The country boy has ways of gratifying these in a healthy way, and grows out of them intellectually and morally better. He traps and hunts the small game of the farm. With the dog he digs out the woodchucks, or hunts the squirrels, and traps the rabbits, etc., and in a thousand and one ways gratifies that instinct which is left as a legacy from our savage ancestry. The boy of the city has the same instinct, and it is more liable to lead him into the direction of rowdyism, drinking, and violence for its gratification. We all know that there is a period in the boy's life when there is a fascination about rowdyism, about acts of violence towards society, and in violent pleasures, which it is hard to be patient with in our riper years. In the city it more often results in deeds of violence, breaking windows, unhanging gates, night disturbances, etc., etc. With the country boy this instinct is worked off in a more harmless way, in ways that are less liable to be a blight and regret in his after life and which at the same time were as really the gratifying of the old savage instinct which gives such a pleasure to hunting, fishing, and roaming free over the fields and through the forests. Every successful system of education must take into account these savage instincts of childhood and youth, bear with them, have patience with them, and try to direct them into those channels where they do the least harm to the man.

Many good people think that the chief reason why the country is better, morally, to bring up children in (and particularly wayward children) than the city, is because that there are fewer temptations. This view has but a small basis of truth. It is true that many of the temptations of the city are absent from the country; but every place has its own temptations, and the country has many which the city has not. No; this theory is a relic of that old monkish idea that the way to make a saint of a sinner is to remove him from temptation and shut him up in a monastery, where the allurements and sins of the world cannot reach him.

Great men are not made in that way. The formation of character is a positive, not a negative process; it is what the country child does, the industry he learns and the strength he acquires and develops that makes him; it is not what he avoids and shuns, but what he meets and overcomes, that gives him his strength for the battle of life. He conquers in great things in later life, because he had the practice on lesser things in his childhood and youth.

But I must hasten on. I have said that a great change is going on, and that hereafter a relatively smaller and smaller proportion of our youth will have any experience on farms. All over christendom this is going on; the city and town populations are increasing, railroads, steam, modern methods of travel, trade and manufacture, and modern sanitary administration in cities, make possible what before was impossible. Here in Connecticut, at the last census, only 7.2 per cent. of the population belongs to the class of "persons engaged in agriculture," and in Massachusetts only 3.6 per cent. Within the memory of persons still alive agriculture was in both of these States the leading industry. But this same change is going on in other countries. Even in old England in 1851 the "agricultural class" constituted 11.2 per cent. of the total population; in 1861, 9.6 per cent.; in 1871, 6.9 per cent.; in 1881, but 4.9 per cent. Similar facts have been reported of France and Germany; and our recent census shows how rapidly the change is going on with us.

In New England a change of sentiment towards agriculture is going on along with this change in relative numbers engaged, and with a larger class agriculture is not held to be quite so respectable as some other vocations. Several causes have conduced to this. One is, that in a part of New England, notably in Massachusetts, many have always held this, as a part of the traditions of the old world. Travelers have noticed more than once the difference of sentiment in this matter in Massachusetts, and in the States west of the Hudson River.

Another reason is, that agriculture is not the leading business that it is farther west. Another, and perhaps more powerful than either, is the large recent foreign immigration of people who bring with them the Old World sentiments that the man who tills the soil is socially and intellectually below the man in trade. We have many foreigners in our newspaper offices, and we see more flings at the farmers here than we do in the western States. Of this very meeting I have seen notices of the "bucolic" gathering in one of our city papers, and the "bucolic mind" is a not infrequent subject of patronizing comment in papers whose editors and writers came from other lands. Even in the great New York dailies we see indications the same way, and within the last two years I have noticed in the paper "founded by Horace Greeley," editorials that would never have appeared in his life time. It is but fair to say, however, that they do not go into the weekly edition, which goes so widely among farmers. Even the New England *Journal of Education* has, within a few months, had its say about the "narrow country farmers" who are powerful in the Legislature, but who "represent the least progressive element in society."

All of this has an essential interest in this connection. With the increase of wealth in cities there is an increase of snobs, and a tendency to class the farmers of this country with the peasant class of the Old World. Each of these things has an influence in the problem of education, and makes it the more important that the old-time value of the farm as a place for the training of youths be maintained. The various forces at work, the effects of recent immigration, the snobbishness of the newly-made-rich, the relatively decreasing numbers of farmers, are all modifying those influences which heretofore have wrought such glorious results for our nation.

City populations are relatively increasing, but in the cities originate and flourish the more dangerous social theories which now begin to alarm so many people. Socialism in all its worst forms has its great development in cities, where great numbers of men work together for wages. It is curious to see how in all these so-called labor movements and labor theories by so-called "working men," the tiller of the soil is left out as a worker. In this matter the farmer is in a curious position. To the snob he is a plodding, narrow, ignorant drudge; to the socialist and city trades-union-men he is an aristocrat and land-holder, one of the oppressors of the race because he owns land, and land ought to be free, like air and water.

I know of no better cure for these wild views as to land than to set a man to work on it. Land is not like air and water, as some would have us believe; it has value only as man's labor gives it value. There is an abundance of cheap land yet on the earth. Land, of itself, is worth little or nothing; only as work is done on it has it any agricultural value, and only as it has work done on it, or near it, has it any value at all, other than as a free hunting ground for savages; and there is no better way for the people to learn this fact in political economy than for them to have some experience in working on the land.

Of late, the subject of city schools has attracted much attention. In the cities there have been great advances, and we see great buildings and graded schools, and the feelings of many are that for purposes of the education of youth, they are vastly superior to the smaller country schools. *I doubt this in toto.* There is a gain in some things, but there is an enormous loss in others. The teacher in the city school has vastly less personal influence; he or she is not Mr. A, or Miss B, it is the teacher in Number 6, or the teacher of Number 9; and the child loses its individuality even more than the teacher. Moreover, the parent is often shut out from any aid to his children; he can neither direct their studies nor aid them in them; he can merely have a sympathy with the methods.

I trudged a mile to a country school in my childhood. It lacked the appliances of the modern great city schools; we had a few maps and a small library, but I had the aid of my parents in my studies. My own children go to a great city school that boasts of several hundreds of pupils. (I speak feelingly on this matter.) I am allowed no voice in what they shall study, nor when they shall study it; I am not even allowed to aid them in their studies out of school hours. To me the doctrine seems monstrous, and as a teacher, as well as a parent, I deplore the results and effects every day. I went to a country school such as it is fashionable now to make fun of, but it is a subject of daily sorrow and regret, that my own children, in a great city school, have not the educational advantages that I had in that smaller country school. I am not overpainting this matter. I know what I am talking about, and weigh my words well in this special matter before speaking them. I have given this subject much thought for the past few years, as some of you personally know, but the great organization, which has more than ten thousand children under its rule, which supports between two hundred and fifty and three hundred employees, and expends a quarter of a million dollars annually, is too strong an interest to give up any power it has.

This new city education is becoming more imperious year by year, and tries more and more to rule the country schools, or at least to govern their methods. I have no sympathy with this.

Have you noticed the change wrought in the school books within the last thirty years ? Once the few books we had were saturated with country life and country ways. How many of us remember the stories and works of Peter Parley, who lived near this very spot ! Do you remember the pictures in the schoool books of those days? They were of country life. Now all is changed; even the pictures, if they are of the country at all, are of the visit of some city child in fine clothes to the ruder country.

This changed way of looking at life, from the country to the city standpoint, is affecting society in a multitude of ways. A popular writer has recently shown the relation between this and modern strikes in the trades, but time utterly forbids following up the many suggestions that come up. The subject has been so long in my mind, and there is so much that I want to say, that I have overrun my hour.

But I still feel that the hope of the country lies largely in its farm population, just as the ownership of real estate in the country is the most conservative material influence we have ; so I also feel that farm education will continue to be the great moral influence to keep the nation in sound ways, and "*level-headed*," as business men say.

The farmer's home is an influence too vast to be any more than alluded to in closing. We live in the favored zone, where we have true homes and firesides. This is the zone of highest civilization, because it is the zone of firesides. A high civilization has never developed in the tropics; it could not. It needs a home and a winter's fire for quiet and thought, and to cement the family. A half civilization grew in Egypt, and India, and Mexico, but it stopped short of a high level ; it needs a fireside and hearth to ripen civilization, and nowhere else do we find the typical home better exemplified than on an American farm.

So, in conclusion, I will say that, while I think that a relatively smaller and smaller portion of our population will have the advantages directly of an education on a farm, yet I believe that in the future, as in the past, this education of the farm will be the salt to preserve our national character and our national institutions.

Mr. GOLD.. I find a question in the Question Box which is very pertinent to the case in hand, and fortunately is not difficult to answer. "How can the farmers of Connecticut help to build up the Storrs Agricultural School?"

The CHAIRMAN. I would like to have Mr. Hubbard speak upon that for a few moments.

Mr. HUBBARD. I respond to the call of the Chairman, not because I think I have anything new or particularly valuable to present. Everyone must know, I think, how such an institution as that is to be helped. I wish that I could say something to impress the farmers of Connecticut, as they are present here before me, with something of my own feeling of the importance of that institution. I believe that it does afford an opportunity for the farmers to honor their own vocation, and one which they ought to improve. It gives them an opportunity to give to their sons whom they may select, and who may for themselves elect to follow their vocation, something equivalent to the opportunity that they give to their other sons who may choose to go into some other vocation. Suppose a farmer has three or four sons. One of them may choose to adopt a professional life. I desire to say for myself that I do not entirely agree with much that I hear in regard to the importance of interesting children in and keeping them upon the farm. All the children that grow up on a farm ought not to remain upon it. A family of half a dozen boys brought up on a farm must scatter. From the necessity of things, from the necessity of their own natures, each one of them must select the vocation which suits him best, in which he thinks he can do best, and it is rarely that all of a large family of boys are properly fitted for one vocation.

No farmer would want his boy to go into the legal profession or the ministerial profession without preparation for it. He would send him to school, to college, and after he had got through his studies at school and college, he would send him to some professional school, so that when he entered the profession which he had chosen, he would be prepared to take as good a position as any other young man in it. If he has another son who elects to remain upon the farm, he should stand on the same footing; he should be fitted for the vocation he has chosen, and he should have the advantages of a thorough practical education given to him. That is just the place which this Storrs Agricultural School is designed to fill, and it is just that place which it does fill. I only want to say a few words to the farmers here to arouse them, if I can, to a realization of that fact. If you have any doubt of it, go and investigate for yourselves; examine the school itself. You will be welcomed there, nothing will be hidden from you, and we shall be glad to show you the results that have been already attained. No one has visited that institution with the purpose of making an honest inquiry who has not come away impressed with its importance. What we want from the farms is the bright, active boys; boys of bright minds and rural tastes. In making the selection of the boys to remain on the farm, it should not be on the line of lack of intelligence, by any means, because the farmer should be as intelligent as any one, but the selection should run on the line of a taste for rural affairs, a taste for rural life, for the influences and interests and capabilities of rural life. You see the indications of that very early in life, and that boy should have, as I said before, all the advantages that would be given to one who should select a professional career.

I might go on and elaborate this thought considerably, but what the farmers can do, in very brief terms, is this: In the first place, inform themselves fully in regard to this institution; and, in the second place, use it to honor their own profession and to give the boys who are to succeed them on the farm an equal chance with those who go into any other vocation. (Applause.)

The Chairman. Mr. Terrell of Middlefield, visited the school last winter and can give us some of the impressions that he received from his visit.

Mr. Terrell. I do not feel competent to say very much upon this subject. It is true I visited the school last winter, and I will say I was greatly pleased with what it is doing, with the use made of its facilities, with the interest that the boys there manifested in the school; and I am glad to say that I am told that some of the boys who graduated at the end of the two years' term that is provided for them, express a desire to return and learn something more. Their enthusiasm, their interest in farming and in all rural occupations has been stimulated a good deal. This is encouraging. It ought to incite the farmers of this State, I think, to patronize that school. As Mr. Hubbard said, the first thing is for farmers to inform themselves of the objects of the school, what it is doing, what it can do, and is likely to do, and to become acquainted with the teachers and with the facilities of the school for imparting instruction, and for doing the work which it was etablished to do. That can best be done, I think, by men going there and examining for themselves.

It is an experiment station to instruct the young men, not only in the ordinary course of farm work, but to instruct them in the more intelligent use of the means of drawing wealth from the soil. We have come to that stage in agriculture in this State, and in this country, where we have got to use more fertilizers than we can manufacture on our farms. The experiments made there in the use of fertilizers make an impression upon them, and seed is planted in their minds that is destined to grow in the future. It must grow in the minds of the youth that are ambitious and enthusiastic, and many of the youth of our farmers have enthusiasm and ambition. This is, I believe, the place to stir up this enthusiasm, to impart information, to stimulate them to inquiry; and that is part of the work there—to stimulate their minds to investigation, to inform themselves early in their lives how to begin operations, how to study the best methods, and how to apply them, the study of books, and the study of sciences, is all used in connection with the efforts made to practically demonstrate the results. Now, while this is being done, the farm is being improved. Experiments are made on lands that are run out; methods are adopted, work is done, results accomplished, and these boys see them. And while they are doing it, the scientific side of agriculture is shown them. Now, if we farmers will investigate that more, and learn more what the object of it is, I think it will be a benefit to us, to our children, and to the State.

I merely wish to urge upon the farmers of this State to investigate this school and see if it is not a place where they can put such of their sons who have selected, or who feel as if they would select farming as their occupation in life. I believe the more you examine into this matter the more you will feel that this is an institution that is to be a credit to the State and a benefit to your children, and the more you will feel disposed to patronize it.

Prof. Brewer. I will only say a word. I want to endorse what the preceding speakers have said, and just add a word to emphasize it. As our population grows denser, as railroads throw New England in sharper and sharper competition with the West, the farmer here must bring to his aid all the knowledge he can get, from whatever source. Now, it has been pretty well proved, I think, that a college is not the best place for the education of farmers, although some farmers are educated there. The young men drift away, or are apt to, from rural tastes. That has been the experience. There is a place for an agricultural school. It is the place for the large number of men and boys who wish to learn something of the principles which are to be used in their future vocation of agriculture. But there is something a little more than that. I do not know but there are some city men here whose boys would not be harmed by going there. I do not know that it is by any means certain that you are going to keep all the boys on the farm after they have been there. When some agricultural schools were started in the West, the boys that had worked on the farms went to the new schools; they learned what they did not know before, and when they went out, they did not all go upon farms.

People said, "Well, it is a failure." Not a bit of it! If a bright man sees a boy who has been to an agricultural school and says, "I want to get a boy that knows something," it is nothing against the school, I assure you. If he has been there and learned something, and got habits that he did not have before that make him a desirable man in any vocation, it is nothing against the school. I should like to see that school well patronized, well supported. I am interested in its welfare. I have no doubt that it will be of very great benefit to this State in promoting its intellectual and material prosperity.

The CHAIRMAN. I will say that our Secretary, Mr. Gold, has two young men at work for him who graduated from this school, last fall. I would like to hear from him whether they are any better for having been there two years.

Mr. GOLD. I can say that they are very satisfactory helpers upon the farm. How much better they are in comparison with other young men that I have who have been more continuously upon the farm, I am not prepared to say. But one point I wish to enlarge upon a little, which Prof. Brewer just touched, and that is, that the education of this so-called agricultural school is not wasted by the State of Connecticut, or any other State that furnishes such facilities, because all the boys who may be educated there do not remain upon the farm. This practical knowledge of the principles of agriculture is as much needed by our professional men, by our lawyers, our clergymen, and our doctors, and our manufacturers, also—I was going to say as much needed by them as by the farmers themselves, and, really, it does amount very much to that, in all the business relations of life. These simple principles and the practice of agriculture, which Prof. Brewer has shown us comes so naturally to the boy through his training on the farm, are exemplified, enlarged, and built up as best it can be done during the two years of semi-professional study which we give the boys there on the farm of the institution; and if it is good for them to be brought up for the business of life on a farm, it is good for them, also, in many cases, to fit themselves for the business of a professional life, to spend two years in the discipline and drill, in learning how to learn things from nature, in the Storrs Agricultural School. [Applause.]

Mr. HUBBARD. I want to say one word more in regard to this matter. I want farmers to remember that this school was established for their benefit. They have boys enough to fill it, and they are not to be crowded out by anybody.

Mr. AUGUR Our friend, Mr. Hubbard, has suggested the idea that farmers' boys probably will not all remain on the farm, and that those who have rural tastes should be selected and sent to the agricultural school. Well, I have sometimes noticed, and I suppose you all have who have visited the seashore, a wave sometimes coming away up on the shore, and then there is a revulsion back again. The thought occurred to me that there are city boys, and probably there is a difference in tastes among city boys as well as country boys, and while some country boys will necessarily drift into the city, the question is whether some city boys may not very naturally revert back to the country. "It is a poor rule that will not work both ways," and I think there will be no possible objection to a good, smart city boy going to the Mansfield school.

Mr. HINMAN. It is very rarely that I have occasion to differ from my friend Hubbard, but I want to enter my protest against the idea that the Storrs School is a school for farmers' boys alone. It is for the State of Connecticut. I should be sorry to have it understood that that school was only for the benefit of farmers; that it is something established for their particular gratification and benefit, as a sop given to them to make them satisfied that everything is going on well in this State. I do not think the General Assembly had any such idea in providing it. I think that certainly no such idea should go abroad. I am confident that Mr. Hubbard, on second thought, will agree with me in that matter.

The CHAIRMAN. It has been said that the tendency of agricultural schools has been to lead the boys away from the farm. We have one young man who is attending our school for the second year, who says that he disliked the farm very much, but his father was anxious for him to go there and get an education, and now he says that what he has learned there has made him well satisfied with the farm, and he wishes to make farming his life work.

Mr. JOHNSON. If I understand the question which the Secretary read, it is about this—"How can the farmers of Connecticut best encourage the Storrs Agricultural School?" It seems to me that there are two ways in which it can be done. One way has been spoken of by our friend Mr. Hubbard and others. That is, for the farmers, the mechanics, and the merchants, if they will, to send their boys to the school. That is one very important thing. Another way is for the people in the State to take what pains they can to inform themselves in regard to the practical working of the school by visiting it at their convenience. We represent a good many different towns here to-night. Let each one, if he happens to hear the person who represents his town in our next Legislature ask any question about the Storrs School, suggest to that member, that if the subject of an appropriation for the Storrs School should come up in the Legislature, to by all means encourage every reasonable appropriation that is asked for. I do not understand that the school is self-supporting. There is a farm there, a farm superintendent, a corps of teachers, and a good board of managers; but they need fuel for the engine in the way of proper appropriations from our State, and I hope that our State Legislature will be liberal and ready to make all necessary appropriations which the board of managers of the institution may ask for. It certainly will be a safe investment. The argument, that all the graduates of that institution will not go back to the farm, is just as unsound as it would be in regard to our State Normal School. We do not think that, because there is a possibility that some of the teachers who graduate from that school will not continue to teach all their lives, it is not worth while to encourage the School. We know that many who graduate from there will soon leave the profession of teaching, but it is a good institution nevertheless, and all who graduate from that school will make better business men, or better wives and mothers, than if they had not had the advantages of the State Normal School. So the boys who attend the Storrs School, if they should, after graduating there, for any reason, choose not to continue in the business of farming, they will make better men in whatever occupation they may choose for themselves by reason of the education that they have received there. By all means let us encourage the Storrs Agricultural School.

Adjourned to Friday, at 10.30.

THIRD DAY.

The meeting was called to order at 10.30, His Excellency Governor Waller, President of the Board, *ex-officio*, in the chair.

ADDRESS OF GOVERNOR WALLER.

Gentlemen of the Convention :

As *ex-officio* President of this Convention, it is my duty, I am told, to preside at this meeting, and I shall undertake to perform that duty to the best of my agricultural ability. It is certainly a very great pleasure to have the opportunity to introduce, as the first lecturer on this occasion, Mr. Cheever, the editor of the *New England Farmer*, of Boston ; a gentleman who, I am sure, is known by reputation to all the agriculturists of New England.

Before doing that, I take the opportunity of expressing my respects for the Convention and for the element which composes it. I know, of course, but very little about agricultural subjects. I suppose if I were to make frank confession it would astonish you to see how very little I do know ; but I am satisfied, from the education I have received during the year by pleasant association with the men connected with the different agricultural departments of the State, that all the aid the Commonwealth has given to your enterprises has been given with judiciousness and given with a fair prospect and promise of profit in the future.

There can be no question to the thoughtful mind that the competition with the cheap lands in the west, now confronting the agriculturists of New England, compels the farmers in the eastern sections to devote their time and intelligence to a line of occupation that requires peculiar knowledge and skill to successfully follow; and with this view, and to maintain this policy, Connecticut has wisely given bounties to agricultural societies, established an experiment station, I think the first in the country, and supported by annual appropriations a school for the education of farmers. All of these things, it is pleasant to contemplate, work together for the same end—to cultivate the intellect as well as the land of Connecticut. I am sure it must be as pleasant an occupation to obtain a subsistence and a comfortable living out of intelligent, skillful labor, as it is to take it from the fields in larger States where there is nothing required but to sow the seed with carelessness, and in the fall to reap the crop simply with labor. And besides that, all this culture and education that are given to the agricultural element of Connecticut and New England show themselves not only in the farm labor, but in the farmhouse; in the faces of the women, in the intelligence and culture of the young ladies; of every pleasant way that goes to make New England farm life comfortable and charming.

I will not delay you another moment from the pleasure which you are to receive from the lecture of the gentleman whose name I have had the honor to mention. (Applause.)

VARIOUS VIEWS OF FARMING.

BY A. W. CHEEVER.

Every successful business man does, and every farmer should, as often at least as once a year, look over his books, take an account of stock, and make out some sort of a balance sheet, in order that he may, as far as possible, be able to know the exact condition of his financial affairs; for a man who is struggling as men must struggle who succeed in this world, ought to know which way he is moving, or if he indeed is moving at all.

A State board of agriculture is but an organization of men associated together for the purpose of doing certain kinds of work, and such organizations, as well as individuals, may very properly take a little time as often as once a year to look over the records, and so far as may be, learn the general condition of the affairs over which they are supposed to have an interest or control.

The topic assigned by your secretary for this hour, it has seemed to me, suggests the taking of a general view of the present condition and future prospects of the New England farmer. But as the best part of these winter meetings sometimes is the discussions which follow the reading of papers, it will not be my aim to exhaust the subject, but to suggest thought, to encourage investigation, and to present my view of the situation, with its balance sheet, subject, however, to personal revision by each and all.

It is sometimes claimed that what farmers most stand in need of is not opinions but facts. but I fear that a sufficient number of facts, classified and arranged, are yet wanting in many departments of agriculture, to raise us to that high level where opinions will become wholly worthless.

So the first opinion I shall give you is, that farming in New England to-day is a much better business than many of us have come to believe.

Riding recently in the cars with a gentleman whose business has brought him more or less into acquaintanceship with nearly every State and Territory in the Union, he expressed it as his belief that New England is, and always must be, the poorest section of the whole country for carrying on agricultural operations. He would like a farm if he could afford to own one, but if he were going to purchase he would surely make his selection at the West or South, where the land will produce crops simply by putting the seed in the ground.

Now, if the mere sowing of seed upon virgin soil and gathering and selling the harvest without making the first effort towards leaving that soil as fertile as we found it is agriculture, then I admit that New England is no place for farming, nor for farmers, and the sooner we go West or South, or take up some other form of industry, the better it will be for us.

Many, far too many, if judged by their works, have no higher ideas concerning the occupation of the farmer than this, and it is from taking such a view that so large a portion of this country has been overrun and despoiled of its fertility, as a drove of village children often overrun and strip a huckleberry pasture of its fruit, running and racing hither and thither to find the thickest spots and the largest berries, and not even having a thought to preserve the bushes, which, if broken down to be stripped in the shade, must most effectually prevent the growth of another crop the following year.

When I look through the back country towns of New England and see the land formerly cultivated, and laboriously fenced with its heavy stone walls, but now growing up to birches and white pines; when I see vacant farm buildings put into the hands of real estate brokers for sale; when I see the young men and young women who were born and reared on these deserted farms wearily wending their way westward, first to New York, then to Ohio, next to the prairies of Indiana and Illinois, then further on across the Mississippi to the rich plains and valleys of the more distant states and territories, at each halt tarrying only to sow, reap, and skin the soil till it will pay for sowing and skinning no longer, I am not surprised that visitors from older countries ask: "Where are your good farms, and where your good farming?"

As I understand the meaning of the term Agriculture, it is something more than the mere scattering of seeds and the harvesting of crops. A good farmer will no more think of letting his land become exhausted of its fertility than would a good engineer think of using up all his steam and then letting his fire go out because it requires an effort and an expense to keep fuel on his grate; no more than would a good manufacturer think of using up all his stock of raw material and then closing his factory. Good farming everywhere means good husbandry, and good husbandry means thrift and economy in the use of raw material, but here in the United States we have been using up our raw material in the shape of the natural fertility of the soil.

Robbery is an unpleasant term to apply to our American agriculture, but it is a term that is far from inappropriate, as the history of our tobacco fields, cotton plantations, wheat farms, and even our forests, but too plainly attests. Like the youthful pickers of huckleberries, we have been scampering and scrambling over this great country in search of the best picking, and while stripping the earth of its spontaneous products, and enjoying its fruits in the cool shade, have been almost criminally negligent of the duties we owe to posterity.

And yet I would not look wholly upon the dark side of the picture. Nature erects no fences for the purpose of keeping men forever on the same spot where they were born. On the contrary, Nature's methods rather invite exploration and the occupation by her children of new territory, whether these children be weeds, fruits, animals, or man; and it is in violation of no natural law that each seeks for the most desirable location within his knowledge or power of attainment.

It is true, I was once inclined to criticise the method by which this country has been peopled and its resources developed. I thought I would have had the land along the Atlantic coast, which was first settled by our forefathers, all made perfect in its way, like the new town of Pullman—the swamps all drained, the rocks all crushed, or buried, or put where they would have been of the most use, and every acre and every rod run by a "garden of Eden" model—every acre being as good as the best, clear to the border-line of civilization; which line should have been pushed back only so fast and so far as an increasing population of good citizens might require.

You must see that this would have been very nice, to have had every acre of land, every rod of public road, and every grove of trees, between the coast line and the most distant back lot, as perfect in its way as are the public grounds and streets around your State capitol at Hartford. I would have had, too, every man temperate, healthy, industrious, and self-supporting. I would have had no fences bordering the highway, maintained at public expense for the convenience of the few; for I would have had every animal-owner take care of his own, and I would have provided for no army of soldiers, nor any policemen, except a few to guard the line along the frontier to keep Indians and woodchucks from our homes and gardens.

But I have come to suspect later that the power which brought this world and all the beings upon it into existence can be trusted to manage its development after nature's own methods, and taking this view I am forced to admit that every step in the world's progress has been taken in conformity to law, and that every apparent obstacle or loss has its use, and that every influence has been in the line of public good.

I think you will agree with me that it is usually the young teachers, the young ministers, and perhaps the young newspaper-men who are the most enthusiastic and the most hopeful regarding their ability to quickly educate and reform the world. Older men have learned that great results are only attained after great and long-continued effort.

So, on coming together at these winter meetings, if we sometimes discover a great diversity of opinion concerning the best farm methods, and find it not always easy to convince our associates that they are wrong and we right, or if, after the week's discussion, we are each able to carry away but a single new idea of value, we should not be discouraged.

COMPULSORY FARMING.

A very large proportion of the men who are now at the head of our New England farms have become farmers by a sort of fate or chance, rather than from personal choice. Circumstances over which they have apparently had but little control have influenced them. In many cases, the strong desires of the old father or mother to have the homestead continue in the family name has exerted a controlling influence over the action of the son; for the old-world love of paternal acres has not all been exterminated from the blood of the new world's people. A part ownership in an inherited farm has tempted many to try their hand at the business who have little real love for it and less of that training necessary to the highest success in any business. Some of the least enterprising farmers in the country are found among this class. They are generally kind-hearted, accommodating neighbors, and useful citizens. They have been kind to their parents in their old age, and are working as well as they know how for the comfort and benefit of their wives and children; but, having neither love for nor much skill in their business, the comforts are not always as abundant as might be desired. Many among this class would have made excellent mechanics had they been early encouraged and trained in that direction, and it seems a pity that good mechanics should have been thus spoiled to make such indifferent farmers. I suspect that a very large proportion of the grumbling and depreciatory expressions concerning farming in general, and New England farming in particular, have emanated from this class of farmers who were made farmers against their will or against their choice; for a man engaged in a business for which he has no love, whatever that business may be, will rarely speak well of it when discussing its pros and its cons.

But the farmer who occupies the lowest position among the several classes of earth-tillers is the really

SHIFTLESS FARMER,

he who would be too lazy to earn his own living in any business so long as wife, or children, or creditors can be induced to support him. The shiftless farmer takes no pride in his farm, and very little interest in its management. He plants little, because he wants little to take care of. He makes little effort at killing weeds, because he has found out that his land is "natural" to weeds, and if he kills all there are to-day another crop will come right up in their places. He keeps but a small dairy, because he has no good accommodations for taking care of the milk; and besides, he knows that dairy farming doesn't pay. He wouldn't keep hens, only those he has kept have stolen their nests, and being too lazy to hunt for the eggs, the old hens sit, and so the stock is annually kept from running out. He never plants trees, because he knows he will never live to see them bear fruit; it takes so long for a tree to grow. He does not put out the small fruits because he prefers more hearty food, and if his wife or children want berries they can pick them in the pasture or woods. He doesn't keep a good carriage, because he doesn't care to ride much, and besides, he has no time. His best company is some neighbor of congenial tastes and aspirations who, in hoeing or haying time, comes and sits on the fence with him and discusses bad weather and worse politics, and when, after an hour or two, the neighbor shows signs of departing, he is asked "What's your hurry?"

The shiftless farmer never has money to lend, nor much to spend, but he contrives to live, often to an advanced age; and although he may have little to show of the luxuries of life outside of a period of prolonged leisure, he gets, I really believe, more of the ordinary comforts than the same amount of labor and energy would bring him in any other business; for his crops, though not large, are growing while he is eating and sleeping; but if the mechanic stops work his pay stops too.

THE INTEMPERATE FARMER,

he who spends his substance for intoxicating drinks need not be more than mentioned in this connection, for he can never succeed, whatever vocation he may choose.

BOOK-FARMERS.

Some years ago much was said and written about a class of soil-tillers styled "book-farmers," the term being frequently used in a spirit of derision. The book-farmer came into existence at that period in New England's history, when the natural fertility of the soil began to show indications of exhaustion. Previous to that time the art of farming had consisted in scratching the surface just enough to enable the seed to germinate and to keep weeds from smothering the crop. The demand for agricultural products was confined chiefly to the farmer's own wants, and there was little inducement on the part of the farmers to raise agriculture to a very high level as a business. But when the soil began to show signs of failure, a few of the better educated men of the country, particularly those whose business or reading had given them some knowledge of what was being done in other parts of the world, began to look into agriculture from the stand-point of the educated men who had lived before them. So books treating upon farm matters were purchased and read, and some of the readers, though without much practical experience in the routine of farm tillage, attempted either by speech or example to teach a better way of conducting farm operations. At that time books treating upon agriculture were chiefly written in the old country, and some of the rules laid down as guides to the farmer were but poorly adapted to our soil and climate, and so reading men without any practical farm experience to fall back upon in forming judgment were not unlikely to be led astray, and also to mislead those who might be induced to follow their advice. So "book-farming" came into disgrace for a time, but only for a very limited time. The constantly diminishing fertility of the soil made a most imperative demand for a better knowledge of the laws of plant and animal growth than the routine farmer of those days was able to command.

"Book-farming," as the term was formerly used, is one that the present generation of farm boys rarely hear. And there was another cause for the too general antipathy against book-learning. By not a small class in those severely Puritanic days, all learning was held to be unfavorable to personal piety. Persons are now living whose parents argued against bringing books into the house because as they said they had observed that much reading had a tendency to prevent young persons from "experiencing religion," something in their minds far more to be deplored than the profoundest ignorance. The book-farmer has been succeeded by the

FANCY FARMER,

usually a man who has acquired a competence in trade or manufactures, but retaining a degree of love for the art that feeds all, either retires from business or settles down on a farm for the amusement he may be able to get out of it, or else he divides his time between business and farming, making the latter a study from a business man's stand-point. With plenty of money to invest he aims to jump at one bound from the low level of the ordinary farmer to that of the model farmer. He purchases the best stock from foreign lands, and experiments with the most approved implements; he introduces new varieties of grains, vegetables, fruits, and even flowers; his business calling him abroad he studies the improved methods of other nations, and takes note of the weak points in our domestic systems, and, possessing true patriotism as well as business ability, he naturally strives to inculcate his new ideas into the minds of friends and associates.

To the so-called fancy farmer, we are indebted in large degree for the farmers' club, the agricultural society and the cattle show, the agricultural college, the experiment station, and, indirectly, for the dissemination of all our new breeds of domestic animals, and the endless variety of valuable labor saving implements of tillage now deemed so indispensable in all the more advanced systems of modern agriculture.

The fancy farmer has made many mistakes but they have been made chiefly at his own expense. Those who claim to be practical farmers have much to thank the fancy farmer for and very little to charge against him.

SCIENTIFIC FARMING

is comparatively a modern term variously applied by different persons to styles of farming supposed to be a little better than their own, but often deemed unattainable except by those who can combine learning with wealth. The term "scientific" rather scares common farmers as though there were some deep mystery involved in it, but if we would remember that the sole office of science is to unfold and explain things, to deal with causes and effects, and that science is only "classified knowledge," or as some one has expressed it, "the sum of known truths pertaining to different subjects," we need to have no hesitation about grasping all the agricultural science possible. That farmer who has learned enough about the habits of the insects which attack his grains and his fruits so that he can forestall them in their mischief, is to that extent a scientific farmer. If he understands enough about the laws of health to be able to keep his animals thrifty, or to treat them properly in sickness, he is still more a scientific farmer. If he understands the theory of plant growth, how the roots get their food from the soil, and knows how to economically enrich that soil so that it shall continue productive, that knowledge is scientific knowledge.

If too, he can clearly explain the exact connection between the "signs" in the almanac, and the weaning of pigs, or the precise relation the position of the moon has to the planting of beans on the earth, I think no one will dispute his claim to be classed among the scientific.

Scientific farming is only another name for intelligent farming, and no one at this late day will have a single word to utter against intelligence as a necessity in profitable farming. We have heard much said of late about

SPECIAL FARMING,

as opposed to general or mixed farming. Special farming accepts the modern ideas concerning the division of labor. He who does one kind of work only all his life may be expected to acquire a degree of skill in that one direction that would be unattainable in one who attempts to do a dozen or fifty kinds. Special farming has its advantages. Our best stock-breeders, butter-makers, fruit-growers, vegetable-gardeners, poultry and bee-keepers, are men who each give their best thoughts and efforts to some one of these branches, all of which are but divisions of agriculture, and may be carried on by the same person, but to just that extent, which one becomes thoroughly master of either branch may he expect superior results, and as it would be next to impossible for any one man to know as much about ten different trades as each of ten might know about some one, it is doubtless the part of wisdom to lean towards some specialty or a division of labor in agriculture as well as in manufactures and trade. It will not, however, be advisable to confine one's self exclusively to a single crop, for a style of farming that is somewhat diversified, is far more secure against loss from unfavorable seasons and variable markets.

I know a specialist who gives his attention to three crops—pears, grapes, and cucumbers, the latter being grown under glass in winter, giving employment at a time when his trees and vines need little or no attention.

A too common mistake of farmers is to start out in some branch of agriculture without sufficiently preparing for the end. A grass farmer sets out a large field of strawberries or plants, a wide area of early peas for market, without making a proper effort to secure pickers, and when harvest-time arrives he finds that either berries, peas, or hay must bring him a loss for want of more hands than he can command. Such men are continually changing from one thing to another, and rarely stick long enough to any one kind of business to half learn it, or to acquire even a fair degree of success. There is one kind of

MIXED FARMING

which I am in favor of always. I refer to that carried on by mechanics and mill-operatives during the morning and evening before and after mill hours, and also during any forced vacations on account of dull times, or other causes.

I would like, too, to see a good many who are classed as farmers, but who can find little to do in winter but to sit by the chimney-corner consuming in idleness all the increase from their summer's work, find some sort of mechanical work to do in winter, by which they could at least earn their daily bread. A good many farmers do find winter work to do in boot-shops, bonnet-shops, furniture-shops, jewelry factories, lumber-mills, and in cutting and hauling wood and lumber and storing ice. Dairy farmers, too, find plenty of work without leaving the farm, if they keep a winter dairy; but idleness in winter is the cause of big leaks on a great many New England farms.

The question, however, of special or mixed farming is one that will be decided by each, somewhat according to his own ambition for accumulation. A specialist in the extreme may sacrifice the best part of a generous farm life in the pursuit of his specialty, be it hens, hogs, hops, or tobacco, and may hardly be able to talk or think of anything outside of the specialty he is pursuing. However much wealth may contribute towards one's success, the highest success is not to be measured by money alone.

The farmer who lives for his farm is in danger of living an unprofitable life. He is in danger of becoming one of those whom Thoreau alluded to when he said: "I am wont to think that men are not so much the keepers of herds as herds are the keepers of men, the former are so much the freer. I see young men, my townsmen, whose misfortune it is to have inherited farms, houses, barns, cattle, and farming tools; for these are more easily acquired than got rid of. They have got to live a man's life pushing all these things before them, and get on as well as they can. How many a poor immortal soul I have met well-nigh crushed and smothered under its load, creeping down the road of life, pushing before it a barn seventy-five feet by forty, its Augean stables never cleansed, and one hundred acres of land, tillage, mowing, pasture, and wood-lot."

If that is the condition of a man who lives for his farm, what must be the condition of the wives and children of such farmers?

It is from such homes that the largest draft is being continually made for keeping up the supply of young men and young women in our villages and cities.

Now, if carrying on a farm means carrying it as a burden upon one's shoulders, then the sooner we all quit and move to the city the better it may be for us. But I am not yet quite ready to believe it a part of the plan of creation to make man secondary to the land he tills. And so, while I am in favor of giving special attention to one or more branches as leading industries on the farm, and to pushing them to a profitable degree, I am also in favor of making the farm, which usually must be the farmer's home, just as good and just as pleasant a home as it is possible to make it. We should endeavor to make our homes such homes as thousands of mechanics and business men are daily dreaming about and hoping for, and such a home calls for a good deal of mixed farming. It can not be asking too much of a farmer to ask him to have a good garden, filled with a generous assortment of such fruits and vegetables as the several members of his family are fond of. It will require less skill and business ability to grow early peas, early lettuce, strawberries, raspberries, blackberries, asparagus, grapes, apples, pears, plums, and the other fruits and vegetables found in a good garden, in sufficient quantity for family use, than to grow a single one of these good things in such perfection as to be able to excel everybody else, and so make one's own price in the market, as a specialist must do if he makes his specialty a great success. Every farmer should have a good garden, whatever his principal crops may be.

My criticism on that class of farmers often styled

WELL-TO-DO FARMERS,

is, that in their eagerness to increase the sum of their possessions they too often overlook some of the prime objects in living. They "plant more corn that they may sell more hogs, to get more money, to buy more land, to raise more corn, to keep more hogs, to buy more land," and so on. A great many, too, have put their surplus gains into the village savings banks, when they should have been expended for home comforts, fruit trees and shrubs, better carriages, better furniture, greater conveniences for the kitchen, running water at the sink and at the stables, ice in an ice-house, stoves in the chambers for the comfort of children, guests, and hired help, more books and magazines of a refining and elevating tendency, and a hundred other things that wives and children have asked for, but without getting.

New England farmers who hurry off to the savings bank with every spare dollar should remember that their dollars are largely loaned to parties who use them for building up the cities and large towns; thus giving these increased power over the country from which those dollars have been drawn; or it is sent directly West, to aid the pioneer farmers and railroad stockholders in increasing that competition of which many of us here so bitterly complain. Let the well-to-do farmer, then, who has a little surplus to invest from his annual savings, consider well whether he had better entrust it to strangers to be used in building up cities and improving distant lands, or whether he shall invest it in his own farm, and in his own neighborhood for making better roads, building more comfortable dwellings, school-houses, lyceum halls, and for public libraries, and thus making the difference between city and country life less unfavorable to the latter.

Had a reasonable proportion of the wealth that has been accumulated from the cultivation of New England soils, during the past two hundred years, been re-invested in New England soils and New England homes, instead of being sent away, New England might to day have been a garden, from Long Island Sound to the Canada line.

Had New England farmers expended their surplus upon their own land, I should have had no occasion now to allude to that large and most pitiable of all the agricultural classes—the heavily

MORTGAGED FARMER.

For, a man who is struggling at fearful odds in the vain attempt to make farming pleasant and profitable without maintaining a due proportion between land and working capital is indeed himself mortgaged. He is like the wild animal of the woods that has allowed himself to be drawn into the hunter's snare. He is a slave and a prisoner while bearing the name of freeman.

Mr. Russell, secretary of our Massachusetts Board of Agriculture, when I asked him the other day what I should say to the Connecticut farmers, said: "Tell them that the greatest fallacy of the age is the belief, entertained by so many people everywhere in America, that farming is a business which can be successfully carried on without capital."

If it is a mistake that well-to-do farmers make in not investing more of their surplus savings in their own farms and homes for the purpose of making their farms more profitable and their homes more homelike, it is a still greater mistake for one with limited means to invest it all in land and have nothing left with which to stock it and work it.

On one of the days I had set apart for writing this paper my eyes fell upon a letter from the wife of a large farmer in one of our best New England States. She has been married ten years,—was formerly a teacher. The farm is her husband's old home, his birth-place; but it is heavily mortgaged. It is so large that a half dozen men are required for doing the work, and more in the busiest seasons. The cultivated fields are some of them so far from the buildings that to haul four loads of manure from the stable and spread it requires nearly a whole day for man and team. The help are all boarded in the house. Two barrels of flour are kneaded into bread dough every four weeks; a peck of beans, all carefully picked over by hand, is just enough for a baking. The barns are large, and are annually crowded with hay, and the grain bins are equally full. There is a dairy, and there are little children growing up to be loved and educated, and the strength of this mother's hands has been divided between the duties of the nursery, the kitchen, the dairy, and the parlor, sometimes with assistance, often without. Butter and cheese have been made by the ton, but thus far nearly every dollar gathered from the annual sales from the farm, above what has been required for paying help and clothing the family, has gone, not to diminish the debt, but to pay the interest on the mortgage which covers it. That discouraged wife and mother believes that all this trouble comes to them from having too large a farm. I believe the difficulty is largely due to paying high rates of interest on land that is not worked up to its highest capacity. It is possible that the farm is too large for the man. It is surely too large for the manure. for I never knew manure to be spread very bountifully where the stable and field were a mile apart. There are too many acres plowed, planted, and mowed over for filling those hay-mows and grain bins, and too much time is spent in traveling, at from one dollar to two dollars per day. The men are too far apart to be kept sufficiently under the eye of the master. But this woman writes me, "My husband and his old father love every inch of this old homestead farm, and it would be a hard wrench to let a single rod of it pass into other hands."

Was Thoreau very far wrong when he said, "I am wont to think that men are not so much the keeper of herds as herds are the keepers of men, the former are so much the freer"? And was Mr. Russell wrong when he said that the greatest fallacy about New England farming is the idea that it can be profitably carried on without capital?

I recently visited a farmer in my own county, who owns two large farms, but who gets nearly all his profit from four acres set to cranberry vines, and which cost him at least $500 per acre for preparation before picking a single berry. The original value of the land was not over $10 per acre.

I visited another, who, a year ago, applied fertilizer for potatoes at the rate of a ton and a half per acre, and by comparing the yield with that of other fields manured a little more sparingly, he found that all the profit of the crop came from the last half ton applied. This year he put on two tons per acre.

Another farmer in my State has the past summer expended some two thousand dollars in wells, pumps, wind-mills, and steam-engines for watering his cultivated fields, and has made money by it. Now, do not understand me as advocating the indiscriminate use of large quantities of dearly purchased fertilizer, nor the erection of steam pumps upon all our farms for guarding against drought; but you may understand that I am utterly opposed to paying interest and taxes on idle and unproductive lands. But it seems to me that this is what three-quarters of our farmers are doing on three-quarters of their land.

A man wanting to borrow a hundred dollars, and who could use only that amount profitably in his business, would never be so foolish as to borrow a thousand dollars and give his note for it, letting the nine hundred lie idle in his pocket; and yet that is about what many farmers are doing who run in debt for large farms, of which not more than one acre in ten is made full use of.

My own farm, some years ago, contained fifty acres of tillage and pasture land, and kept about seven animals, including a horse and a pair of steers. It required two men and a boy to do the work among the rocks and stumps, and the profits were exceedingly small.

After a while one-half the area was given over to forest growth, the only crop that such land can profitably be devoted to with present values. The remaining twenty-five acres was so improved by clearing and draining, that it soon carried double the stock the fifty acres had previously supported. Still later greater improvements were made, particularly by heavier manuring and double cropping, and the stock was again doubled, the twenty-five acres supporting four times the number that could be kept on the fifty acres by the old system, while the net profits were many times doubled, and by the introduction of labor-saving implements and horse power in place of hand labor, the number of hands employed remained about the same as when the fifty acres were cultivated. By the early management, the hired man, who received ten dollars a month and his board, was enabled to lay up more from his wages at the end of the season than could his employer from the profits on the labor of both and the income on the capital all put together. By the later methods, the working capital employed amounted to three-fourths the entire value of the real estate, including farm buildings. The gross income from each acre annually exceeded the market value of the land itself, and the net income, after paying all expenses, left a liberal salary to the owners, and twice the rate of interest, in addition, that the best savings banks pay. These statements are based on farm accounts that have been carefully kept and balanced annually for nearly fifty years.

I could point you to other farms where equal or even better profits have been realized. I could name a small farm, managed chiefly by members of a small family, from which more value has been sold within the past three years, above the cost of hired labor, than the amount it would take to buy the farm, were it in market, with all its buildings, including the owner's residence, which is really no part of a farm, and should never be carried in a farm account, more than should the private residences of stockholders in banking corporations be carried in the banking account.

One reason why farming everywhere is credited with such small rates of profit is because farmers fail to keep correct accounts, and oftener to keep any at all. They spend all they make, and then because there is nothing left, claim they have made nothing.

New England has thousands of farms stocked with animals and farm implements, which would not bring, in market, exclusive of the dwelling-house, over two thousand dollars, for land, stock, and tools, the interest on which, at present ruling rates for property well secured, would not exceed one hundred dollars. Now what kind of a living would an annuity of one hundred dollars afford a man? It costs more than that to support the poor in our almshouses; and yet, on a capital of two thousand dollars or less, in a New England farm, whole families obtain good livings, keep the principal secure, educate the children, ride to church, and have their own way about things generally, more than is possible among any other classes using the same amount of capital in their business. And yet the majority of these small farms,—or rather low-priced farms, for many of them contain from fifty to one hundred acres each,—are not half worked; no, not a quarter. And here we would ask, Does any one know of a farm anywhere, that is worked up to its full capacity? Has any one yet found the limit to the profitable working of a single farm acre? I once began such an experiment, but failed to complete it. I sowed an orchard to winter rye in autumn. Early in May of the following year a heavy crop of fodder was cut and fed green. Then the land was plowed and manured, and sowed to oats. These were as heavy as could stand; and the crop was in bloom and fit to cut early in July. Again the ground was turned over, again manured, and sown with barley. The barley also made a full crop, and was cut about the middle of September, and in season to be out of the way of picking a fine yield of winter apples. I had then the whole of October and November in which to start the round again by sowing rye, but as I failed to do so I suppose I must admit that my farm was a little too large.

I told you in the outset, that in my opinion, farming in New England is a much better business than many have been inclined to believe. Except in the single product of milk, sold direct from the stable, we seem to have less competition among ourselves than is found in any other business that is unguarded by combinations for mutual protection. We have the best markets in the world almost at our very doors; and it has been shown, over and over again, that an acre of good well-tilled land here, will produce as bountifully as will an acre of good land at the West, or anywhere else, while the crop, when grown, will sell for a good deal more money.

The average yield of wheat in all the States of the Union is less than fourteen bushels per acre. In the thirty principal wheat-growing States and Territories it is but thirteen bushels; yet your own State of Connecticut stands only second on the list with her nineteen bushels per acre, while the other New England States raise on the average from fifteen to sixteen bushels. I have myself grown thirty-nine bushels of the choicest wheat per acre, weighing up to the standard of sixty pounds per bushel, and as Professor Brewer has already told you, the waste product, in the form of straw from such a crop, is worth more in the nearest village than the western farmer can get for his whole crop, including both straw and grain. I know it may be said that the western farmer has richer land and larger fields; but we have plenty of room for larger fields here, and our best farmers are clearing away their fences, and are fitting their land and adapting it to the same kind of tools the prairie farmers are using; and we have the facil ities, if we will only use them, for making our lands as rich as the richest.

It is true that the eastern farmer has been closely pushed by his western competitor, but, from various causes, that competition is becoming less severe, and we are slowly learning to adapt ourselves to the changed conditions brought about by the skinning process, which has passed over this country like a great devastating wave. The gradual loss of fertility in the western soil, the growing home markets there, and the improved methods of farming here, are every year placing the farmers of the two sections more nearly upon the same level.

American farmers, and I believe Americans generally, have been called a race of grumblers, except when making or listening to Fourth of July orations; but it must be remembered that grumbling in a free country is only the first step towards setting wrong things right. Our progress as a thoroughly self-supporting and self-governing people may at times seem slow, but when we bear in mind the crude condition of the mass of material there was and still is in this country, both human and earthy, and that in making this great experiment the world had given us no model to work from; when we look about over our hill-sides and compare even our poorer homes with the homes of the average laborer in almost any other part of the world; and again when we find the leading men of other nations, as well as those from other portions of our own country, coming to New England for patterns by which to improve the condition of their own people, and to reform their own methods of government and of education,—when we bear in mind all this, I say, if we can only be sure that our progress, though slow, is real and in the right direction, we may congratulate ourselves that the gain is not ours alone, but that an influence is being exerted that is reaching out towards the farthest corners of the earth; and that instead of the little paradise of a garden and republic which our Puritan fathers in their imagination and exclusiveness might have seen developing on the shores of this New World, the farmers of New England and their descendants are rearing a structure which must hasten the time when every honest and industrious worker can, if he chooses, own a house and land, and own himself, and this not only in New England and in America, but wherever the names New England and America are known.

Mr. Chamberlain. As the speaker has just alluded to his succession of crops upon the piece of land which he attempted to bring up to its full capacity of production, I would like to ask him what is the comparative value of the crops that he cultivated there? I would like to know the comparative value of the rye—whether he used it in a dry state or a green state—and also of the other crops which followed that rye. It is a very important question with us what we shall cultivate for fodder, and if the gentleman will inform us of his valuation of Hungarian grass and millet, if he has had any experience or personal knowledge in regard to that matter, I should be very happy to hear it.

Mr. Cheever. In reply I will say that my land is rather light, and much of it is not well adapted to grass. It does not bear two or three crops of grass a year without any fertilizer. I can raise crops of much greater value, as well as very much larger in quantity, by devoting the land to rye, oats, barley, millet, and corn, to be grown as forage crops, to be cut and fed green, than I can by devoting my land to grass. Comparing a ton of the best English hay with a ton of anything else, I think the advantage will be in favor of the hay; but a ton or a little more to the acre is all the best farmers average over their farms, while by growing two crops a year, one of rye and the other of corn, or one of rye and the other of oats, and growing the second year any of the large, rank-growing crops, a farmer can certainly get much more value than from grass alone. Rye has come to be grown by milk farmers and by dairy farmers to a large extent, much more than a few years since, and whoever tries it once I think tries it twice. Sometimes the mistake is made of allowing it to stand too long, it gets too tough, and cattle do not like it. For an early crop it is valuable; it grows when nothing else will grow, and occupies the land at a time when it would otherwise be idle. The growing of barley is also increasing with us considerably. Sown in midsummer or any time during warm weather, it makes a late crop that stands the frost and affords good feed when your corn fodder and millet will be killed by freezing. I have cut barley when the ground was frozen and it was good feed. There are little things to learn in growing these crops and feeding them as in everything else. I have done some injury to milk on one or two occasions by changing too suddenly from one kind of feed to rank green barley, cut in cloudy weather, and I have found a rank taste in the milk. But that is nothing seriously against such crops. The change should be made gradually from one feed to another.

Mr. WEBB. Is rye as a soiling crop for cows apt to give a bad taste to the milk ?

Mr. CHEEVER. No, not if properly fed.

Mr. WEBB. I have tried it several times and it never failed to give a bad taste to the milk.

Mr. CHEEVER. I begin to cut my rye very early in the spring, before it shows any heads, and feed it lightly. It will not do to turn cows from hay out into rank June grass immediately, and expect to get as good milk as if they had been brought to that feed gradually; and the same is true with respect to any other green feed.

Mr. CHAMBERLAIN. We want to get all the benefit of the gentleman's experience that we possibly can on these subjects, and I would like to ask him at what point in the maturity of these various crops he thinks they are the most valuable?

Mr. CHEEVER. Chemistry and practice may seem to conflict a little, but we must feed crops when cattle will eat them. Chemists tell us that grass is worth the most when it is in full bloom or a little past. Rye in full bloom will not be eaten greedily by cattle the first time it is offered to them; but when cut before it blooms, while it is still so tender that you can chew it yourself and swallow it without choking, it will be eaten readily. I would say that it should never stand until it comes into bloom. I have put a great many tons of it into the barn, and I never intend that the blossom shall show before it is cut, and only very rarely is that the case. I do not know why the same rule does not hold for all the forage crops. Barley and oats I think should be cut before they are in full bloom, because they will be so much more tender and will be eaten with so much better relish; yet I do not believe in feeding wholly upon them, especially immediately after changing from other feed.

QUESTION. Should you apply the same rule to grass?

Mr. CHEEVER. I suppose the questioner has read the discussion on this subject as to when grass is worth the most. Every farmer knows that his cattle like hay best that is cut early enough to be tender, a little before it is in full bloom; but hay is the most expensive food that I can grow on my farm for stock.

QUESTION. I would like to know if you make winter fodder of these green crops that you raise?

Mr. CHEEVER. I always aim to have enough and some more than will be wanted in summer, and then cure the surplus, cutting it at the right time. There is a little advantage in letting it get in full bloom when it is to be cut for winter use. It dries quicker and cures faster.

Mr. MYRICK. Would you let rye blossom in full?

Mr. CHEEVER. I would never let rye blossom at all, neither for curing nor green feeding. My own practice is to cut it before it comes in bloom. If I should have some that unavoidably stood too late on account of the weather, I would feed it to horses or cattle, instead of cows that I was urging for milk.

QUESTION. Do you apply the same rule to the cutting of corn?

Mr. CHEEVER. No, sir.

QUESTION. I would like to inquire of Mr. Cheever if he has ever tried sowing rye upon a pasture?

Mr. CHEEVER. I never have. I have only five acres of pasture, which has never had anything done to it since the farm was originally divided. It is simply used as play ground and exercise ground for cattle; they get what they can. My pastures are rocky, and I cannot afford to plow them. Rye is sown for pasture with more or less success, but I do not believe much in pasturing on poor land.

QUESTION. Does this system of raising two or three crops a year exhaust the soil?

Mr. CHEEVER. I should say not. Whether the soil is exhausted more by growing a crop of seed than by growing a crop all ready to form seed, with all the material in the stalk, I suppose chemists must answer.

QUESTION. Has Mr. Cheever had any experience with millet and Hungarian grass?

Mr. CHEEVER. Large experience.

QUESTION. How will they grow as compared with rye?

Mr. CHEEVER. Rye has considerable value because it will grow when nothing else will, in late fall and early spring. Millet will not grow then; it grows only in hot weather. My rule has been to sow rye early; then sow oats that come early, then spring barley and spring wheat; and, after the weather comes warm, put in millet, and corn a little later, so that I know it will mature, and then put in barley. Millet is excellent food. My cows seemed to want me to think it wasn't worth anything,—advised me not to raise any more; I thought it wasn't worth much the first year. Cows, like human beings, do not like new food. Many of us did not like tomatoes when we first tried them, but we may be excessively fond of them now. I have found, in later years, that millet was fully equal to the best English hay. In feeding forage crops, I feed whatever I happen to have all summer long.

QUESTION. Have you had any experience with lucerne?

Mr. CHEEVER. Very little, and very unsatisfactory. I have sown a patch of lucerne, or *alfalfa*, which is a kind of clover which does well in certain soils, but I think we are too far north. It does well in some climates, but I cannot recommend it from my experience.

Mr. GOLD. The first question I took from the question box was the one which has just been asked of Mr. Cheever with regard to *alfalfa:* "Has any one in Connecticut had experience with *alfalfa*, and with what result?"

Prof. BREWER. I would like to say a word about that. I have made a good many inquiries and I cannot find that it has ever been grown successfully in any cold country. Many years ago, when I was on the geological survey, I sent communications to Australia, Syria, the Mediterranean, Egypt, and northern Africa, inquiring in regard to the best forage plant in hot climates, and the answer came back from many places, "lucerne," or *alfalfa*, which is the Spanish name for lucerne. I cannot find that it has been grown successfully in any country that has cold winters. It is not as good as clover. Now and then you will find a place where it will last a few years, but it goes out.

Mr. AUGUR. I tried a very little at one time, but it was not a success.

Prof. BREWER. I ought to say that *alfalfa*, under the name of lucerne, has been tried over and over in New England, for more than 150 years. You may find any number of accounts of its being introduced from the old world, particularly from Germany. Here in New England, in Colonial times, before the days of agricultural papers and agricultural societies, by means of which men come together and compare notes with each other, one would try it here, another would try it there, but they all failed, for the reason that it is a plant that belongs to a warmer climate, or, at least, a climate with warmer winters than ours.

In the third *Essay on Husbandry*, by Jared Eliot, 1749, p. 59, he tells about trying lucerne and sainfoin as forage plants on his farm (at Killingworth, near Clinton). He says "they will flourish a while, but others have found as well as I that it will not bear the Rigours of our Climate." He says that he has procured seed from England, and from Philadelphia.

QUESTION. Is not potash most economically supplied to the soil by using a high grade of muriate of potash? Are not phosphates most economically supplied to the soil by using pure ground, raw bone? Is it not economy for farmers to buy the ingredients and mix their own fertilizers?

Mr. Cables. Last winter we bought a piece of land about two miles and a half from home. It had been kept in grass for twenty years, perhaps, the grass mowed and sold, and, in the fall, the land pastured. When we bought it, it grew only weeds and low moss, and looked as though it was very sterile. The question with me was, "Can I buy barn-yard manure and fertilize this land? As it is now, it is no use to me or any one else." I made up my mind that, as it was on the top of a high hill, it was no use for me to entertain the idea of carting barn-yard manure there, and to get posted in regard to what I should use, I bought "Harris on Fertilizers," and read up during the winter. He gave me an index to buy fertilizers by, and it has worked very satisfactorily this summer. The index was this: Buy the fertilizer you can buy the cheapest. He says: "Figure nitrogen at 17½ cents a pound; figure phosphoric acid at 12½ cents; figure potash at four cents. Send to the different dealers in fertilizers and get their guaranteed analyses, and upon that basis figure them up, and if you can get them at these figures (that is, if the fertilizer does not figure above that, or perhaps five dollars more a ton), you can safely buy it; but you can buy the chemicals and put the fertilizers together yourself cheaper than you can afford to pay more than five dollars profit for putting it together." He says, "I have the impression that you can buy Peruvian guano more economically than any other fertilizer, and know from personal use, that Peruvian guano is more easily assimilated by plants than any other fertilizer." He started me on that idea, and I wrote to the Mapes Formula and Peruvian Guano Company of New York, and asked them to send me their circular giving the guaranteed analysis of all their fertilizers, and of Peruvian guano. They sent me a circular and also a letter. In the letter they gave me an analysis of Peruvian guano, but said, "We do not guarantee this analysis." But as I understood it was an analysis made by the New York State chemist, it was very satisfactory to me. I looked up the matter and after figuring upon this basis, I found that Peruvian guano was worth some $70 a ton. Their corn manure figured $51 a ton and they asked $50. Their potato fertilizer, as near as I remember, figured about $33 or $34 a ton and they asked $50 for it. Some of their fertilizers ran above and some below. The value of none of the fertilizers that were figured in the list ran much above the cost, while Peruvian guano ran very much above. I wrote to six other firms, and four gave guaranteed analyses; the other two sent me no guaranteed analysis, but said, "You will find it in our books." I said, "If you cannot give me a guaranteed analysis in your circular, I don't believe you want to have me figure on it very much during the winter, but would rather I would buy your fertilizers when I am in a hurry about it." I went down to New York intending to buy Peruvian guano, but the gentleman whom I saw at the Mapes company's office rather discouraged me by saying, "You know it is an imperfect fertilizer; there is too much phosphoric acid and too much nitrogen for the potash; you will run your land like fury." "Well," I said, "I want to run my land like fury; if I can get a big crop the first year I am satisfied." "You can do it," said he, "but you will take the potash all out of your soil. Don't you see that you have got 22 per cent. of phosphoric acid here, nearly six per cent. of nitrogen, and only four of potash; whereas, if you take our complete fertilizer, it has four per cent. of potash, from eight to ten of phosphoric acid, instead of 22, and from two and a half to three of nitrogen instead of six; and that excess of phosphoric acid and nitrogen in Peruvian guano will so force the crop that it will take all the potash out of the soil, and in time you cannot raise a thing with your Peruvian guano." "Yes," I said, "but you have offered me potash at four cents a pound, in the form of muriate of potash, and why can I not, after I have got one crop by the use of Peruvian guano, buy your potash, sow it on broadcast, and so give a sufficient supply of potash to the soil right along." He said, "I don't know any reason why that would not be all right." I said to him, "You ask me $50 a ton for a fertilizer the analysis of which shows there is only about ten per cent. of phosphoric acid, three or three and a half of nitrogen, and four per cent. of potash, while I can buy your Peruvian guano for $55 a ton, which contains more than double the amount of phosphoric acid, and nearly double the amount of nitrogen. I will risk the running of my land too hard. Besides that," I said, "I consider Peruvian guano more valuable than anything else I can find in the market; I consider that plants assimilate Peruvian guano more readily than any other fertilizer." He admitted it.

I tried experiments with different fertilizers on cabbage and potatoes, using the perfect fertilizer, containing nitrogen, phosphoric acid, and potash, special fertilizers containing phosphoric acid and potash, leaving out the nitrogen, phosphoric acid and nitrogen, phosphoric acid alone, nitrogen alone, potash alone, plaster (sulphate of lime), and also Peruvian guano, the Stockbridge fertilizer, and Bradley's fertilizer. The Peruvian guano costs us $54.60, delivered on the ground. The State of Connecticut experiment station said that it was worth about $64.90 a ton, figuring on their basis. The Stockbridge cost us $50 a ton, delivered on the ground. As we figured it, its value was about $33 a ton. Bradley's was worth about $38.30 a ton; it cost $42.50.

Now for the result with the potatoes: We weighed ten hills. The first row gave us 26 pounds for Peruvian guano. The next row had nothing; it gave us 7¼ pounds; an increase of 19¾ pounds for the Peruvian guano. The perfect fertilizer, containing nitrogen, phosphoric, and potash, gave us 20 pounds —just 6 pounds less than the Peruvian guano. Phosphoric acid and potash gave us 14 pounds. Nitrogen and potash gave us 9½ pounds. Nitrogen and phosphoric acid gave us 12 pounds. Phosphoric acid alone gave us 11¾. Common plaster gave us 11⅓. Nitrogen gave us 7 pounds and 10 oz. Potash gave us 5¾. The next row had nothing, and gave us 6 pounds. The Stockbridge fertilizer gave us 13 pounds, and

Bradley's 18. The experiment has shown us that the land is deficient in phosphoric acid. I think the result that we got from Peruvian guano has shown us also that in Peruvian guano we had just what was wanted.

Mr. West. What is the nature of your soil?

Mr. Cables. The soil is not hard clay, but of a clayey nature. It had not been plowed for years, and is wet during the spring. We did not get the water out until quite late. I consider that it was because it had not been plowed and mellowed up, and the water could not get down through.

We used Peruvian guano and these other fertilizers on eight acres of cabbage, putting the guano in the row. The land was plowed in the fall and harrowed thoroughly in the spring. Then we had a machine that we got up in the winter to furrow it, with two shovel plates in front, and it furrowed out two rows at a time. We furrowed it very shallow—we couldn't furrow it deep because there was so much sod. After we had furrowed it, we set the men to work scattering the Peruvian guano in the furrows—a very fine sprinkling. We did not dare to put much in, for we knew it was very strong. We also tried Bradley's fertilizer, putting on just double the quantity of that that we did of Peruvian guano, because, according to the analysis, Peruvian guano was worth double. Where we put on a double quantity of Bradley's fertilizer, it burnt the cabbage so badly that I suppose there were four plants gone to one that was left, in some places; in other places, two left and another open space, and so on. It spoiled the patch. The few that did grow and mature were very large, but soft. I never saw a soft head in the eight acres where we used the Peruvian guano. We tried this experiment to show what the land needed. Where we used the perfect fertilizer, we got good cabbage. Where we used nitrogen and phosphoric acid, leaving out the potash, we got larger cabbages and solid heads. Where we used phosphates alone, we got nearly as large cabbage as where we used the perfect manure—very fine cabbage and very well matured in every way. During the growth of the plants, we could see a perceptible difference between these three fertilizers and Peruvian guano. But where we put on potash alone or nitrogen alone, or potash and nitrogen together, there was no perceptible growth for some time; in fact, the cabbages never grew to be anything. The difference was not perceptible between the growth where we put nothing and where we put potash and nitrogen alone or potash and nitrogen together.

Adjourned to 2 o'clock.

AFTERNOON SESSION.

The meeting was called to order by Mr. Barstow at 2 o'clock, and Mr. J. B. Olcott introduced as the lecturer of the afternoon.

THE CONFLICT OF CIVILIZATION WITH ITS OWN WASTES.

BY MR. J. B. OLCOTT, OF SOUTH MANCHESTER.

If theology is a theory of the nature, science, and arts of goodness, then it will be likely to affect men according as they know what is good, and the theory corresponds with their knowledge.

Regarding theology as comprehending all goodness, it appears a matter not for one, but every day in the week; a subject, not for the few alone, but a great popular study, interesting all who love a good thing.

As we increase in positive knowledge of what is good by comparison with evil, we find as many and various conditions of goodness as there are varieties and conditions of men. Hence, in a world of changes, the constant need for revising, averaging, and correcting our theological views and opinions.

A theory of goodness, for instance, which nimble commerce would grab at in flush times, might not be good for slow agriculture at any time; and the farmer who carefully spreads his savings upon the land can scarcely hold identical theological opinions or theories of goodness with the man who touches the soil—vicariously or otherwise—only to make it worse.

We say a thing is good if we never saw anything better adapted to its purpose. Absolute goodness ever depends upon its relations to things. The abstract goodness of a stopple becomes locally precious only when it happens to fit the jug.

A lecture or paper to be read is never remarkably good unless it suits the occasion. The weather may be good or bad when either wet or dry, hot or cold, as it hits our necessities.

This present matter which I am reading may seem irrelevant, but if it is only a little to windward of our present purpose and gives us a chance to get well seated, and draw in a long, restful breath, it will have its temporary good uses.

Goodness is progressive. It grows to a harvest here, and is frosted and set back for a period there—like corn. Heaven for the tadpole would be misery and perhaps death for the completely amphibious frog. The belief of the old appears like a straight-jacket to the young until they have grown into a strict faith themselves with the knowledge of the old. Although the young world was pronounced "good" by its creator, we read of trouble soon after, and perfect goodness has remained ever since, even among the most hopeful, a pursuit rather than a possession. Would it be ill-natured to suggest that some of our theories of genetic goodness have led us too far from the idea of tending garden?

In considering the conflict, or muddle, of civilization with its own waste, we cannot climb the inaccessible heights of goodness. We will not attempt to say what the Saviour meant when he declared "There is none good but God," except to guess that a part of his meaning was to provide for continual hope by opening infinite distance before the eternal progress of the human race.

Our subject calls us to the very beginning of goodness, such as tadpoles may feel, if not understand—to that "cleanliness" which "is next to godliness" (next before godliness, I believe it is, as purity comes before peace).

When the world was new we may suppose it was clean, and that its fresh purity was a vast element lying at the foundation of its goodness.

But purity, like goodness, has its degrees, its relations to things, and its progressive order, differing widely in the minds of different people. Our feeding and evacuating ducts may be pure enough for a variety of parasitic lives, while altogether too foul for our own.

The rude, small boy, struggling with a soapy rag in his face, has different views of cleanliness from those entertained a few years later, when observing maidens begin to cast critical eyes upon him, and an elder sister, or the next above him in the shop or store, explains the neglect of his back hair and the conspicuous lodging for dirt behind his ears.

To his barber no man is a hero, and our neighbors are our severest though silent critics in the matter of cleanliness and impurity. By their cleanliness shall ye know them.

A cat may look at a king, and the humblest member of society may scrutinize social purity or dirt. The rot of the papal church touched thousands of starving peasants in Europe before Luther saw it, and the draft of New England civilization was felt by sheep on a thousand barren hillsides, and by fish in hundreds of polluted streams, before any one was called upon to speak about it.

The Indian, when game and fish were plenty in our new world, found it clean enough and good enough for him. He strode the grassy glades and leaf-carpeted aisles of his native wild garden with a righteous ancestral pride not surpassed in its way by that of his civilized brethren, in easy times, pacing beneath their noblest architectural devices. The exceeding purity and cleanliness of Indian society got itself recorded, by the way, in the historic effort to identify its origin with the lost tribes of Israel.

The aborigine held a place in New England nature regulated by nicely-balanced adjustments, through centuries of undisturbed existence. Under those conditions—before the introduction of any conflicting elements—it may be believed that a perfect equilibrium of opposing forces in savage society had been reached. The Indian meddled less with the surface of the earth than the free waters and pure airs of his native climate did. Only beavers built dams. Only rafts of dead flood-wood checked the flow of clean rivers into the sea.

An occasional fire—by chance or not—is the only circumstance we can imagine to have interfered with the annual round of aboriginal events.

To examine in detail, or even to name all the changes produced by "civilized" interference, would occupy too much of our time. Concentrated industries and accumulated filth have introduced a new and malign force into the climate of our continent. The wind blows where it listeth upon the modern as it did upon the aboriginal American, but we have now to engage help around all sides of a polluted stream or pond in order that prevailing winds may not make them all sick at once. The weather has become a local and sanitary rather than a general meteorological study within a very few years.

Perhaps you will not agree with me that the highest type of humanity possible under aboriginal conditions had been established in this northern country. The millions of happy "savages" knocked on the head by brutal discoverers in the warm West India islands lead us reasonably to imagine that Columbus uncovered a science of practical life there which colder northern and equally crowded "civilized" communities have not yet learned. That the peaceful inhabitants of those islands had already mastered the problems of personal waste and nutrition, and were yet no match in war for their more savage conquerors, does not prove the former an inferior race in the sight of eternal goodness.

The coming man, to make his title good, must incarnate all the good that has gone before him.

Perhaps we shall not agree in questioning whether the type of humanity, under our own possibilities, has been established at its highest. Did any civilization or barbarism ever have greater cause for, or consciousness of, shame? Frequent divorces, abandoned children, and so forth, show how some of us are losing faith in the coming of the children of men in all their glory, every time. Our women have as good a right—except we have broken the eternal laws of goodness—to the highest honors of maternity as the mothers of Israel had.

The aboriginal American gentleman was a lofty and crafty character. He was born away above farming for a living. Possibly the continent is producing his natural and scientific equals, but I am afraid not superiors, for their day. A friend writes me how in a recent trial of "malaria" in the Massachusetts courts, conflicting "scientific" and "expert" testimony only served to "confuse the jury." Are our medical and legal experts too unskillful to winnow mixed social science from chaff? Are our courts and juries too unlearned and ignorant, or did they know too well which side their bread was buttered? Either way, the people suffer, civilization receives a shocking check, and public confidence chokes, all the same, whether hung by the legal or medical horn of a scientific "bull."

Herbert Welch, one of our social agents among the Sioux, tells us how an astute member of that tribe questions our government policy of rich gifts to murderous chieftains who had recently been on the war-path. "Perhaps, if I make trouble, and kill somebody, the great father will send them to me?" he asks. The logic of the plains is more than a match for the barbarous statesmanship that allows the strong to oppress the weak. Native American tribes, it is said, number as many people as they did at the beginning of white settlement, but it is doubtful if their quality has improved.

Our forefathers beat the Indians from their lands by their superior knowledge of somewhat intricate artificial things. Rum and sugar, gun powder, and certain contagious diseases which their women were not familiar with, were the chief conquering elements in that fight. These weapons, it may be remarked, were about equally injurious to the aggressive party. The axe and plow, with the destruction of fish and game, were prominent aids upon our side.

The changes we have made in the last half century could scarcely be conceived greater from any convulsion of the continent. The main-spring of society in a strong and contented rural people has been broken. Public health is destroyed in its aerial and aqueous fountains. An artful and unnatural concentration of human industry is proving itself now, as it has done so many times before, a feverish, filthy, and wasteful experiment. Civilization has no sanitary common-sense equivalent to the wholesome, hereditary science of the uncontaminated savage. Books, unread by the many, offer no practical substitute for righteous human law, bred in the bone and flesh of righteous family life.

Within the easy memory of living men, we have swept available fertility into the sea at a rate that no nation, lacking our long railway arms, ever has or ever could approach. The Roman Empire hurt the soil less in five hundred years' slow hauling of ox-teams. In the matter of land butchery, the great Yankee nation stands pre-eminent.

You never expect any valuable statistics from me, Mr. Chairman. You seem to be satisfied if I remind you of things which you already know. But it happens that flying sheets of census reports are blowing about country lanes so that anybody may know now what they contain. Citizens, by the way, learn to value census figures, by seeing how agents "load up" at their places.

See the average corn crop of Tennessee and Kentucky—twenty-one and twenty four bushels; of rye, five, or seven, or eight bushels; of wheat, six or seven, or eleven or twelve bushels.

My figuring is careless of fractions, because we don't expect accuracy from a farmer. When we talk of five bushels as the average rye product to the acre, of a great, central American state, we understand that it is rather small, but yet that five bushels of rye will make a good deal of bread, and such a crop is better than nothing. But in reflecting what an average means, we shall perceive that some growers had more, and by so much more as they had others must have had less—sometimes scarcely getting their seed back throughout whole counties and sections of these comparatively new states. The census average may be a great comfort to the speculator, while it indicates a mighty hard scrabble for the people.

Still, we are paying more western rye for German potash than the German peasant can afford to, and that is what he comes over here to see about. It makes Connecticut bushes laugh at eastern capital to see the peasants and potash going west.

In a matter cognate with soil depletion—for in any great careless gathering there will be corresponding heedless waste—in the pollution of its streams, by the stop-watch in race history, the United States has no competitor. For speedy nastiness by wholesale and retail, the American people can "take the cake."

Now, mind you, I do not stand here making these statements as one without hope. The rapidity with which we have made changes for the worse is one of the elements of our salvation. The mischief has been done by living men before living witnesses. Every good housekeeper knows that a young kitten or puppy, caught in the act, can be broken of its dirty tricks, and so, please God, can a young nation.

If once we made frugality and cleanliness the fashion, and a strict matter of national business, Columbia, now sitting forlorn in her own poverty and filth like a bedraggled harlot, as the old reformers would say, might arise regenerate, glorious in white raiment, like an angel of goodness among the nations.

Convince our strong men—our working millions, the salt of the earth—of the vital errors of our present course, and the energy of our restoration may surpass every historical record in grandeur, as the victories of peace surpass the triumphs of war.

Let us beware of the false prophets who treacherously beguile us toward the old ruin by showing how older nations are worse off than we are. Such tempters will presently revive a belief in the devil.

A land with its rivers running filth instead of pure water, is like a body with its veins running filth instead of pure blood.

Being a damage to life, the loss and waste cannot be estimated in money. To compound with the impurity of society for cash would be to set some infinitely small part of the price upon the purity of one's own soul.

Should Mr. Blaine's recent proposition to divide the profits of national grog-shops among the States, find favor in our sight, we shall presently have some politician proposing a national scheme for taxing stream pollution to pay our doctors' bills, and build hospitals for the sick.

Is this statesmanship run mad, or is it the millennial humility of a government that would make every Lazarus of a nation live by licking and healing its own sores?

In this dreadful matter there is a humorous element, grim or not, as we please to take it. The old writers picture a justly indignant deity laughing at our calamity. We may as well laugh as cry over spilled milk, they say, and Captain Scott has well quoted here the practical farm philosophy in our civilization of "picking up the pail and starting for another cow." But if we are losing our grip on the milk, and can't find another cow that will stand our blundering drains upon her, shall we not have to shift our practical philosophy, and alter our theories of goodness to fit the incontrovertible facts?

The historical joke in our case, Mr. Chairman, is, that the close descendants of the very people who drove the Indian from the land of his forefathers by tricky bargains—the power of rum and sugar, small-pox, etc.—are being driven out of the land in turn—our old extensive farming class is—by the stench of polluted streams and the power of "malarial waves."

What ark of refuge can we build against this atmospheric flood—what peak of Ararat can we land upon in safety from an overwhelming malarial deluge?

There is more grim humor in this sorry human race wherein What's-his-name "takes the hindmost." Great cities everywhere feel the terrible pressure of an uncontrollable parasitic population bred in their own disordered vitals. New York solemnly tells Chicago of "the lower classes" that "will not go to any kind of decent dwellings so long as they can resort to the dens which now contain them."*

There is poetic justice in this punishment of one wicked generation by another which every honest descendant of the old Indian-fighting, rum-distilling, Puritanic race, must philosophically accept.

We die, but slowly, however, as the Indian did. Though we shake fit to snap our boots off and burn with feverish fires, the putrid stream device for poisoning the old, open-air people, is very slow, uncertain, and unsatisfactory.

Before we get through I want to show you that the method is a very old one. Chewing dirt to spit in the face of friend or foe has been tried before and failed, utterly, over and over again, causing a degeneration of human taste at last, intimately below our starting-point in a savage equilibrium among healthy animals and men.

"The cloacæ of Rome," says Liebig, "absorbed all the well-being of the Roman peasant." Says Victor Hugo—"When the Campagna of Rome was ruined by the Roman sewer, Rome exhausted Italy, and when she had put Italy into her cloacæ she poured Sicily in, then Sardinia, then Africa. The sewer of Rome engulfed the world."

No novelist has undertaken yet to write the order and sequence in which our bankrupt states have gone, or are going, into the hopper. The matter is too fresh for a market novelty. Current history holds its discreet nose but never says anything while this nursery of all robberies is going on.

Has not the conflict between civilization and its own waste always been a losing game for the world, from the tower of Babel down to the last village sewer? From the ancient rot, sweetened by the earth of ages, we poke out some bright relics, that's a fact, showing how good men and women protested, or things might have been worse, sooner even than mouldy old evidences show them to have been.

Not much appears among the ancients to flatter our wicked vanity. Reformers were bought off and were driven off then as now. But how can any one sell the right to pollute a stream—a

* See "Dwellings for the Poor in Large Cities," in Sanitary Engineer of Nov. 22, 1883.

right no one ever had—a wrong, proven by all history, to be the death of men and nations?

By its ingenious modern cloacæ, stuffed with abominations, society slings its contaminated dye-stuff abroad to return malarial boomerangs upon itself. Social artists seem not to have fully learned the sailor's joke about throwing only certain things and "hot ashes to windward."

In old times as now it seems that poor human nature was prone to run away, like an Arab, from the pestiferous exhalations of its own camp. We may reasonably suppose that some of our Puritan ancestors belonged to that party. Will their descendants be content to see the chosen land of the fathers defiled in turn?

Some of our women hated the sewer by heredity I know, and would never have a sink in the house so long as they lived. Even in winter time, in old age, they might be seen tottering out to spread the contents of their wash-hand-basins on the snow of the door-yard or garden, over some part of the ground where they knew the land was poor. Those women had a righteous agricultural spirit, and felt the everlasting justice of returning due aliment to the soil.

When we leave the earth worse than we found it for man to get a living from then comes trouble. Dishonesty and crime begin with robbing the soil.

There, in the abused ground we have tilled and wasted, is the birthplace and cradle of primeval disorder, increasing in sorrow, anguish, and despair, as an overwhelming wave of accumulated misery rolls around the world. Overdrafts upon the soil are as disreputable in agriculture as overdrafts upon a bank are in finance. Wrecking a farm or a garden—pilfering from the land for our own selfish desires—educates our minds and hardens our hearts for all villanous ways of taking more than we give—of grasping more than our share. Having once made farms fit to run away from, all treason and unfaithfulness comes easy to us. We are ready, then, in any selfish pinch, to wreck the most sacred human institutions. After blasting the land and making a desert anywhere, we may carry on murderous civil wars with all the forms and pomp of bogus law, and break and abandon mills, villages, cities, societies, and nations, without a scruple. Time fails to show you the dark side of modern "business," full of dead men's bones and loathsome corruption—a veritable hell upon earth—of which all theories of goodness should teach us to beware.

Farmers or gardeners who have themselves planted, and spent a lifetime or less in trying to repair the mischief done some minute section of the earth's surface, will know what I mean.

I speak to farmers, for it will be their sons and grandsons who will have to rebuild and re-organize town and country in regard to health and waste in times to come.

The mothers of the farm carry in their hearts the germs of future cultures and religions. We are losing faith in the devil, they say; but if no evil spirit outside of our forefathers sowed the tares we are reaping, then we must now be scattering the seeds of future social weeds, if the future is to have any.

Running away from one's own filth has been so common in New England that we have made a great "paying" business of shipping invalids to and fro across the continent, wherever there was a showing of healthy conditions, and means of access to them. Thick-settled communities have kept their own death rates low by sending invalid populations away to die. The fair repute of many "health resorts" has been ruined by this means. The dying catch at sanitary straws. A few winters ago every train for the Pacific coast was loaded with what were called "condemned Yankees." Twice in our hunt for lodgings in Santa Barbara we were met by the pitiful plea: "Don't disturb us now, please. A man is dying upstairs. His place will be vacant soon!"

This running away for health is about played out, however. With our rapid communications, every corner of the land has become infected with filth and disease.

The country is no longer, as it once used to be, healthier than the town. The larger cities seem, indeed, the healthiest, for several reasons: people are better fed and better paid. Good food and regular payment of higher wages will always secure the pick of a floating population. It may or may not be that the city is more intelligent and intellectual than the country. Opportunities for reading, hearing lectures, and passing a wise common-sense from hand to hand have certainly been superior in well-ordered cities since the decay of rural families and country churches.

Here was a young man "most dead with the shakes" in New York, running right into a nest of ague in my district, where all the women and every man but one were flat on their backs half the time this summer with some form of intermittent fever.

Of course I wouldn't advertise that matter in this way if I supposed other sections had any advantage. The best hope for concerted remedial action consists in frankly owning the notorious facts.

In old times—as long ago as Æsop, and later, too—free discussion of this "social evil" was neither possible nor safe. His little story of the wolf and the lamb—what do you suppose he meant by it?—might have stuck on the way down to us had it not been disguised as a pretty fable. The bones of wolfish cities, however,—smothered at last in their own corruption,—whiten along the pages of history. Every lamb "eaten in a trice," for roiling the water up stream, finds its modern counterpart in the still hunt for those who oppose corporate impurity. Æsop, by the way, told some one who asked, that the reason why hogs made such an outcry and sheep took the butcher's knife so quietly, was because the latter were constantly used to being sheared. But the "lambs" on our polluted streams are of an age and sex—some of them—not to be very tender eating. Our "wolves" are not the beasts of Æsop's time, either. They know which way their filthy water runs, and some of them are becoming convinced that universal pollution raises the ill winds which blow good to nobody.

It may well be, however, that some in every audience can't see this matter as I do. As physicians here and there appear to disagree—more than they actually do, in my opinion—we may as well go into details a little. It is reported of the flowage case, at Lenox, Mass., where eight hundred people sickened around a new mill pond, that seventeen doctors swore, in reference to health, that filth did no harm and drainage no good. This is incredible.

Let us imagine, if you please, Mr. Chairman, that one of us is a —— "lamb," down in the grass by a polluted stream somewhere, and that you are a —— person who has recently invested in the most approved fixtures for draining your house in town that have ever been contrived. We meet as men continually meet—not according to the old fable exactly—and are talking affably about the matter. You go on and tell me how, when you first built and married, you didn't know or think much about house-drainage, so you fixed your back-door conveniences as your smartest neighbors did. The well and privy consisted, really, of two adjacent holes, about twenty feet apart, one was dug deeper than the other one, which took the sink water, too, but the fluid inside of each stood at one level, generally, except in a very dry time.

This arrangement made tombstones necessary for your first wife and her two children, besides causing thirty-one cases of fearful sickness, and seven funerals among the neighbors who came bothering around your well buckets. All this occurred, moreover, without anybody being the wiser at the time. Not one of the preachers of those ten funeral sermons, nor one of the doctors practicing in those sixteen families, let a word of suspicion drop against the water in your well. At that time there was no board of health and no cattle commission kicking up bobberies in the State.

This "luck" of yours was current medical, scientific and theological salvation in spots during very recent dark ages. My story of the "wolf and the lamb" is condensed, we must understand, from many true ones, as I presume Æsop's was.

The second wife happened to be a school-ma'am, who had boarded around and seen a great variety of back-doors. She scented Bluebeard about yours at once. She made you clean the well and move the privy to a fresh spot. You also fixed a nice leaching, untrapped and unventilated cess-pool, separately, to keep the wash-sink and chamber water out of the privy.

You were always a good provider, were making money, had plenty of the usual kitchen help, and no pigs or chickens to keep swill from going into the sink, where at every douse of liquid the cess-pool returned an equivalent bulk of foul air.

More sickness and more funerals resulted, all charged to an "inscrutable Providence," except that a "little medical whiffett," suspected of being "an infidel," who attended in your family, told you to your very head that filth from your cess-pool had been draining into the well for a long time; and though he lost your practice, you learned from him, after a little reflection, the sorrowful facts in the case.

The next marriage was performed upon "business" principles. It brought money into the family, and involved a new house upon a new site with "modern improvements," and direct sewer connections with all the filth in the town.

How many times did we change hoppers, or traps, or have the whole drainage system of the house ripped up and renewed? Never mind how many. We know that plumbers, architects, builders, experts, and medicine cost more than the house originally did, and we are not satisfied yet.

You confess ingenuously all these struggles of yours—these conflicts with your own waste—without ever thinking that your listener is an agricultural "lamb" on the stream below, subject, not only to the nuisance of your filth; but to that of 15,000 other people, too.

You honestly demand my sympathy in your troubles, losses, sickness, and death. You are so innocent of all purpose to offend me or mine that you are surprised when I ask what the odds is to the stream my cattle make your milk and beef of, what hoppers you dump your sick family filth through—or what patent trap for sewer gas you put in last?

These particulars do not help epidemics of filth-disease in my neighborhood any. My wife and children shake or toss in fever all the same. Alterations in your methods of flinging your slops into the brook have no use in sweetening the stream or the airs blowing your way from it, either.

This story is the story of thousands. Some have spent and suffered less, some have suffered and spent more, and all is of no real practical avail, except in helping trade and doleful experiments in climbing up some other way.

How can we expect to contrive a system of drainage and sewers for a town while we have not yet learned to keep our own personal pipes in order? Verily, we must be born again and again, until a generation that can see beyond its own nose has arisen, in wiser selfishness, to take hold of this work.

All we know at present is the ignorance of fowls who roost as high as they can, forgetting how the baleful spirits of ordure will rise higher than our wings can carry us.

No animal but man is so incredibly foolish—when we come to think it over—as to set the horrid example of extending his intestinal canal into the brook. If we, tailless apes, do it, will not imitative monkeys on the stream above us do it, too? If we send diphtheria, typhus, or the ague among our neighbors below through our waste-pipes, must we not expect to draw "typhoid malaria" or cholera from our neighbors above through our supply pipes?

A few weeks ago Boston's Board of Health told how an epidemic of typhoid fever in Natick must endanger Boston. Why?

Because the peristaltic daily health of Natick is daily diluted in Boston drinking-water.

Hartford sits nervously in the lap of what was once one of the fairest and sweetest, and is now one of the filthiest valleys in the world. Hartford was comparatively far-sighted. She treated concentrated industries coldly, at first, but has now become the focus of surrounding streams of filth. Will raising our "rates" as "risks" increase, save us? May God help our capital city towards the straight and narrow path of purity and peace, is my constant prayer.

When one who is deeply interested in a certain Theological School was giving me a charming account of the physical and intellectual culture of the students gathered there, I could not avoid asking whether those young men were being taught, constantly, not to soil the brook? I have no faith in any theory of goodness for this world or the next which does not include that doctrine.

How the tools of reform can be wrought and tempered in schools is a constant question. Whoever heats and hammers the metal must never hate it—that is certain. Youth bred in loveliness should have valiant hearts of love to warm the earth and pour oil upon its troubled waters. Luxury, like the moon, gives less light and heat than it borrows. Every hive must know how to select, feed, and develop its peculiar queen bees.

Our institutions of learning and our churches need not be afraid to move in this matter. It will presently be popular enough. The people are coming to understand the remedy. No city or village has any good reason for laughing at any other village or city, because in regard to bad air and water, we are all—town and country—in the same boat.

I beg my temperance friends to examine the wide-spread causes for intemperance in the light of present thought. "Disinfectants" are sold, now, by the written order of physicians in every "no-license" town. "Will you disinfect?" or "Will you fumigate?" are the frequent questions at bar.

Maybe some cool and calculating person, who sees how I am hoeing my row here, perceives that I am missing many important points in this conflict. Of course I shall fail to hit or even to hint at a good many. We may remember that reforms of careless or ignorant practices as old as history or human depravity are not to be finished in one afternoon.

Some comfortable people may need to hear exactly how it is that their stench-traps do not give security. A kink in the trap or pipe makes a perfect water-seal, we are told by the plumber. Well, supposing the good cook pours boiling water from a kettle of potatoes into the sink on a rainy day, when the main drains are full. Must not confined sewer-gas when heated belch back through the water-seal with flatulent ease?

Fresh inventions constantly expose the weaknesses and fallacies of the older ones. We are pouring hot water at all hours from our bed-rooms and kitchens, and a recent device for preventing back-action of sewer-gas is a seal of quicksilver.

Where parties are able to pay for it there is considerable interest in testing all the new contrivances as they come along. People of smaller means may be excused for skipping some. Readers with no money at all, may discover, cheaper than Solomon did, by the perusal of numerous mutually neutralizing trade pamphlets, how vain are all our combined schemes for family drainage and family waste.

A plan for relieving any chance-pressure of gas upon the house system carries a pipe from the family main directly up, outside of the house, by a gable or chimney. This open vent delivers the poison into the upper stratum of air to be diluted and spread among neighbors as smoke is with a rising barometer, or to fall downward and be inhaled or drawn into open windows as smoke is whenever the pressure of the atmosphere favors a fall.

We have examples of great cost in the appointments and collaterals of house-drainage with no corresponding safety or benefit to general cleanliness. Did Mr. Vanderbilt spend $100,000 on his? —or what was the figure? Excessive outlays by the rich always set the conservative middle classes and the poor to thinking. A Diogenes of these days, like Henry Thoreau, would make a break for the woods. We have comforting evidence within a few years, however, of a ground-swell of opinion among our best housewives that a decent out-house or closet, kept neat and tidy, upon some handy modifications of the earth-pan, is a thing not to be sneezed at.

Some are throwing out earthen pipes now for pipes of cast and also of wrought iron. But a doubt rises whether we really do any better with the fecal filth of cities than was done by the best of the ancients. We are learning to hide it in deep drains, where the temperature is cooler, and ferment less hurried, and we have learned to our cost, as the ancients did, that this material needs air. Frequent sewer openings accompany the streets and sidewalks of every intelligent city, while the organic waste of humanity moves sluggishly below. City waste goes—not to a haven of reorganization in some paradisic city garden, to return, like rain, in an eternal round of refreshment. No—but it goes from inland villages and cities to sicken their own people along the meadows and pastures below, and multiply the chances of returning miasm and death at our own doors.

When the city meets the country now-a-days in loving embrace, things are so dreadfully mixed that we can't tell who is giving the other a distemper.

In treating this "conflict" for an hour am I too hopeless? Can we restore our streams to purity and catch shoals of red-fins on every ripple, and trout in every bend of the brook, as we used to when we were boys, or must we give up our waters to snapping-turtles and other case-hardened amphibia, while races of men fitted—or "acclimated" as some doctors say—by long heredity, and accustomed more and more to filthy conditions, shall gradually be elected to fill our places? In that degrading theory of lasting life our short cut would be to beg the beggars from the slums of European cities, or cross our New England people with river Chinese at once.

But I don't see why we should build houses, villages, and cities so cramped and helpless in this broad land as to be forced out of existence by our own ordure; nor why we should follow headlong the beaten track of national corruption and decay. Sometimes I think our great theological roosters crow too long upon one metropolitan dung-hill.

In the vast spaces between our cities there is room yet for righteous republican states. The interest in saving and the love of economy is as strong in the town as in the country. In this matter of social waste and the decline of public health—resulting in national waste and ruin—I believe the larger cities are quite as ready to reform as our rural people are. My first reading of soil and stream pollution came from certain humble Philadelphia prints nearly forty years ago. Our trouble, everywhere, proceeds from ignorance, preoccupation of capital, and mistaken teaching.

In Paris, visitors are shown with pride an underground sewer-city of 25,000 people. New York shakes in its miasmatic borders for fear the Hudson will be dried by northern wood-choppers till water fails to wash its skirts of filth. Yet an underground railway is wanted to balance the duplicate system above. The older city of Paris, to offset its subterranean glory, makes occasional bloody exhibitions above-ground, of which mankind thinks with a shudder.

The tiresome old remedy—is there no other?—for rich, lazy, and filthy communities, was a course of depleting government, followed by fire and sword and a howling desert—the abomination of desolation! After that every pool and stream was left clear enough to mirror the heads of wild beasts, stooping to quench their thirst.

To fear that society is too far along with its polluted streams to stop its nastiness, is to offer the same reason for the abuse as the old granny gave when her young cub, just from sea, abused her well: "Johnny is so accustomed to using the water in that way, you know!"

Can it be supposed, in a new and vigorous country like ours, that the course of social affairs will be fashioned after the dirty tricks of more than brutal boys, and the moral cowardice of old grannies of either sex?

Whoever fancies that our ripest towns, sundered by long railway distances from each other, are to be judged of as to which way they will jump, or grow, or fall, in the same category with the effete cities of ancient times, makes a mistake.

No doubt there are places upon this continent tolerably well fixed to support the sewer-rats of foreign communities now being shipped to us, and engender local human corruption of our own. We see people every day learning to stew and ferment their drinks. We find, by consultation with eminent savans, that there is a "scientific" basis for dashing water, suspected of retaining microscopic germs of danger, with alcohol. It may possibly be that this great American people, selected by the free air of these times from among all nations, is standing now face to face with the road leading to death and the ruggeder path towards lasting life. Some say nations, like individuals, always occupy that spot and are always choosing right or wrong.

New England, however, is bound to feel the influence of the West during the next twenty-five years in another way. Tariffs and railroads, which made a difference in the East during the last quarter of a century, are now to aid in abating that difference by the production of finished as well as crude goods at the West.

Farmers from the West have visited their ancestral hill-side homes in the East and seen how old New England farm frugality is rendered nugatory, and manufactures have become debauching in their tendency by the misappropriation of Western wealth floating in sickening miasm through our putrid streams into the sea.

The waste from factory villages puts even the slack ways of the most careless Western farmers to the blush. The shelled wheat of their heading machines may feed wild pigeons and chickens, but it poisons nobody's air and pollutes nobody's water.

Hence it happens, to the intense pecuniary interest of unprofitable Yankee spindles, and unsanitary water-powers, that the first great economic combination of mechanics with agriculture since the fetid odors of family dye-pots were first concentrated under one wasteful thumb, has been made in the far West, upon the soil of an "impoverished prairie."

I refer to the new manufacturing city of Pullman—a city of 16,000 people. There we find the rejected raw materials of our "social evil" made the corner-stone of the builder. There we read of a big outlay of capital in house-drainage, paying ten per cent. in garden stuff upon the investment. There the husbandman takes his place as guardian over the fundamental health and wealth of society. There we see the distributive wash-hand-basin of the vigilant Puritan matron of the olden time transformed, by glorious mechanical apotheosis, into the ceaseless beating of mighty distributive steam engines! The experiment is a ticklish one, however, as those who know most about it will admit. Let us pray for the city of Pullman!

Our "new theology," when sufficiently familiar with earthly facts and actual means of grace, will presently be making us delightful pictures of millennial industry and peace. When houses, built with wise hands, shall no longer be whited sepulchres. When we shall quit taxing our incomes to produce business for the undertaker. When the cooler airs of a summer evening shall be balm to the spirit instead of a constant source of dread. When labor shall be turned from civil warfare to a winning fight with public enemies and the manly duty of making the planet fit more and more for the footstool of God!

Some new articles respecting the care of land and water will have to go into our revised creeds, and the sins of robbing the soil and fouling the brooks, scarcely noticed now, will have to be denounced as unpardonable in our new theories of goodness and views of religious duty.

Let us consider, for a moment, the fecal waste of our highest civilization from a commercial point of view. We have long used and advocated the use of commercial fertilizers. We have bought honest ones, when we knew that only by denying ourselves lesser luxuries could we afford to buy. The last and weightiest feeling that has often determined me to buy was the thought that by building up and encouraging a fertilizer business we should certainly keep a vast amount of good manure out of our streams.

Saving by the cent's worth is not very popular, but great mills for the manufacture and saving of waste are right in the line of daily fashions. Looking at our pestilential waters, where thousands —yes, tens and hundreds of thousands—of dollars float by us in needlessly poisonous retention or exhalation every year; looking at our invalid people, discouraged by the natural decay of hope under punishment they may not deserve and do not understand, I have often asked myself why these precious materials should be so wretchedly thrown away? Why should not this most dangerous waste be made salable, innocuous, and given to the poor land?

We can well afford protection and a big bounty to manufactures of that sort.

One reason why we don't do anything about cleansing our water and air is because we don't know how, or very few people do, or have even considered the need of so doing. Ignorance as dense as ours, in such a great matter, cannot be done away in a moment. In regard to the use of sewage for producing food I do not suppose that one in a hundred of our leading men could water a bed of lettuce in a dry time without spoiling it. Not one in a thousand of capitalists will risk money in farming or gardening this side of the virgin wheat-soil line. Although every one who thinks the matter over knows that available fertility is the next thing to specie, yet all hands are afraid of the social waste that our sterile earth would turn to gold.

A "Polluted Streams bill," appropriating $10,000 for a study of our case, was killed in the last General Assembly—voted down by dummy legislators, put there, or allowed by their masters to go there for similar purposes—as is often done in general assemblies. The ruling monkey hand delights to roast its chestnuts at State fires, and rake them out with the paws of ignorant treason. It was whispered around that somebody was going to make $10 per day out of that bill, and that was enough to kill it. Yet we, grown men. sorely need schooling in the matter covered by that bill, and are taking it in distempers right and left. Ten thousand dollars will not pay the loss in medicine and time alone—saying nothing about life in some of our towns—caused by general pollution since the failure of that most wise and prudent measure.

To get our rights in this matter, we may yet have to lug the malarial germ into court. They say, by the way, that germ cannot be found, because suspicious microscopic characters, when arrested, can prove an ubiquitous "alibi"—so to speak. They are found everywhere—which is precisely what we might expect. "Healthy" people carry the germs of disease with them as a sound horse carries the "bots," till they get the best of him at last.

Now if any listener fancies that this new "sum of all villanies" on this continent—this basic "social evil," this pollution of private wells, springs and public waters, of streams, ponds and reservoirs; this soiling of the whole earth and this wrapping of it in a dirty atmosphere—finds any special reforming impulse in our leading minds at this time, then I fear such listener is mistaken. Spasms of sickness here and there scare us into spasms of cleanness. We clean at the spigot and let the bung-hole go. We take out more and more patents and manufacture more false sanitary gods while our rivers run blacker and blacker. Medical and sanitary journals serve up startling facts and theories for a few medical readers, but they are growing cautious of letting the people know. Farmers get, once in a while, a lecture from the press about washing their milk-dishes, while our putrid streams smell to heaven and make every drop of milk an object of reasonable suspicion.

You may wonder what I mean by "false sanitary gods." I mean the new toggles that are continually being loaded upon the sewerage system civilization already staggers under. Here's a recent sample, copied in our Medical News from the London Lancet. Titled English parties have patented a plan for tapping adjacent gas-pipes and establishing fires with intensely heated plates beneath the gratings of every street sewer vent. In this way it is calculated that heat and suction will keep the sewers ventilated and singe all the "animalculæ and fungoid life" in the sewer gases. With influence enough to get money enough, no doubt this invention may be made to "work" until the great day of "confusion of tongues." Warming sewage will not help people much on the streams below, but a city street lined with subterranean lights would be showy in the night, anyhow, and intestinal views would be open for the curious at all hours. Possibly sewer gratings, constantly heated, might be rented—seeing the sewer-gases are made innocuous—for some heating, baking, broiling, or pot-boiling purposes. Surely there would be a remedy for cold feet and a free fireside for the poor and destitute classes. Gas companies would favor the idea, and a long line of trade and "street" interests would be touched by it at once. Electric extinguishment and lighting might easily be arranged for incendiary periods. Perhaps northern cities could use the surplus heat to keep side-walks free of ice; indeed, as we think the matter over, long, branching vistas of possible utility open before us in the line of false sanitary gods.

The city mind has become so different of late from the country mind, Mr. Chairman, in regard to what is good, that I don't like to make fun of any sanitary idea gentlemen may please to offer. The scheme just now alluded to for singeing distempers out of sewers may yet find favor with our great sanitary lights—who knows? I am very sensitive to city influence myself, and before seeing this foreign idea had already spent some time in conjuring a plan to establish a draft of fire and smoke in our own sink-drain at home. May be we've got to burn these things out, abolish them, or be abolished ourselves. But if it should appear that city sewers need singeing in the care of public health, it will certainly appear that the streams receiving the sewerage will need singeing too. I have read, lately, that one of our principal cities has been making accidental experiments in this direction, and has actually had its river on fire with flaming coal-tar, in a most extraordinary manner. Whether any sanitary patents are growing out of this idea I have not yet learned.

All diseases are more prevalent and sweeping, wherever they occur, since clean streams are the exception and filth has become the rule. In the multitude of general and wholesale causes for disease the people are being taught to believe themselves at the mercy of inscrutable, malarial waves, and find little interest or hope in local and personal reform.

So long as our leaders and masters in money-making are in good health and getting rich, why should they lead in reform? In the pride of their strength, these captains of industry slap their broad chests with Louis XIV, and cry: "The State!—it is me!" In a republic this is language for every citizen.

If work-people are sick, what are the odds to our profits so long as a fresh crowd of workmen stand ready to fill vacant places? The teeming millions of a nasty old world hang like a cloud over any fresh development of cleanliness in this. Old-style family labor grew in strength by marriage, and home industry, and long years of steady habits, tending to hereditary virtues. Slavery at the south had to buy or raise its labor with considerable care, and epidemics in laborers' quarters lost the owners a rousing sum in cash. Now, you or I can set a thousand full-grown men at work to-morrow on credit, without risking a dollar upon their health; and capital may discharge a disabled or unprofitable army of scattered work-people any day, without particular odium.

In respect to stream pollution, we grow more and more careless. The fathers of concentrated industry had a few grains of farm economy. They cast their stale bread upon the waters expecting it would return in fish. But the fish come now in cans or salted from streams we have yet set no mill on.

Being a law-abiding people as long as we can stand it, oughtn't we to quote something legal right here to show that the present outrageous abuse of our streams has not the first legal leg to stand on?

Says Judge Potter (xiii, R. I., p. 611): "The right of every owner of land bordering on a stream to the use of the water is well settled; and the fact that he also owns a mill does not lessen his rights. *Prima facie*, he owns to the center of the stream, and if he owns on both sides, owns the whole of the land under it; and he has the right to have the water pass his land in its natural, pure state. . . . This court can not alter the law. Nor can the

Legislature take this right from him any more than it can take his land."

Judge Potter, I am sorry to say, is dead, and this reminds me to say that if we are going to be ruled by judges for a while we must look sharp who they are. With good farm judges, wide awake to the lasting interests of the State, our "malaria companies" would presently be taught by valid decisions from common sense and common law that every land-owner or citizen, whether a riparian owner or not, has a right to his currents of air as well as water, in their "natural pure state."

Once we polluted streams with reluctance. My mother used to scold my father for washing his sheep in the brook. She said her grandfather, who had more sheep, used to wash his in a tank below his barn, and let the rich water off upon his meadows.

In the second generation of wastefulness we throw everything into the brook that we want to be rid of. Aside from the question of health, we are continually destroying each other's industries by dirty water, with much civil war to wit.

Some good people imagine that as our land grows poorer we shall begin to keep our waste out of the brook, and so the millennium will come gradually in that way. But the deplorable fact in Connecticut is, Mr. Chairman, that as the land grows poorer the streams become richer. In our little agricultural coteries—newspaper or scholastic—we are prone to dream that a more frugal science in farming is cutting a wide swath in the minds of men; that we agricultural bankrupts are growing honest and learning to pay our debts to the soil.

Admitted, if you please, that here and there an enthusiastic, a vainglorious, or a conscience-stricken fellow does set a brilliant example of enriching barren fields for his successors to skin. Such efforts do not amount to a huckleberry, Mr. Chairman, in opposing the grand sweep of American fertility into the sea.

I know of one or two praiseworthy cases, where individuals and families have religiously worshiped their land and kept it as God's foot-stool, without robbing Peter much to pay Paul. But these estates have not been "settled" or sold lately, and we can't tell what the religion of our children or successors will be.

We are shown "rich" farms dotted over the eastern states among intervening wildernesses. But the hills from which their richness came look rather dry. The children of wealth are too often educated by their fathers and by society to drain Mother Earth as dry as they can. The "cocoon" of a rich farmer too often consists of personal property—stocks, bonds, and mortgages, easily distributed—easily wasted in blundering New Jerusalems, and rarely finding its way back to the soil again.

American land-butchers, the sweeping "agriculturists" of the continent, cannot be expected to join heartily—can they?—in pumping city sewage against gravitation upon our dry hills and plains, because of a lifelong training in pumping with gravitation. The children or grandchildren of such—going by contraries, according to an American fashion—might perhaps do it.

The capital acquired in virgin land-butchery may help us, as David gathered bloody stuff for the temple; but we might as well try making a good shepherd of an Indian hunter as a sewage gardener from an "extensive" farmer.

This "conflict" we are speaking of began in men's minds away back in the pastoral age. Is that why boys, fresh from city gutters, take their first lessons in agriculture so kindly from the rich plains of the West, and why all is "Greek," to the most of us, betwixt—town and country—the alpha and omega of American civilization?

Sanitary engineering—the new profession, as at present developed—deals chiefly with local traps, vents, flush-tanks and pipes pointing into the creek, and causing—like What's-his-name's revolving gun—"tremendous slaughter on both sides."

Do these engineers propose to arrange their pipes judiciously, in regard to the course of "malarial waves," etc., etc., so that each sewered community shall presently smother all riparian proprietors below, and so make room for suburban sewage gardens? Or, if that is not the game, what is the civil plan? Is there no calculation, no foresight at all? Are we simply setting up mills, villages, and cities, like bricks, along our streams, to knock each other down with plagues of disease and death, like rows of bricks in childish play?

Says Victor Hugo: "Paris throws five millions a year into the sea. . . . With what object? Without any object. With what thought? Without thinking of it. For what return? For nothing. By means of what organ? By means of its intestine. What is its intestine? Its sewer."

The sanitary engineer who comes into my house and gallantly probes the rot caused there by my own or the other fellow's blunders, and takes his wages for ensuring my family against its own waste, must enlarge his views a little. We civilized people are our brothers' keepers to the extent of being already obliged by common law and latent common sense to keep our filth out of his waters. If our modern sanitary engineer undertakes to do that, much of his present occupation will be gone. Capital enough has been invested in direct illegal pollution of streams to furnish every offending household with earth-closets and trained attendants.

Students of society discover that the classes which endure and thrive under filthy conditions of water and air are not such as strengthen a State.

The school of sanitary engineering, yet in its infancy, will comprise a righteous theory of about every kind of goodness. The priest, doctor, lawyer, chemist, statesman, politician, and social philosopher will have to be tried in the crucible of real life many times and born again many times before we shall develop the problems of social waste and cheap food for crowded communities into a polite science and art. Yet many so-called savage races had a fair working practice, and one at least of our domestic animals can give lessons in this simplest of earthly duties. Is not the State institution at Wethersfield the only one which furnishes its graduates positive daily training in this matter?

We must not skip the "moral" or the "human element" in this conflict, as insurance men say, when a touch of hard times sends fire into the "business" camp. In our prisons and jails, how is it? To make both ends of society meet correctively in a prison, our wardens and jailers should be gods, almost, to cure the evil tendencies of legally-selected social waste. Are they so? Do prison contractors set a wholesome example for produce outside of prison walls?

Does it never happen, on the other hand, to the shame of outside society, that the too healthy lad condemned to penal service, takes his first experience of strictly upright management and control in jail?

It will scarcely do to make homes for the dishonest more attractive than honest people can afford; that would manufacture the waste we already have to deplore.

Some of us perceive a decline of independent patriotism; that a government which patronizes whole classes, must neglect whole classes, and that every effort of seesaw reform is apt to aggravate the evil, by causing all hands to look for government help.

What time have we to consider the malign growth of public farming by which feed-pipes are changed to waste-pipes, and the golden calf we worship in the State becomes a worthless old cow with a trick of sucking herself?

Before we are done, and passing a hundred opportunities of exposing my ignorance, among other and very important examples of the conflict of civilization with its waste, I want to excite a little thought about one of our filth diseases in particular, and one that has recently become wofully prevalent in our beloved Commonwealth. One also which some medical men wag their heads over now-a-days as "a great mystery." I allude to "the shakes."

My personal knowledge of this distemper is but small. Being the only person exempt in my district I have to refer to experience, years ago in California, where I had a single brief "shake," but where several of my comrades passed through the chilly crisis, at night, much to my astonishment, in my arms.

It might be difficult to prove such a thing in court, but I have a belief, that man—present company always excepted—is the nastiest of living animals.

For instance—let me tell you what the young community of Sacramento, composed of the "flower" of numerous States, did in eighteen hundred and forty-nine. The river at that point runs between high, bluff banks in the plain while the water is low. So it was difficult of approach with buckets or teams, and water for city use was pumped from the bridge over the narrow outlet of the slough—pronounced slew, in the dialect of that time. It may be interesting to know that the present speaker let himself for $8.00 per day to run the old log-pump taken out of some vessel, that, with two or three hogsheads, fitted to wheels and shafts for as many single horses, constituted the machinery for the city waterworks of that period.

This "slew" was Lake Sutter of the maps, an oblong cove, just above the new city of canvas, calico, and boards, running at right angles with the river, possibly fed by springs, and covering perhaps an acre or two. Its steep banks were thinly wooded, and these became at once the popular retiring-place of the town, and completely plastered with filth.

Perhaps I should say, to the credit of the other sex, that Sacramento was peopled entirely by men, in August, 1849, and the first woman appeared like a wonderful vision, some time later.

I do not recollect that the condition of our water-works was ever the subject of much remark, although every one might have known it. People who can't very well help themselves, touch such topics lightly, in self-defense. Some of us who had time went above, toward the American Fork, for water. A little copy of Preissnitz's water-cure was among my choice possessions. It saved me much pain, if not life; but sanitation was an unknown word among my fellows.

Owing to the long, dry season of that climate, the fecal matter around Lake Sutter would not have been washed into the waters of the lake until the winter rains. So we were for the most part using the leach of preceding evacuations.

The sickness prevalent was appalling, only it wasn't to us, for we didn't stop to think about it—death and disease were so common. The next year was the dreadful cholera year, when we lost fifty daily in a population of 4,000. By that time we must have had some wells dug, and in one way or another began to get ourselves weaned from that horrible slough-water. Of the air on its banks I have said nothing. Buildings went up around Lake Sutter, and so it became less private.

I would not have occupied your minds with this view of the first settlement of Sacramento, if I did not believe that at the same time you would get a glimpse of the carelessness of a pure water supply which has attended the beginnings of all colonies in all new countries. The reckless, enterprising fellows, who begin new settlements, soil the brook the first thing they do. We can reasonably suppose they did it at Athens, and at Rome, as at Rugby, Tennessee—or wherever heedless speculators ever went into camp.

Veteran campaigners, when they think the matter over, will agree with me. The last camp-meeting I attended in New England—a good while ago, I must confess—was no exception to the filthy rule.

Let man go where he will, he carries the material inviting trouble with him, and not one time in a hundred, in my observation, does he keep it out of his drinking-water—almost never out of the air. How can we tell, in a crowd of houses, whose leaky cess-pool stands plumb over the subterranean stream that feeds our well? No wonder we were sick with all manner of fevers on the

Sacramento, since if one man had a fever he was certain to infect the water drank by others.

One of my neighbors recently died of typhoid fever, while drinking ice cut from the dilute dejections of two populous villages, combined. Such ice needs to be carefully boiled, Mr. Chairman. My neighbor was advised not to cut that ice, but said he'd "risk it." His physician didn't know what his medicine was "bucking" against until too late.

The former generation did many nasty things to show its "pluck." Capt. ——, who killed hogs in my district, when I was a boy, finding the cider-mug empty, scooped it among the scrapings of the scalding-tub for a swig—looking around the crowd afterwards for applause. We know less what we drink than he did.

From my readings within a year only, I could quote scores of instances, showing filth as the constant attendant of disease. A "salvation army" encamped on the cleanest and dryest sandy plain may soil its water between two days.

A curious story among the many, came to me between the lines reporting a health convention in the *Sanitary Engineer.* That journal has been, and let us hope, will continue to be very frank and truthful. Newspapers have a politic way of giving important news a very obscure place in their columns. Whoever runs fast will not be likely to read that as he runs.

Special journals are useful studies, but being restricted in matter, they attain but a private, class circulation. Like cases in civil courts, nobody attends to them unless there is some special, pecuniary interest.

In regard to weightiest matters of vital concern the people continue in Egyptian darkness, as ignorant of secret processes against them as in the days of popish inquisition.

I am the more willing to quote this instance from the *Sanitary Engineer*, because it shows how a community, beleaguered with filth, may help itself by means of a board of health.

The New York Board was called to Ogdensburg last summer, for a session of several days, and had a grand hygienic time. Local health boards, physicians, and everybody interested, came in from the surrounding country, filling the hotels, and the newspapers, giving every table and family something fresh or piquantly stale to talk about, besides promoting local trade and putting business men in good humor.

The last half-day of the convention—and I shall never believe that this serio-comic drama was not contrived before hand—when the excitement for public health was at its highest, some one arose and stated that five—or was it seven ?—cemeteries were draining into the public drinking-water! The city powers were present, and doubtless very supple at such a time upon such a subject.

"Of course—certainly"—they stammered, and "steps would be taken at once," or words to that effect, "to remedy the evil."

We must imagine how long "notional" local "fanatics" had been "scolding" about these cemetery leachings. The report gave no hint. Supposing the authorities—chained to the shafts of lumbering city horse-carts—knew their duty well; it may be they couldn't do anything until the people were waked up to their duty too.

Private grief, having no remedy, is scarcely wholesome to bear in secret. To endure public injury in silence brings us to share in public crime. The total of popular wrongs, long repressed, breaks out sooner or later in dynamitic revolutions. The great stupidity of this generation of business men lies in thinking goodness don't know every sin against goodness, while the least peccadillo is being branded on some human heart. Secret injuries to popular life stand out in letters of fire with any increase of heat or light.

To abate social evils in a republic we must "agitate—agitate!" said Mr. Phillips. In this matter of the waste of civilization by polluted streams, no one need dream that we have an easier task than he had, whose work seems not yet thoroughly done. The price of "purity," as of "liberty," is "eternal vigilance."

Rouse a board of health meeting if you can, or if that is impossible, call the doctors to talk in sickly districts. They have ideas fit for a healthy meeting which they do not care to speak at a patient's bedside.

We are trying the latter remedy in my district, and I must say our physicians respond nobly. The people may not be able to see who tells "the whole truth" at first—some testimony may lie like a witness-box—but people will see plainer after a little. It is for their interest to see, and the truth will make them free. Unrighteous opposition serves to stiffen the faithful, and mistaken evidence raises the facts sometimes, as a sliver is raised by running square against the point.

Bear with me, if you can, while I turn your attention to a matter you know as much about as I do—that is, the occurrence of chills and fever in our new settlements, spreading westward for forty or fifty years in our own time, while we, remaining quiet upon our farms in the east, didn't have any, and couldn't understand the trouble.

Says Dr. Ezra Hunt in the *Medical News* of October 27, 1883: "The tendency to deny the influence of any local cause for any disease on the part of the resident community, is one as old as the days of Hippocrates."

Dr. Hunt might have said personal cause, too, for a search for that is not popular. And we may observe that while shame and self interest prevent the exhibition of both local and personal causes, the narrowly selfish and time-serving physician is very apt to acquiesce in charging disease to some remote origin, as that will be more likely to remain in obscurity.

Who went west? Many young and inexperienced people; many enterprising, pushing fellows; some children, some aged people; many discontented folks not well fixed in the east, but yet with the pluck to "dig out"; as many wise and shrewd women as you please to nominate.

Well—how did they travel? In the beginning—in the time we are thinking of—they took the common road, of course—none too good—halting at common camping places, and drinking from the same springs and brooks. They traveled, in part at least, by long routes, where one person, being sick, might pollute by his dejections the water and air of many following. This is pure theory, no doubt, but is it not reasonable? Knowing the carelessness of men—saying nothing about filth in streams by actual purpose, for that outrage was left to our own times to do—can we not see how our western cousins ran the gauntlet of filth diseases in their air and water, carried them to their new homes, and got such a prejudice against water—any water, and air also—that they were very apt to boil the one before drinking, and some of them tried to shut the air out of their houses, as some of our own frightened people have done?

Was it an old style Tennessee preacher who dashed his water with spirits, "because since the flood it tastes so strong of sinners?"

Whoever started west in the early days soon struck the trail of strange travel, where all manner of people were journeying—refugees from towns, immigrants directly from the ship, etc. The malarial wave of those days, Mr. Chairman, was a long streak of contagion, branching as the people spread to find their new homes.

How did our western brethren ever get over their sickness? Some didn't. Others—the more prudent, careful, thoughtful, and industrious, with fixed and steady habits—soon strengthened themselves in quiet, well-ordered plantations, like the best of those among their old homes, where their water and filth were kept separate.

Why did we never have intermittent fever in New England in old times? We did have it in spots. Several bad spells are recorded, where new people were coming in and settlements were crowded and nasty. President Hunt, of the National Health Association, says our factory people always had more or less of these filth fevers.

Isolated farming communities among the hills and upper valleys of Connecticut didn't feel these modern plagues much until the disorder of the old rural society ran into decay. Moths don't lay eggs in worker cells, bee-keepers will tell you, while swarms are numerous and the hives of home industry are strong. We didn't own to the presence of filth disease in particular—we didn't have this malarial racket—until after the great mixing of the war and subsequent commerce; when immigration was constant, and our streams were becoming dreadfully polluted; when all the machinery was complete for injecting our headwaters with fresh imported virus—direct from the Pontine marshes, if you please.

Now, with filthy emanations ubiquitous and omnipresent, false science or quackery—traitorous alike to the soil, to society, and the purity of the world—is able to discover and boast of its mysterious "waves" of bad air or malaria.

To check the waste of civilization at its fountain-head—to abolish these malarial waves—let us check the malarial ripple of our sewers, and all the fecal waste we possibly can. Teach the people to BE CLEAN, and these waves of malaria—as the old farmer said of the dollars, if we take care of the cents—will take care of themselves.

The CHAIRMAN. The audience I know will be happy to hear from Prof. Brewer, if he has any light to throw on the subject.

Prof. BREWER. I shall have but a few words to say, although I consider this subject one of supreme importance. There is no problem that is presented to the civilized world to-day that is more difficult of a practical solution or of greater importance than this one that Mr. Olcott has touched upon. I do not know of a civilized country, except our own, that is not trying to meet it in some way by intelligent investigation. We have been told that this State does not want to hear about it. The number of deaths that are caused directly by this pollution of streams and pollution of waters every year, in this State, is very large. Of that there is no question whatever. Unfortunately, we cannot always put our finger on the man and say, "This man was killed so, that man was killed so," as we could if they were shot or killed at a railroad crossing, or something of that kind; but, nevertheless, they are just as surely killed, and that people are surely killed is just as susceptible of proof in one case as in the other. We can only prove it, however, in the averages, and not, generally, as to the individual. Sanitarians, as you know, study death tables for the purpose of comparison. Those diseases and accidents of which men die are classed in five great classes, one of those being what are called "accidental," including persons who die from wounds, and so on. Another class we speak of as "developmental;" those that are incidental to the growth of the human race; the teething of children, old age, the diseases incident to child-birth, and so on. But these two only kill off a small portion of the population. The great mass that go down to their graves before they are three score and ten, die of the other third class of diseases, which embraces the local diseases; all kinds of local inflammations, the constitutional diseases, to which cancer, consumption, and so on, belong. But the class of which we are speaking here to-day we call "zymotic diseases." They include all the pestilences, contagions, and all of those diseases which spread, as cholera, as typhoid, as the plague, and so on, do through their contagious nature. They are largely preventable diseases. I do not believe the time will ever come when they will entirely cease, because men will never live up to the best of their knowledge. So long as there are folly, and selfishness, and sin in the world, everybody will not do as well as they know how, and some will die always before the natural term of human life; but much fewer will die of those diseases in the future than in the past. I believe to-day we have got perfect control over cholera, over the plague, over the typhoids, over the small-pox, and a variety of those diseases which in previous ages have kept down population, prevented the growth of all large cities, and constituted all of the pestilences, nearly, to which people in our climate were subjected. But there is a large class of diseases called "filth diseases," to which these zymotic diseases belong. Whether they are caused by the pollution of well-water or not, some of them we know are spread in that way. I say we know it. There is no question of it whatever. The man is a fool who stands up in these days and denies it, with the facts in regard to the spread of those diseases. We cannot prove that some are caused by it, but we know that if they are not caused by the pollution of the water we use, it enormously increases their malignancy. We cannot prove that diphtheria is caused by it, but anybody who has had any experience in the matter knows that it enormously increases the malignancy of diphtheria.

Now, to come back to the point that is directly before us, this matter of the pollution of streams. It must be taken hold of in this State. I say it *must be*, and it *will be*. (Applause). It is simply a question of time. There are two reasons to-day why it is not taken hold of, and only two. First, a large number of people are ignorant, or at least uncertain, as to the facts; and, secondly, there are important money interests, vast concentrations of capital, that want things to go on as they are. Now, as individuals suffer, they cannot frighten great corporations; they cannot contend effectually against the influences which are exerted by those who have large property; but I tell you, as we see this matter more clearly face to face, as we see the disease, suffering and death that it brings, and the lives that might be saved by a more enlightened policy, it is sure ultimately to be acted upon. The State cannot afford to go without it. If it is not taken up on humanitarian grounds, it will be on pecuniary grounds. That has been the experience of more than one place. Sanitarians and philanthropists talked for a great many years regarding the conditions of some of our south-western and west-southern cities with respect to yellow fever. So long as only men died and people suffered, while business went on in the city of Memphis, these warnings were disregarded. They had a cess-pool system there which seemed incredible to us. The city lay on level ground along a bluff, and in order that they should not have so much trouble with the filth (they were entirely without sewers) they dug their cess-pools deeper and deeper. I have forgotten how many thousands there were in the city, but I have not forgotten the depth of them. They were thirty, forty, fifty, and sixty feet deep, and they were not cleaned out from generation to generation. They went on digging more of them and digging them deeper, and although that matter was not stopped on humanitarian grounds, there came a time when it had to be stopped on other grounds; when the States around said, "We cannot have a single city stand as a menace to the commercial prosperity of the great Mississippi Valley." When pestilence swept over them, it bankrupted the city. The city, as a city, passed out of existence. There is no city of Memphis to-day. They have disincorporated it, to get rid of debts which they could not pay; for a city may be bankrupt by sickness as a man may be; and they sewered the city, not they, but others did for them, to save the Mississippi Valley from pecuniary loss.

Now, while I do not say that the state of things here is such that we shall be placed in quite such a bad condition as that, I say the day has passed when any town can afford to be sickly. There is no city that can afford to have the reputation of being a sickly place. Trade will not go there, manufacturers will not build there, and if any town gets the reputation of being permanently unhealthy, it is the heaviest blow that can be laid upon its prosperity. Times are not now as they used to be, and the competition between cities is very different. Large numbers of people are more afraid of going to an unhealthy place than they used to be, and if the State of Connecticut, or those who act for the State in its legislative halls, will not consider this matter on humanitarian grounds, for the saving of life and the saving of health, they will be compelled to do it to save the prosperity which has heretofore blessed the State. I am sure that something will have to be done, that something will be done. I have no plan to suggest by which this is to be brought about. It is a complicated question; it is a question for engineers, it is a question for money to work out; but that it must be brought up, that it must be made the subject of legislation, and that it will be, I have not the slightest doubt; and all I ask of you is, that each and every one of you will use your influence to hasten the adoption of some measures to put a stop to the sickness and suffering and death, that the condition of things which now exists entails upon the people of the State. I have seen considerable of the pollution of streams in this State. How much it has to do with the introduction of malaria here I shall not discuss; that it has very much to do with its malignancy, and with the condition in which we now find it, I have not a shadow of a doubt.

Mr. Wetherell. I have heard it claimed that water purifies itself, and that where it is polluted by a factory, by the time it gets a mile away from the factory, it is as pure as if the factory had not poured its filth into it. I would like to ask Prof. Brewer if that is so.

Prof. Brewer. I can explain that in one sentence: It is not true.

Mr. Wetherell. I did not suppose it was.

Prof. Brewer. It has not been proved true by an experiment that ever has been made. I have samples now of water polluted with all the ordinary forms of filth, with sewage, with urine, and so on. That water has been standing since last May. There is fermentation going on. The water works clearer in looks, but it is not pure. I ought to say right here, that a great many persons are misled by this. I have given special attention and study for many years to one point connected with this, from another direction. Where waters are inclined to be a little roily or turbid, a very little sewage clears them of that turbidness. A very little sewage passed into water that is roily will clear it; I mean, it will make it clearer than it was before; but that does not make it purer to drink; it may retain all of its virulence. Some of the most deadly waters that have ever found their way into wells have been of exceeding clearness, sparkling and bright. I will only cite one case, but if you should look through the records of sanitarian literature, you would find that it would take more than this afternoon even to cite the others. I will simply refer to what is known in sanitary literature as the Broad street pump affair.

Sanitary science, as we know it, is of very modern date. It had its start with the outbreak of cholera in London about 1848. It was in this country in 1849. It was then discovered that cholera was spreading in that city through its drinking-water. Then, with the outbreak of the same disease in 1866, it was more fully investigated, and as the result of the investigations there, the present health laws of Great Britain were enacted, and sanitarian science in the shape which it has now assumed may be said to have begun with those cholera outbreaks. In one of those outbreaks there was a sudden explosion of cholera, as they called it. If you could imagine a steam boiler to have blown up in a certain part of the town and scattered its water over a crowd, and here and there, wherever a drop fell upon any man, that man had died of the cholera, it would illustrate what happened in London at that time. In a small district of the city, if I recollect right, over five hundred people died within two weeks. It was found that they lived around a certain pump, known as the Broad street pump. It was found that people had been in the habit of drinking water from this pump. The water was very popular, because it was clear, and bright, and sparkling.

Many people drank that water in preference to the water supplied by the water companies, which came from the Thames, which everybody knew to be foul. Now, what relation had that to the cholera? It was made a subject of lengthy investigation, the reports of which may be found in the reports made by the medical officer to the Privy Council in one of the English Blue Books. They found that the earliest cholera patient in that vicinity had lodged in a house very near this well; that he had died there; that during his sickness, the ejections had been thrown into the privy vault; they found that that was a leaky vault; and that all the materials had leaked through into the well; they found the track along which the filth had run to the well, and they found that immediately after this occurred, that which sanitarians call "an explosion" took place, which killed, as I have said, over five hundred people in two weeks. They found that in one case an old lady, living four or five miles away in the city, died of cholera. They could not find out that there was any such infection in her case, but it turned out that the old lady had formerly lived in the vicinity of this Broad street pump; she thought the water was the purest in the city, and she was in the habit of sending her man with a large jug over there to get the water from that well. She was the only person who died of cholera in the neighborhood where she lived. I only cite that to show that we may have water of apparently exceptional purity, which we know contains sewage. Every experiment that has been made of late years shows that waters do not purify themselves except in a very long time. They must run a long ways and be a long time exposed to the air, before they will be purified; they do purify themselves in the end.

Mr. Webb. This is a question of which I have been thinking a good deal, and for a good many years. That the emigrants polluted the springs which they passed on their journeys, I cannot believe. I have crossed the plains eighteen times and never had a chill. I have traveled with large crowds and small. In 1849 I was on the frontier where people were dying by hundreds of the cholera; I passed through and all around them and never had a chill. I have traveled in thirty-four States of the Union and voted in four, and came back to Connecticut to catch the ague and be made a freeman. That all this sickness and all this malaria results from the impurity of streams that are polluted by the filth from cities or villages I do not believe. I think that the defective plumbing in our cities and towns, upon which so much money is spent, is the cause of as much disease as anything else. I have had a little experience in this matter. I have within a mile of me forty acres of ground which is a swamp, and as filthy and foul as any man in Connecticut can find, and on that forty acres the water is at nearly all seasons of the year from six inches to four feet deep, and filled with vegetation growing up and decaying. We have six or seven ponds on the hills surrounding; I do not know the amount of ground flowed, but there is a very large amount which in the woods, and all flowing over this swamp from the surface and the little streams and the falling rains. Waterbury has the same thing, and all these villages down here have the same kind of ponds and reservoirs filled with surface water, and that water is brought to the villages for drinking purposes. Have the exhalations from such places nothing to do with malaria? Years ago we tried to get the New Haven water company to do something. I was appointed on a committee by the people of the town of Hamden to appear before the legislature and get them to compel that company to keep that pond up to a certain stage of water, and not to drain it down more than two feet. When they drained it down, it would smell badly enough to kill a hog. They finally agreed that they would do it. But when it comes to a remedy, it is pretty difficult to find it. As I was going to find some experts to examine the ground and to give an opinion in regard to it, I met a member of the legislature, an old acquaintance of mine from Litchfield County, who was a representative. I stated the circumstances, and asked him if he would not do something for us. He asked me, "Is there any money in it?" I said, "Not a red! There is life and death there, but no money. We are going to make a square appeal to the legislature, and if you have got principle enough to help us, help us; if you haven't, help your master, the Devil." (Applause.) I let that man slide. I have been around there with Prof. Brewer, a member of the Board of Health, and he knows it and knows how it looks. Here is a cash capital of three or four hundred thousand dollars, and they do not care whether a life is worth a thousand dollars or two cents.

Prof. BREWER. They said their works were worth a million and a half when the city was talking of buying them.

Mr. WEBB. I took a census of the town of Hamden, and I think I found but five or six of the inhabitants of that town who had not had the fever and ague, more or less, and a large number of them most of the time.

Now, what can we do? I say, le the Legislature pass a law that every one of those ponds shall be cleaned. (Applause.) There are many large places where the pond, when the territory was originally flowed, was quite deep, but the accumulations of silt and the deposits of vegetable matter that has grown up and decayed, have made the water comparatively shallow, and it is full of pond lilies and all kinds of water grasses, which are growing up and decaying. Let the Legislature say that those ponds shall be cleaned, and let Yankee ingenuity invent a dredge that shall clean them out and throw the mud upon the borders of the pond and the farmers will carry it off. It comes to the matter of dollars and cents. How much is a life worth? But when people unite and say this thing must be done, and make a row about it, then the capitalists, who are interested, will hire experts by the hundred, and every one of them will swear just as he is paid to swear. (Applause.) There is no use talking. That is the square truth, exactly. Now, then, we have got to face the music to do anything in this regard. We have got to clean the ponds, and we may have to clean the house, to some extent.

Dr. JENKINS. I have been a little interested lately in examining the different experiments that have been made with regard to the utilization of sewage and getting it so that it shall not be a cause of disease in the community. In considering the matter of the care of sewage, there are two considerations. The first one, of course, is the sanitary consideration—the damage to life and health which results from the way in which sewage is cared for, or rather left uncared for, at present; the other is the actual money loss to the community. We know how carefully sewage-material is saved and is prepared in China for use on the land. The fertility of their lands is maintained almost entirely by the application of this waste material—the dejections from the population. Various experiments have been tried and are being tried with regard to the use of sewage for irrigation. In the neighborhood of Edinburgh, there are extensive fields which are irrigated in that way by the city's sewage; it has also been tried in the neighborhood of Berlin, and in other places.

I have recently read a discussion upon this same matter before a society of German investigators, and it seemed to be the general sense of the meeting that those experiments were not encouraging. Experiments are being tried, and with apparent success, in certain places, by treating sewage chemically. The city sewers carry into the streams only what is called storm-water, or water that falls in atmospheric showers, and the water from the kitchen sink, the kitchen slops, and the rest, is passed into cisterns which are regularly pumped out and the contents carried to a central station, and there, by chemical agents, they are precipitated as far as may be; that precipitate is prepared to a certain extent and sold as poudrette. The liquid is put into a large distilling apparatus and sulphate of ammonia is prepared from that, and then the rest of the material, the fluid, which has been rendered comparatively innocuous, is run off. But in our large cities, in the ordinary way of handling sewage, that would not work. It seems to me if we could only all of us be farmers and go back on the land, returning to the old Levitical administration, the difficulty would be remedied. There has been no way devised of treating refuse matter better than that, and the nearest approach to it seems to me to be the earth-closet system, which has its draw-backs and its disadvantages. But, as Prof. Brewer has said, this is the great and trying question of our times, and it is something that has got to be settled before long, or it will settle us.

QUESTION. I would like to ask Dr. Jenkins one question: Can a typhoid germ be detected by analysis in water?

Dr. JENKINS. Not by analysis at all. It is possible that water which by chemical analysis would be regarded as absolutely pure and harmless, may contain the most virulent and poisonous germs.

Prof. BREWER. I wish to say, in that same connection, that there is no case on record of typhoid fever being spread by earth-closets. Inquiries have been made in the sanitary journals, and they have not brought to light a single case of typhoid fever being spread in that way.

Dr. JENKINS. I know a family of four persons in the city of New Haven, who, during one winter, used an earth-closet and found it worked with entire success. They used the dry ashes that were taken from the stove in the room.

Mr. WETHERELL. I would like to inquire if the dilution of sewage matter by the large quantity of water which falls in showers, and the large quantity which is used for domestic purposes does not make it quite worthless as manure?

Dr. JENKINS. That is the great trouble in handling city sewage for agricultural uses. It has been so diluted with enormous quantities of water that it cannot be profitably handled on the land. In Berlin, acres of land have been converted into a marsh by the deposit of this sewage upon it. Nothing can be done with it, on account of this enormous quantity of water with which the sewage is diluted. Not long ago I had occasion to examine the sewage from the outlets of a number of our New Haven sewers, and I examined also the amount of solid matter in our drinking water in New Haven. I took what is called a tolerably pure article of drinking water. It had four grains of solid matter to the gallon. The water from the sewers, which was rank, which had a foul smell, and which was disgusting to the sight, did not contain over forty grains of solid matter to the gallon. Yet the one was good drinking water and the other was positively filthy. But you see that in a gallon of this sewage you get only about ten times as much solid matter as you do in the water as it comes from the delivery pipe in the city.

Prof. Brewer. Let me add a word here. I think it has been proved conclusively in the old world, that where the storm-water and sewage are carried by the same sewers, that material cannot be handled for agricultural purposes; but where the sewage proper is carried off in one way, and the storm-water is all carried off in another way, by what is known as the separate system, (of which the system adopted at Memphis is an illustration,) that makes a very different matter. In our climate, more water runs off from the soil than sinks in. Now, if we take into account that more than half the rain fall, coming intermittently as it does, goes out with the sewage, you see that the aggregate sewage is enormously diluted. It was found in London that the average was literally purer than some of the water of the wells that was used; that the ground had become so befouled that the water that got into the wells absolutely contained more organic matter, by chemical analysis, than the average sewage of the city.

Mr. Wetherell. I would like to ask Prof. Brewer one other question: What are these corporations going to do with this filth that is incident to their places, in view of the difficulty of handling it?

Prof. Brewer. That is a problem for them to settle and not for me. If my neighbor creates a nuisance on my premises, I tell him to get rid of it. It is his business to get rid of it and not my business to solve that problem for him.

Mr. John S. Kirkham. I want to ask Mr. Webb if there are any fish in those ponds?

Mr. Webb. Yes, sir, there are eels there, plenty, and there may be other kinds in that swamp. There are very large springs breaking out in that swamp, boiling up from the bottom.

Mr. Augur. I want to ask Prof. Brewer or Dr. Jenkins if there is any simple means by which the amount of impurity in water can be determined?

Prof. Brewer. Unfortunately not.

Mr. Kirkham. I asked Mr. Webb that question about fish because of his statement that he did not believe that the sickness and malaria came from the cities and villages. We have a stream in our town that used to be a good trout brook; it was filled with perch and suckers, and an abundance of fish of all kinds, which were healthy and good. But now fish cannot live there. There are no fish in six miles of that stream which runs through our town, because it is poisoned by the discharges from a city sewer.

Mr. Webb. Is not the destruction of the fish caused by chemicals?

Mr. Kirkham. There are no chemicals of any kind that go into it. The death rate of the city of New Britain, as I was told by one of the oldest citizens there who had looked into this matter, has increased from twenty-four in a thousand, fifteen years ago, to over forty last year, since their sewage system was introduced; and in the town that takes that sewer, which was a noted healthy place twenty-five years ago, and where, as old Dr. Brace said in his fiftieth aniversary sermon, but ten perished out of a thousand in a year, of all ages, the last six years, the death rate has averaged nineteen in the same number. These facts tell a story that must be explained somehow.

Mr. Webb. I did not say that sewage running into a stream did not make the water impure. I should not say so, by any means.

Col. Warner. I would like to ask Prof. Brewer what he would recommend for New England country homes as the best method of disposing of refuse matters.

Prof. Brewer. I will tell you what I would do if I had a country house. I would take care of my liquid slops, and have them run into a tub, and I would have handles to it, so that it could be carried off a few rods from the house and the contents dumped upon the ground for manure. They oxidize pretty rapidly in that way. As regards the other matters, I think I should be governed by circumstances. If I used an ordinary privy, I should disinfect it with lime. That is what I used to do in olden time, when I lived in the country. The disinfection is complete and the deodorizing is complete. Of course, the vault must be kept dry; and, with all its disadvantages, I believe that the earth-closet is eminently practical. I have seen within the last year, in the suburbs of a large city that was not provided with sewers at all, where you would think the problem was a great deal more complicated than in an ordinary country house, (it was, I may say, in the city of Minneapolis,) a number of families that had transformed their old-fashioned privies into earth-closet arrangements. Dry earth was collected in the summer and put into barrels (it was the dust of the road), and a barrel of this dust was set in the old-fashioned establishment that they had back of their houses. The material was dropped into a wooden box, and once a year that was shoveled out, and found perfectly innocuous by the farmer who took it away. He said it was worth to him the cost of hauling. I have known several cases in the country where the earth-closet has been used successfully. The only trouble is the care that is required to have dry dirt always on hand. That is liable to be neglected.

Mr. — ——. I have noticed that the removal of the filth from the vaults in cities is very disagreeable. This may be easily avoided. At my own home, the coal ashes are thrown daily directly into the vault. The result is that in the spring, when the vault is cleaned out to go out on the farm, there is no odor; the men find no difficulty about it. Whether coal ashes are of any value in themselves I do not know, but they certainly remove all odor from the vault itself, so that there is no trouble about the house.

Prof. BREWER. As a sanitary arrangement, that is complete. It is an absorbent.

Mr. WEBB. That is something within the reach of every individual. Make your vaults shallow, put in your coal ashes, and the vault will be kept perfectly sweet; you would not know where it was. I find that my men would a great deal rather take the material from there than from the manure sheds.

Mr. ———. We know that sewers are indispensable in cities, but where the outlets from them run into our streams, they are made very impure. I know a stream of water that runs through a large number of farms, where a great many cows are kept, and in warm weather that stream is offensive for miles off. The cows have to drink that water, and I don't suppose it enhances the value of the milk. I don't believe Prof. Brewer can tell us what to do in such cases.

Mr. CHAMBERLAIN. I feel that it would be almost presumption in me at this point to attempt to add a word to the very able, instructive, and entertaining lecture by Mr. Olcott, or to the words of these gentlemen, who have given this matter so much careful and intelligent research, from whom we have heard; but I will cite one instance to show that men of scientific research, upon whose intelligence we uneducated farmers depend so much, are sometimes at fault in this very matter. I remember that in the early history of Meriden, it was thought necessary and indispensable at one time to appoint a board of health who should look into this matter of house drainage which we have been considering this afternoon. What was the result? It was this. All over the city, people were required to drain into cess-pools, and in many instances, where the drainage of the house ran upon the surface and was rendered by the air and the soil to a great extent almost utterly harmless, people were compelled by order of this board of health to empty it into cess-pools within six feet of their cellar walls. Now, Mr. Chairman, I do not believe we can over-estimate the importance to ourselves of this question. How can we stop this rush of fertilizers to the sea, as Mr. Olcott has put it, or this danger to human life, as these other gentlemen have put it, as well as he? But I see the great importance of this matter and the importance of some expression on the part of this convention upon this subject, and I want to make this simple motion, that the chair appoint a committee of three, who shall draft a resolution to be offered at the meeting this evening, expressing the opinion of this convention upon the importance of this question and the importance of public action upon it. As Prof. Brewer has told us, there must be and there will be public action upon this subject. I think it no more than fair to Connecticut that this body of most intelligent gentlemen should express their opinion upon this question.

This motion was carried, and the chair appointed the committee as follows: Messrs. Chamberlain of Meriden, Prof. Brewer of New Haven, and Dr. Bowen of Woodstock.

Question. How many bushels of corn can be raised per acre, upon land too poor to raise anything but mulleins, by using patent fertilizers alone?

Mr. Ayre. I have raised with commercial fertilizers, or chemicals, one hundred and forty bushels of ears of corn to the acre on land that was too poor to grow mulleins.

Mr. Gold. I think Mr. Hall of Wallingford raised on those sandy plains over one hundred bushels of ears of corn to the acre by commercial fertilizers alone. That land is naturally too poor to grow anything.

Question. At what expense?

Mr. Gold. He had a very handsome percentage of profit.

Mr. Chamberlain. Will you tell us what the fertilizers were?

Mr. Gold. Mr. Hall was at that time in the dried fish business largely, and I presume that dried fish was the material principally used.

Mr. Chamberlain. I was on Mr. Hall's ground at the time, and I asked Mr. Gold to state what the fertilizers were that he used, for my own memory failed me in the matter. I remember this, however, that he told me he used one ton of dried kelp to the acre, besides a generous addition of his own fertilizer.

Mr. Webb. Let me say on the kelp business, that every-one who bought it did not consider it worth five cents a ton.

Dr. Jenkins. That question suggests another, and that is, the method of cultivation. I should not be at all surprised if the ton of kelp to the acre which was put on the Wallingford sand would be a better application for that land, with a proper system of tillage, than a stiff dose of Peruvian guano.

Question. Will some one give his experience in planting chestnuts for timber?

Mr. Skilton of Morris. In the town where I reside, some fifty or fifty-five years ago, a man took it into his head to see what he could do with chestnuts. He ploughed up a piece of ten acres and sowed it with chestnuts. Last year, that piece of timber was sold to a man to cut off the wood for ties. He got some times seven ties from a tree. He cut off two thousand from less than half of it, and took the poorer part. There are trees now remaining, as he told me this week, that are eighteen inches to two feet through at the butt—nice, straight, chestnut trees.

Prof. Brewer. In what part of the State was that?

Mr. Skilton. That was in the town of Morris, bordering on Bantam Lake.

Mr. Augur. What was the value of that land before it was planted?

Mr. Skilton. The land adjoining that, which is nearly of the same character, is worth not to exceed twenty dollars an acre to-day. Probably that land adjoining, which is in pasture, may have deterioated since that was sold.

QUESTION. What is the best method of ice calkings for horses?

MR. OLCOTT. I have used for twelve years the screw calker which you have seen on the table. I have made one pair of shoes last four years. I have three or four horses shod in that way. When I want them to go sharp, it does not take a long while to get ready. Otherwise, I might have to go to the shop and lose considerable time.

MR. WETHERELL. Whether or not there is a tendency to ball up?

MR. OLCOTT. We have that trouble with any shoe that I know of. I don't know that it is any worse in that respect than any other method of shoeing.

QUESTION. What can we sow in spring to replace the usual hay crop, when, owing to the drought, our meadows are not producing as much hay as before?

MR. GOLD. Sowed corn, millet, or Hungarian grass, according to the soil and conditions, will furnish a supply of fodder in almost any part of Connecticut. Sowed corn I should prefer to sow in drills; millet, or Hungarian grass, I should sow broadcast.

MR. WEBSTER. What distance apart would you have the corn in the rows?

MR. GOLD. We could spend all the rest of the evening discussing the methods of raising sowed corn and the advantages of this, that, and the other method. I prefer to put it in rows from three to four feet apart, and not over three pecks of seed to the acre, that small ears may grow upon the stalks, and that there may be perfectly healthy plants to feed, rather than plants with small and stunted leaves, that never even send out a tassel.

MR. WETHERELL. Whether fodder corn is not more valuable to raise for milch cows than Hungarian grass?

Mr. Gold. Under certain conditions, we can get three tons of Hungarian grass to the acre, cure it and put it in our barns as cheaply as we can get an acre of hay grown upon our fields; but under other conditions, the Hungarian grass will be an entire failure. Hungarian grass requires well-tilled, finely-pulverized, warm soil, free from weeds and other obstructions, and to be sown late in June, after the weather gets warm, and then it will make a rapid and satisfactory growth, from a ton and a half to three tons per acre, that can be cut with a mowing machine and cured as readily as hay, and it will make hay of the most nutritious kind for animals.

Mr. Webb. I will say one word in regard to that. If a man finds that he is going to be short of hay and wants to help himself out, he can do as I did last spring: turn over a piece of ground and sow Hungarian grass. I have raised three crops the past season on the same ground, sowing my oats early in April, manuring thoroughly, cutting the oats as soon as the heads commence to show; then turn the stubble over immediately and sow it to Hungarian grass, putting on another coat of special fertilizers; the Hungarian grass will mature sufficiently early so that you can cut that and sow a crop of turnips. In that way you can get a large quantity of first-class food for your stock. With a long season, you can get perhaps more food by a crop of sowed corn, dried well, and which will help to fill up.

Mr. Chamberlain. I would like to endorse what the Secretary has said respecting the nutritive value of Hungarian hay. I regard it as one of the most nutritious of the plants that we can cultivate. I think it discounts the best English hay that we can raise or make, and it grows very quick. Mr. Webb told me that he harvested his Hungarian crop in forty-two days from the time he sowed it. This can be done at any period after the ground gets sufficiently warm to give it a quick and luxuriant growth. I think Mr. Webb's suggestion in regard to sowing oats a very good one, because we can get the oats off about the time the ground gets sufficiently warm to put in our Hungarian grass. It is a remarkably available crop. As Mr. Webb says, if you find you are going to be very short, after you have taken off a piece of early potatoes, early peas, or anything of that sort, you can easily raise a crop of Hungarian hay afterwards. I cultivated some three or four acres the present year. That which I sowed early matured in forty-five days, so that I cut it when I thought it was just right to cut. I cut it just before it comes into seeding. I think we should be careful not to allow it to seed, because, of all grasses, I think this is most injured by ripening. I question whether it is altogether healthful food for cattle or horses after the seed is formed; but, on an acre of ground, I produced nearly four tons of perfectly dried Hungarian hay, and the ground was not very highly manured. After I had taken off a crop of peas, I put Hungarian seed on that ground; the drought affected it very seriously, but still I got a good crop. I believe Hungarian grass to be superior to millet; it makes more palatable food, and is not so harsh for the animal's mouth. Millet is a little woody after it is dried, and I think not so nutritious.

The CHAIRMAN. I would say in this connection, that I have found in the eastern part of the State a great mistake on the part of farmers. They think that because Hungarian grass will grow in forty-two days, they can sow three or four crops a year. As I understand it, it should not be sown until after the first of June, when the ground is thoroughly warm.

Mr. CHAMBERLAIN. I have known two crops to be grown with fair success; the first crop being an excellent one, the second, a fair crop.

QUESTION. How much seed do you sow to the acre?

Mr. CHAMBERLAIN. I sowed on this acre just about three pecks, which made it quite thick.

QUESTION. What is the best variety of corn to be sowed for fodder corn?

Mr. GOLD. White Southern corn. It is preferable to the Western corn, and to any variety that we raise here with which I am familiar. I have found that every kernel of thoroughly ripened corn from Delaware, or somewhere down there, would grow, which is very rare, in my experience, with Western corn.

Mr. WETHERELL. Has the Secretary tried any of the large varieties of sweet corn for that purpose?

Mr. GOLD. Yes, sir, in small quantities; but the difficulty in growing seed of the Evergreen corn and other varieties is such that in our section of the State we should rarely get enough of it to make sure of a crop.

Mr. WETHERELL. My farmer finds that sweet corn gives better results than any other kind of corn as feed for stock.

Mr. WEBB. I raise but one kind of corn for sowing and for the grain. I have what is called "the Pennsylvania Dent." It is a yellow corn, with a white cob.

Mr. WEBSTER. In my experience, the fodder grown from sweet corn has been the best I ever knew.

Mr. ROOT. I have heard in this Convention that gentlemen can raise one hundred bushels of shelled corn to the acre. Which is the more valuable, that one hundred bushels of shelled corn with the fodder, or a crop of sowed corn, on the same ground?

Mr. WEBB. My sowed corn is planted in rows about three feet and six inches apart, and from four to six grains in a hill, so that it will ear to some extent. From a little experience I had this fall, I am going to try two sowings. First, I will set my machine so that it will plant once in four feet, about four kernels, three feet and a half apart. Two weeks afterwards, I will set it so it will sow between the existing rows. In that way, by accident, I got a second crop, one above the other, and I got a very large proportion of ears from the first sowing; the other tasseled out and made very excellent feed. I have never had anything that would produce so much milk, fed green, as that. It happened accidentally, but the result was so satisfactory, that I am going to try it again, as an experiment.

Mr. Root. My inquiry has not been answered. I want to find out which will pay best, the shelled corn or the sowed corn?

Mr. Webb. I can tell you—that which you need most. I used both. I have raised about six tons and a half of dried fodder; I have raised twenty-six tons of green; in the dried state it produced, I think, about six tons. Properly made and properly cared for, that is equal to hay, although perhaps it is not generally so considered. I have a milk dairy, and sowed corn, ton for ton, will be equally profitable with hay.

Mr. Gold. In answer to Mr. Root's question, I will say that I tried, this season, this experiment. I sowed, with a machine, two fields of about seven acres each. All the land was prepared in the same way. The first half of each field, we drilled in about half a bushel of corn to the acre, in rows four feet apart. The other half of the field we made the rows three feet apart, and drilled in about a bushel to the acre. This was done in both fields, putting the sowed corn upon the poorest part of each field. We cultivated both fields almost entirely by horse power, with the cultivator and plow, going over both parts with the hoe, very lightly, once. The sowed corn was cut up and fed green; the small surplus being fed dry to the cattle. Of course, the labor was very much less upon that than upon the other. I am unable to say which part of the field was most profitable; but, as Mr. Webb says, the profit depends upon which kind of feed you want most. I wanted sowed corn at that season, and I raised it by drilling three feet apart, and with very little culture, except by the horse. I wanted the grain, and I got that from the part planted four feet apart, and with very little hand culture.

Question. Has any one used bone dust to any extent on grass land, and for other crops?

Mr. Hale. Our farm of about forty acres, devoted to small fruits, has been manured almost wholly for the past ten years with raw, ground bone, and muriate of potash—depending largely upon the bone. We have taken poor, worn-out land, apparently, some of which was so poor that it did not produce five bushels of rye to the acre, and built it up into very productive land for a fruit garden, wholly upon raw, ground bone and muriate of potash.

The CHAIRMAN. What quantity do you use to an acre?

Mr. HALE. We use more, perhaps, than would pay for ordinary farm crops. We have used 1,000, 1,200, and even 1,500 pounds to the acre of bone alone, and as high as 500 pounds of potash.

Mr. A. J. WHITTLESEY. I would like to ask Mr. Hale, whether he used the dry bone or the wet?

Mr. HALE. For a number of years we used fine-ground, raw bone, dry, perhaps twenty per cent., as fine as flour, the balance coarser grades. For the last three years, we have been using very fine bone, which we obtain from Rogers & Co., at Meriden, and which costs twenty-five dollars a ton. This is more readily available than coarser bone, and we have found it very satisfactory indeed.

Mr. AUGUR. We have used the same article to which Mr. Hale alludes. There is considerable moisture in it sometimes, but often it gets reasonably dry, we have used it on our peach orchards, considerably, and we think favorably of it. I do not know that we have used it quite as largely as Mr. Hale. I should say from six to eight hundred pounds to the acre, perhaps every other year.

Mr. WEBSTER. Is this sowed on the surface or plowed under?

Mr. AUGUR. We have usually sowed it broadcast and cultivated it in.

Mr. SEDGWICK. I would like to say, in connection with Mr. Hale's remark, that if farmers can buy fine-ground bone for twenty-five dollars a ton, they better run in debt and buy all they can get. It is the cheapest fertilizer at that price that I know of.

Mr. AUGUR. This is damp bone, containing something over twenty-five per cent. of moisture.

Mr. SEDGWICK. Bone in New York is worth twenty-eight dollars a ton before it is ground, and if any farmer can buy fine-ground bone for twenty-five dollars a ton, it is a great investment.

Prof. CLARK of Amherst. We have used bone, potash, and sulphate of magnesia for our peach trees, and the color they gave to the fruit was astonishing. We sold our peaches, in some cases, for a dollar a basket more than we could if they had not been so handsomely colored. We put two tons of bone, a ton of potash, and five hundred pounds of sulphate of magnesia, on about twelve acres.

Adjourned to evening.

EVENING SESSION.

The closing session of the Convention was called to order at half-past seven o'clock, by Mr. Barstow, and a paper was read by Leander Wetherell of Boston, on "Gardening and Fruit Growing."

The question box with miscellaneous questions occupied an hour.

Mr. HYDE. I do not appear here as a commercial traveler nor an advertising agent, but a little matter was placed in my hands last night, with an earnest request from a personal friend that at some convenient opportunity I would present it to this meeting. It is a tree protector, which is said to be a protection against all the insects which infest our forest and fruit trees, with the exception, perhaps, of the curculio, which is a winged insect. I will leave the article upon the desk, so that it may be examined by any gentleman who has a desire to do so. It is simply a rubber band, filled with ordinary pins. It is said that it is impossible for any of the insects to pass them. I have nothing more to say in regard to the article. I have been told that the Secretary has had some experience with it.

Mr. Gold. There is one hanging up in my office, and I believe that it will prove quite an efficient protector against the canker worm. I do not see why it will not, and, as a cheap and efficient protector, it is commended.

Mr. Wetherell. What is the cost?

Mr. Gold. It cannot cost much. I think about twenty-five cents a yard. It is elastic and durable. I do not see how the canker worm, or any other insect, can pass it, unless it is provided with wings to fly around it.

Mr. Hyde. I would add that the gentleman who gave it to me said he had given it a fair trial last season, and not a tree was infested with insects that had this protector upon it, while all the others were.

Question. Has any one present had experience with artesian wells?

Mr. Gold. An artesian well was begun in New Haven; and, after it had been bored about 2,000 feet, the augur got stuck, and they have got to contrive some way to release it.

Mr. Skilton. One has been driven in this city. I have not seen it.

Question. Will it pay the farmers of Connecticut to go to raising sorghum? How many gallons of syrup does Mr. Gold raise per acre, and what is the cost of making it?

Mr. Gold. Sorghum will produce according to the success of the culture, and the quality of the land, anywhere up to three hundred gallons per acre, upon good Connecticut soil. If well cultivated, it is a paying crop. If not, it is a poorly remunerative product, in my estimation and experience.

Mr. Wetherell. What is the syrup worth by the gallon?

Mr. Gold. Well, sir, it is worth to the farmer the price of a good article for sweetening that he would buy in the market. It is a more than ordinarily good article for the manufacture of gingerbread, and for use in the common kinds of cooking in the family. It compares favorably with New Orleans molasses in that respect, which is a higher grade of molasses, but its quality will depend very much upon the quality of the cane. We have not got into the habit of utilizing the seed, of which a fair crop produces from twenty-five to thirty bushels to the acre, in this climate.

Mr. WETHERELL. How does the value of the seed compare with oats?

Mr. GOLD. It is said to be worth as much per pound as oats as food for cattle, poultry, swine, or any other purpose.

QUESTION. Can the Canada thistle be exterminated? If so, how?

Mr. A. J. HAYWARD. Don't let it breathe, and that will kill it. It breathes through its foliage. Don't let it make any foliage.

QUESTION. Mr. Hale says pistillate strawberries are the most productive. Is this so? What is the experience of others?

Mr. GOLD. The so-called scientific men of the country knew nothing, for a long time, about the fact that there were staminate and pistillate strawberries. It is said that an old market-woman in Cincinnati was wonderfully successful in filling the market with very fine fruit, and she had discovered that by planting staminate and pistillate plants, she could raise strawberries of a quality that distanced all her competitors. It was asserted by fruit men that there was nothing in the supposed whims of this old woman. I believe it is admitted now that the theory is true.

Mr. AUGUR. Just a word in regard to pistillate varieties. At Philadelphia, one gentleman from Minnesota said he would not plant any strawberry, except those that had perfect flowers, but I think many will differ from him in regard to that. Pistillate strawberries are quite productive if planted by the side of a perfect flowering variety. Many of our pistillate varieties are extremely desirable; still, if a person can have but one variety, he better have one of the perfect flowering varieties.

Question. Can the Canada thistle be exterminated by heavy manuring?

Mr. Day. In order to exterminate the Canada thistle thoroughly, cut it close to the ground at the time that it is in full bloom. They do not all flower at the same time, and you may have to go over the field two or three times; but by cutting it at that time, you may be certain of exterminating it. I have done it.

Mr. Bill. That is rather an important matter, for the Canada thistle has got a strong foothold throughout the State of Connecticut. I have traveled in Canada, where I have seen thousands of acres entirely ruined. I found acre upon acre of lands that I purchased, covered with Canada thistles. I have entirely driven them from my land by cutting them at the time of blossoming. You may not do it the first time, but follow it up two or three years, and you will drive them from your lands.

Mr. Wetherell. I will mention a case where that plan did not succeed. My grandfather was in the habit of cutting a patch of thistles every year, and was very particular about cutting them at the right time. He practiced that all through my boyhood, and the thistles were in the pasture when I left the farm, right in that same spot.

Mr. Hale. I think if the gentleman will put a little handful of salt around the stump, he will get rid of them easily.

Mr. Augur. Prof. Brewer, two or three years since, made this statement: that if Canada thistles were cut the twenty-fifth of June and the twenty-fifth of September, each year, they would not need cutting but a very few times, and it would certainly kill them.

Prof. Brewer. I said that a man sold the secret through central New York, some years ago, for ten dollars. His rule was to cut them the twenty-fifth of June and the twenty-fifth of September. I believe he stated that the time to cut them was just as they were coming into blossom.

Mr. ———. One season will do it, if you keep constantly at it. Cut them off every time they show their heads, and one summer will destroy your Canada thistles. I have had much experience with them, and know this to be a fact.

Mr. ———. The father of Mr. Scoville had a piece of Canada thistles that extended into his garden from the street. He ploughed the piece repeatedly, week after week, and sowed corn, and let his hogs root it over, and they would eat the thistle roots as deep as they could dig them. After practicing this method four or five years, he thought he had exterminated them. This must have been over seventy years ago. If you go up the street to-day, you will find Canada thistles on that very ground. His son has endeavored to exterminate them, but there they are, and they will stay there as long as this earth remains.

Mr. Hyde. I believe that Canada thistles thrive on some soils as they do not on others. I have a little patch of Canada thistles, that I cut three times a year. I don't know that I have diminished them, but they do not increase.

Mr. Hunt. If you will cut them just before they blossom, and, if possible, just before a rain, too or three cuttings will almost invariably kill them.

Question. Will Mr. Meech give the history of the quinces upon the table, and tell us how they can be kept so as to preserve the color?

Mr. Meech. The history of those quinces is involved in some obscurity. An old gentleman, early in the settlement of Vineland, came from Hartford to that place, and having had a quince tree in his grounds, he brought it along, and put out cuttings in a little corner of his yard. I purchased twenty-five little trees of him, which I set out. I cultivated them until the trees began to bear, and then I found that I had a rare treasure in the old man's trees. That is all I can tell you in regard to the history. The method of preserving them is one of great simplicity. I arrived at it after trying a number of methods. It is nothing but salt and water, and it preserves specimens better than anything I have been able to find. Just dissolve as much salt as the water will hold, put in your specimens, and keep them covered. You can preserve any fruit you desire by covering it with brine as salt as salt will make it.

Mr. ———. A disease has appeared in apples in Hartford county, consisting of specks or spots of brown, of various sizes, spreading from the blossom end, and finally destroying the fruit. Has any one any light to throw upon this matter?

Mr. Augur. I have no doubt that is a disease of a fungus nature, but what the remedy is I am unable to say.

Col. Warner. I would like to ask Mr. Augur what his remedy is for the maggot? All the early varieties of apples in my section were ruined last year and this year by the maggot.

Mr. Augur. At the meeting of the American Pomological Society at Philadelphia, I asked Prof. Rogers that same question, as I did not know of any remedy myself. He said that the only remedy he could suggest was keeping animals in the orchard, to pick up the falling fruit. I think it possible that, if some insecticide were applied at the right time it might be effectual, but I do not feel sufficiently familiar with the habits of the worm to answer that question.

Col. Warner. I have kept hogs in my orchard for years; they eat every apple that falls, but the evil is not remedied. The inside of the apples that fall is full of little yellow streaks, where a worm or insect of some kind has run all through. Sweet apples are especially affected by it, and early apples are entirely ruined.

Mr. Gold. I consider it the most threatening pest at present to apple culture in the State of Connecticut. I am troubled with it in my orchards.

Col. Warner. In the orchard where I keep hogs I have no canker worms whatever, but the hogs have not stopped the maggot.

Mr. Hyde. My experience has been very similar to that of Col. Warner. My entire crop of apples has been ruined by the maggot. We are not troubled in our section with the canker worm.

Mr. Webster. Where I kept my sheep last season there is an orchard, and not a canker worm was found in that orchard; but all my apple trees outside of that pasture where the sheep were were eaten bare.

Question. What is the cause of horses gnawing boards in the stable?

Dr. Bowen. My idea is that it indicates a condition of the animal analogous to that of cattle who gnaw bones, and the same remedy will apply there that we generally find efficacious with our cattle—a liberal feeding of bran with their regular rations. If the gentleman who asks the question will try that, as I have tried it and known others to try it, he will find that his horses will not trouble him in that way any longer.

Mr. Webster. I have two horses. I mean to feed them well. I feed in the morning two quarts of wheat bran, and two quarts of meal a day, and give each of them four quarts of oats and a little hay—nothing in the middle of the day. But they eat my mangers badly.

Dr. Bowen. I think they ought to if you give them nothing in the middle of the day.

Mr. Webster. I have got as good a pair of horses as you ever owned. If you have got a horse that will travel with either one of mine, I will give you $300 for him.

Dr. Bowen. I think it is a mistake to feed a horse but twice a day. With cattle it is different. A horse has a very small stomach, holding but sixteen quarts, and when you consider the thousand pounds that is to be sustained upon what is put into that stomach, it would seem that feeding twice a day was not sufficient. If you change your feed, I think it will make a difference.

Mr. Webster. Some people have an idea that if horses gnaw their mangers they are cribbing horses. I never owned a cribbing horse.

Prof. Brewer. The Chairman of the Committee appointed to consider what action should be taken in reference to the pollution of streams and other waters of the State requests me to present a resolution. I will say in explanation that a law has been proposed, which, although not passed, is printed with the proposed laws in the Public Acts of the State of Connecticut for 1882, which seems to cover the ground of what must first be done. I will read the Act, and then read the resolution.

This proposed Act covers the ground for an investigation. There must be an investigation and inquiry beforehand, in order that we may have intelligent legislation. In my opinion, this is a growing evil. The committee therefore recommend to this Convention the following resolution :

Resolved, That this Convention recommend the next Legislature to pass the law already proposed and printed with the Public Acts of the State of Connecticut, passed January Session, 1882, entitled "An Act to establish a general commission for investigating the pollution of streams and other waters," or a law which shall be equivalent to the above proposed Act.

This resolution was passed unanimously.

Mr. Kirkham. We have asked our Legislature to pass the bill that has been read, or something similar, but we have no one to do the business. Legislatures are not easily moved. Therefore, I move that C. E. Owens of Hartford, J. B. Olcott of South Manchester, and L. S. Wells of New Britain be a committee to present the subject of pollution of streams to our next Legislature.

Prof. Brewer seconded the motion, and it was passed.

The following paper, by Mrs. Rose Terry Cooke, was read by the Secretary:

THE TWO MRS. TUCKERS.

By Mrs. Rose Terry Cooke.

"You can make the fire while I put the hoss out," said Amasa Tucker, as he opened the back door of a gray house, set on top of a treeless hill, tracked here and there with the paths the geese had made in their daily journeys to the pond below, and only approached at the back by a lane to the great red barn, and a rickety board gate set between two posts of the rail fence.

This was Wealthy Ann Tucker's home-coming. She had married Amasa that morning at her father's house in Stanton, a little village twenty miles away from Peet's Mills, the town within whose wide limits lay the Tucker farm; and had come home with him this early spring-afternoon in the old wagon, behind the bony horse that did duty for Amasa's family carriage.

Mrs. Tucker was a tall, thin, young woman, with a sad reticent face, very silent and capable; these last traits had been her chief recommendation to her husband. There was no sentiment about the matter. Old Mrs. Tucker had died two weeks before this marriage, but Amasa was "forehanded," and knowing his mother could not live long, had improved his opportunities and been "sparkin'" Wealthy Ann Miner all winter, in judicious provision for the coming event of his solitude.

He had thought the thing all over, and concluded that a wife was cheaper than a hired girl, and more permanent; so when he found this alert, firm-jointed, handy girl living at her uncle's, who was a widower on a great farm on the other side of the village, Amasa made her acquaintance as soon as possible, and proceeded to further intimacy. Wealthy liked better to work for her uncle than for a step-father with six children, but she thought it would be better still to have a house of her own; so she agreed to marry Amasa Tucker, and this was her home-coming.

She opened the door into a dingy room with an open fire-place at one end, a window on the north and one on the south side, small, paned with old, green, and imperfect glass, and letting in but just enough light to work by. One corner, to the north, was partitioned off to make a pantry, and a door by the fire-place led out into the wood-shed. The front of the house contained two rooms. One opened into the kitchen and was a bedroom, furnished sparsely enough; the other was a parlor, with high-backed, rush-bottomed chairs against the wall, a round table in the middle, a fire-place with brass-andirons, and fire-irons, a family Bible on the table, and a "mourning-piece" painted in ground hair on the mantel. Green paper shades and white cotton curtains, a rag carpet, fresh as it came from the loom—if its dinginess could ever be called fresh—and a straight-backed sofa covered with green and yellow glazed chintz, made as dreary an apartment as could well be imagined. Wealthy shut the door behind her quickly, and went to the shed for material to make her fire. It was almost sundown, and she was hungry; but she found only the scantiest supply of wood, and a few dry chips for kindling. However, she did her best, and she had brought some provisions from home, so that she managed to lay out a decent supper on the rickety table, by the time Amasa came stamping in from the barn.

He looked disapprovingly at the pie, the biscuit, the shaved beef, and the jelly set before him.

"I hope ye ain't a waster, Wealthy," he growled.

"There's vittles enough fur a township and the' ain't but two of us."

"Well, our folks sent 'em over; and you no need to eat 'em," she answered, cheerily.

"I ain't goin' to; don't ye break into that jell, set it by; sometime or nuther somebody may be a comin' here, and you'll want it."

Wealthy said no more; they made their supper of biscuit and beef, for the pie also was ordered "set by."

She was used to economy, but not to stinginess, and she excused this extreme thrift in her husband more easily for the reason she had been always poor, and she knew very well that he was not rich to say the least. But it was only the beginning.

Hard as Wealthy had worked at her uncle's, here she found harder burdens; she had to draw and fetch all the water she used from an old-fashioned well with a heavy sweep; picturesque to see, but wearisome to use; wood was scarce, for though enough grew on the hundred acres that Amasa owned, he grudged its use.

"I shan't cut down no more than is reely needful," he said, when she urged him to fetch her a load; "wood's allers a growin' when ye don't cut it, and a makin' for lumber; and lumber's better to sell, a sight, than cord-wood. Ye must git along somehow with brush; mother used to burn next to nothin'."

She did not remind him that his mother was bent double with rheumatism, and died of the fifth attack of pneumonia. Wealthy never wasted words.

Then there were eight cows to milk, the milk to strain, set, skim, churn or make into cheese, and nothing but the simplest utensils to do with. A cloth held over the edge of the pail served for a strainer; the pails themselves were heavy wood, the pans old, and some of them leaky, the holes stopped with bits of rag, often to be renewed; the milk room was in the shed, built against the chimney that it might not freeze there in winter, and only aired by one slatted window; the churn was an old wooden one with a dasher, and even the "spaddle" with which she worked her butter was whittled out of a maple knot by Amasa himself, and was heavy and rough.

Then to her belonged the feeding of the pigs—gaunt, lean animals with sharp snouts, ridgy backs, long legs and thin flanks, deep-set eyes that gleamed with intelligent malice, and never-sated hunger. Wealthy grew almost afraid of them when they clambered up on the rails of the pen in their fury for food and flapped their pointed ears at her, squealing and fighting for the scanty fare that she brought. For Amasa underfed and overworked everything that belonged to him.

Then there were hens to look after—the old-fashioned barn door "creepers," who wanted food too, and yet catered for themselves in great measure, and made free with barn and woodshed, for want of their own quarters, and were decimated every season by hawks, owls, skunks, weasels, and foxes, to say nothing of the little chickens on which crows and cats worked their will, if they dared to stray beyond the ruinous old coop contrived for them by Amasa's inventive genius out of sticks and stones.

Add to all this the cooking, washing, baking, and sewing, the insufficient supply of pork, potatoes, and tough pies, the "b'iled dinners" whose strength lay in the vegetables, rather than the small square of fat pork cooked with them, of which Amasa invariably took the lion's share: these accumulating and never ceasing labors all wore day by day on the vitality of Mrs. Tucker, and when to these were added an annual baby, life became a terror and a burden to the poor woman.

But what did Amasa care? He too, worked from "sun to sun."

He farmed in the hard old fashion, with rude implements and no knowledge but—

"My father done it afore me so I'm a goin' to do it now; no use talking." One by one the wailing puny children were laid away in the little yard on top of a sandhill, where the old Tuckers and their half-dozen infants lay already: a rough inclosure full of mulleins, burdocks, and thistles, overrun with low blackberry vines and surrounded by a rail fence. It had been much handier for the Tuckers to have a grave-yard close by than to travel five miles to the Mills with every funeral: and they were not driven by public opinion in regard to monuments; they all lay there like the beasts that perish, with but one scant grey stone to tell where the first occupant left his tired bones. Two children of Wealthy's survived, Amasa and Lurana, the oldest and youngest of seven.

Amasa, a considerate, intelligent boy, who thought much and said little, and Lurana or "Lury" as her name was generally given, a mischievous, self-willed little imp, the delight and torment of her worn-out mother. Young Amasa was a boy quite beyond his father's understanding; as soon as he was old enough he began to help his mother in every way he could devise. And when his term at the village school was over, to his father's great disgust, he trapped squirrels and gathered nuts enough to earn his own money and subscribe for an agricultural paper, which he studied every week till its contents were thoroughly stored in his head. Then began that "noble discontent" which the philosophers praise.

The elder man had no peace in his old-world ways; the sloppy waste of the barn-yard was an eye-sore to this "book-learned feller," as his father derisively called him. And the ashes of the wood-fire were saved and sheltered like precious dust, instead of thrown into a big heap to edify the wandering hens. The desolate garden was plowed, fertilized and set in order at last, and the great ragged orchard manured, the apple trees thinned and trimmed, and ashes sown thick over the old mossy sod. Now these things were not done in a day or a year, but as the boy grew older and more able to cope with his father's self-conceit more was done annually, not without much opposition and many hard words, but still done.

Then came a heavy blow. Lurana, a girl of fifteen, fresh and pretty as a wild rose, and tired of the pinching economy, the monotonous work and grinding life of the farm, ran away with a tin peddler, and broke her mother's heart; not in the physical sense that hearts are sometimes broken, but the weary woman's soul was set on this bright, winsome child, and her life lost all its scant savor when the blooming face and clear young voice left her forever.

"I don't blame her none, Amasy," she sobbed out to her boy, now a stout fellow of twenty-two, raging at his sister's folly.

"I can't feel to blame her. I know 'tis more'n a girl can bear to live this way. I've had to, but it's been dreadful hard—dreadful hard! I've wished more'n once I could ha' laid down along with the little babies out there on the hill, so's to rest a spell; but there was you and Lury wanted me, and so my time hadn't come.

"Amasy, you're a man grown now, and if you should get married, and I s'pose you will—men folks seem to think it's needful, whether or no—do kinder make it easy for her, poor cretur! Don't grind her down to skin and bone like me, dear; 'tant just right, I'm sure on't, never to make no more of a woman than ef she was a horned crittur; don't do it."

"Mother, I never will!" answered the son, as energetically and solemnly as if he were taking his oath.

But Wealthy was nearer to her rest than she knew; the enemy that lurks in dirt, neglect, poor food, constant drudgery, and the want of every wholesome and pleasurable excitement to mind and body, and when least expected swoops down and does its fatal errand in the isolated farm-house no less than in the crowded city slums, the scourge of New England, typhoid fever, broke out in the Tucker homestead.

Wealthy turned away from her weekly baking one Saturday morning just as the last pie was set on the broad pantry shelf, and fainted on the kitchen floor, where Amasa the younger found her an hour after, muttering, delirious, and cold.

What he could do then, or the village doctor, or an old woman, who called herself a nurse, was all useless; but the best skill of any kind would have been equally futile; she was never conscious again for a week; then her eyes seemed to see what was about her once more; she looked up at her boy, laid her wan cheek on her hand, smiled—and died.

Hardly had her wasted shape been put away under the mulleins and hard hack, when her husband came in from the hayfield smitten with the same plague. He was harder to conquer. Three weeks of alternate burning, sinking, raving, and chills, ended at last in the grey and grim repose of death for him, and another Amasa Tucker reigned alone in the old house on the hill.

It is not to be supposed that in all these years Amasa the younger had been blind to the charms of the other sex; he had not "been with" every girl who went to school with him, or whom he met at singing schools or spelling matches, or who smiled at him from her Sunday bonnet as he manfully "held up his end" in the village choir.

He had been faithful always to the shy, delicate, dark-eyed little girl who was his school sweetheart, and now it was to Mary Peet he hastened to ask her to share his life and home. He had intended to take a farm on shares the next summer, and work his way slowly upward to a place of his own; now he had this hundred acre farm, and to his great surprise he found $3,000 laid up in the bank at Peet's Mills, the slow savings of his father's fifty years. He began at once to set his house in order; he longed to build a new one, but Mary's advice restrained him, so he did his best with this. The cellar he cleared and whitewashed with his own hands; cleaned its one begrimed window and set two more, so that it was sweet and light; the house was scrubbed from one end to the other; a bonfire made of the old dirty comfortables and quilts; the kitchen repainted a soft yellow, and new windows, with clear, large glass, set in place of the dingy old sashes; the woodhouse was filled with dry wood and a good store of pine cones and chopped brush for kindling. A new milk room was built, but a little way from the back door, over a tiny brook that ran down the hill north of the house, and under the slatted floor kept up a cool draught of fresh air; a covered passage connected it with the kitchen, and a door into the old milk room made of that a convenient pantry, while the removal of the old one from the kitchen corner gave to that apartment more room, air, and light. A new stove, with a set boiler, filled up the hearth of the old fireplace; but further improvements Amasa left for Mary.

A different home-coming from his mother's she had indeed, on just such a spring day as Wealthy came there. The kitchen shone clean and bright, a bowl of pink arbutus blossoms made its atmosphere freshly sweet, and the fire was laid ready for her to light, the shining teakettle filled, and the pantry held such stores as Amasa's masculine knowledge of household wants could suggest; flour, butter, eggs, sugar, all were in abundance, and no feast of royalty ever gave more pleasure to its most honored guest than the hot biscuit Mary made and baked for their supper, the stewed dried apples, the rich old cheese, and the fragrant tea gave Amasa this happy evening. Next day they took their wedding trip to Peet's Mills in the new and sensible farm wagon Amasa had just bought, with a strong spirited horse to draw it.

"I want you should look around, Mary," he had said the night before, "and see what is needful here. I expect most everything is wanting, and we can't lay out for finery. But first of all get what'll make your work easy. Your wedding present will come along to-morrow; to-day we'll buy necessities."

Mrs. Peet had not sent her only girl empty handed to the new house. A good mattress, two pairs of blankets, fresh, light comfortables, and some cheap neat white spreads; a set of gay crockery, a clock, and a roll of bright ingrain carpeting had all come to the farmhouse soon after the bride's arrival; her ample supply of sheets and pillow-cases, strong towels, and a few tablecloths had been sent the day before, so this sort of thing was not needed; but there was a new churn bought, and altogether new furnishings for the dairy, several modern inventions to make the work of a woman easier, a set of chairs, a table, and an easy lounge for the parlor, some cretonne covered with apple blossoms and white thorn clusters, and pails, brooms, and tin-ware that would have made Wealthy a happy woman, crowded the over-full wagon before they turned homeward.

The old house began to smile and blossom under this new dispensation, and the new mistress smiled too.

Amasa milked the cows for her, and lifted the heavy pails of milk to strain into the bright new pans; he filled the woodbox by the stove twice a day, put a patent pump into the old well, and, as it stood above the house, ran a pipe down into a sink set in the wood-shed, and so put an end to the drawing and carrying of water.

The fat, round, placid pigs, that now enjoyed themselves in the new pen, he took care of himself.

"'Tant work for women folks," he said.

"You've got enough to do, Mary; there's the garden you'll have an eye on, and the chickens, if you're a mind to; I'm going to build a hen-house and a yard to it right off, that'll be good enough for you as well as the chickens; and I want you should promise if any time the work gets a mite hefty and worries you, you'll speak right out. I can afford to have everything else worn out rather than my wife."

Really, it paid! It does pay, my masculine friends, to give any woman a kindly word now and then; if you had done it oftener, or your fathers had in the past, the rights of women never would have angered or bored you as they do now, or unsexed and made strident and clamorous that half of creation which is and always was unreasonable enough to have hungry hearts. Try it, and see.

Amasa was wise above his generation; he had seen his mother suffer, and learned a lesson. Mary never pined for kindly appreciation of her work, or help in it. When she had a door cut through into the parlor, the stiff chairs and sofa banished, the flowery curtains hung at either window, the gay carpet put down, and the new furniture set in place, with her wedding present—an easy stuffed rocker—drawn up to the table, on which lay two weekly papers and Harper's Magazine, she had still sense enough left to make this hitherto sacred apartment into a real sitting room, where every evening she and Amasa rested, read, or talked over the day's doings; and when the first fat, rosy baby came, and Mary was about again, it added another pleasure to have the old cradle beside them all the evening with its sleeping treasure.

Can I tell in words what a sense of peace and cheer pervaded this household, in spite of some failures and troubles? If the rye did blast one year, the two best cows die another; if a weasel once invaded the new and wonderful hen-house and slaughtered the best dozen Plymouth Rocks; if sweeping storms wet the great crop of hay on the big meadow, or an ox broke its leg in a post-hole; still there was home to come back to, and a sensible, cheerful woman to look on the bright side of things when Amasa was discouraged.

But, on the whole, things prospered; and as Amasa heard the sweet laughter of his happy children, and met the calm smile of his wife, he could not but look back on his mother's harassed and sad experience, and give a heartfelt sigh to the difference between the two Mrs. Tuckers, unaware how much it was due to his own sense of justice and affection.

There are two morals to this simple sketch, my friends: One is, the great use and necessity of taking an agricultural paper, and the other is the equal use and necessity of being good to your wives.

Accept which you like or need most. In the language of the ancient Romans: "You pays your money and you takes your choice."

Mr. DAY. I propose a vote of thanks to Miss ROSE TERRY COOKE for the beautiful and entertaining paper to which we have had the pleasure of listening this evening. (Adopted.)

Mr. MYRICK. There is one thing quite remarkable about this Convention, which I think ought to be noticed, and that is, the large number of young men who have been in attendance at these meetings. I have attended a great many agricultural meetings in this State, as well as in Massachusetts and Vermont, and I can say, truthfully, that at no meeting of the kind have I ever seen so many young men, nor have I felt so much at home; I have not felt lonesome here at all. I therefore think it right to offer the suggestion that a vote of thanks be given to all the young men who have attended this Convention, and that they be requested to come another year, and bring all their young friends with them.

Prof. BREWER. I want to second that motion. I do not know but it may interfere with my modesty, because I class myself with the young men. Nevertheless, I have noticed so many here that are younger than myself, that I wish also to thank them for coming.

The motion of Mr. Myrick was adopted.

Mr. AUGUR. All the papers of the State have kindly noticed this meeting, and especially the agricultural press in this and other States. We are largely indebted to them for the success of this meeting, and I desire to offer the following resolution:

Resolved, That we, as members of the Board of Agriculture and farmers of Connecticut, cheerfully recognize the influence of the agricultural press in their notices and advertisements of this meeting, and that we tender them our most hearty thanks. (Carried.)

Mr. EDDY, of Canaan. As one of the young farmers here present, I rise to reciprocate this vote of thanks to us by thanking the Board of Agriculture who have given us the opportunity to be here, and to be so much interested and pleased.

Mr. AUGUR. While we recognize what the agricultural and the daily press have done for us, we also remember that the railroads have offered the facility of free return tickets to those who have attended this Convention; and also that we owe a debt to the people of Waterbury for their courtesies to us, and especially to the manufacturers who have so kindly invited us to visit their works. I desire, therefore, to offer this resolution:

Resolved, That we tender our thanks to the railroads of the State, and to the citizens of Waterbury, for their kindly attentions to us during this meeting. (Carried.)

Mr. WETHERELL, of Boston, handsomely responded to the vote of thanks to the press, after which Mr. Kirkham moved a vote of thanks to the exhibitors who had so kindly furnished their products for exhibition, which motion was carried.

Rev. Dr. ANDERSON. Having had the privilege of speaking a word of welcome to this Convention at its first session, I feel like claiming the right to respond in a few words to the vote of thanks which has been passed in regard to the citizens of Waterbury. I am afraid, very good friends, that the citizens of Waterbury have not done much for you, but if that be the case, it is for the reason that I indicated in the remarks to which I have just referred, made at your first session. They have been so busy with other things that they have hardly got it into their heads that there has been a large Farmers' Convention in session here through these three days. If they appreciated these meetings as they ought, it seems to me they would have been present here in large numbers. When I heard it suggested that the young men should be thanked for attending this Convention, I said to myself, "The young men certainly ought to thank the Convention for what they have heard at its sessions," and when I heard the vote of thanks to the people of Waterbury, I said to myself, "The people of Waterbury ought to thank them now for the papers which have been read, for the lectures which have been delivered, and for the presence of these men, representing our rural districts so well as they have represented them here during these three days." I have not been able to be present at all your sessions; I have been present when I have been able to. It is not the first Farmers' Convention that I have attended, but I have not attended many, and perhaps that has been the reason why I have been somewhat surprised, and I must say it has been a pleasant surprise to me, by the conduct of this convention, the quality of the papers that have been read, and, you will allow me to say, by the quality of the thought, and the quality of the speech, to which I have listened from day to day here on this floor. I am glad we have had this Convention here. I shall be glad to have them in the future.

But, gentlemen, it is in the hands of the State, as I understand it. We have a Board of Agriculture that will look out for all this, and, if they are wise, as I think they will be, they will fall into line, in this age of conferences and conventions, and insist that the convention idea shall find expression amongst the farmers of Connecticut and gather them all in, young as well as old. (Applause.)

Mr. Hubbard. If I may occupy the attention of this audience for a moment or two, I will try to relieve my mind of a little burden that is upon it. I have no new action to propose, but I would like to emphasize that part of Mr. Augur's omnibus resolution, which thanks the manufacturing company which invited us down there this forenoon. It was kind on their part to take the trouble to invite us. But what I wanted to say was, that it seemed to me we learned something which farmers need to learn, and that is the uses of brass. (Laughter and applause.) We never got into a brass-manufacturing place before, and I think that the farmers of this State (I am not sure but it is true of the farmers of the whole country) are rather ignorant on the subject of brass; they do not have enough of it, and they do not exactly know what to do with the little they have. I hope that every one of us who went down and watched the processes and operations that went forward under our eyes, learned something. I think I did. I learned that brass was a good thing, rightly used, and I think that if we rummage around among our stores, we shall find some brass that we have got, and if we study up the matter we can find some good use to which to put our brass. We learned, among other things, that a little brass will go a good way, if rightly used. I don't think we have very much of it, but still, I rather think we have enough. I believe it would be a pretty good thing for farmers generally if they studied up this matter of brass, and used what they have a little more than they do. (Applause.)

Mr. Hyde. I move a vote of thanks to the ladies who have favored us with their presence on this occasion. We owe much of the interest and pleasure of these meetings to their presence. (Carried.)

Mr. Williams of New Jersey. I would like to add my testimony to what has been said with regard to the interest manifested here, and to express my thanks for the enjoyment I have had in attending your sessions. I wish, as a slight return, to say to you that on the 22d and 23d of January, 1884, the New Jersey Horticultural Society hold their ninth annual meeting in the city of Camden, and on the 6th of February the State Board of Agriculture will hold their annual meeting at Trenton. I should like to extend a cordial invitation to every lady and gentleman here present to visit us on those occasions if they find it convenient to do so, and I pledge myself that we will give them the right hand of fellowship and a cordial welcome.

The CHAIRMAN. It is with great reluctance, after the pleasant time we have spent in Waterbury, that I have to announce the adjournment of this convention. I only regret that it has not been in my power to make the meetings what they would have been in other hands. For my shortcomings I ask your pardon. The convention is now adjourned.

NOTE BY THE SECRETARY.—The attention of the reader is called to reading between the lines one central idea, which runs through the whole work of the convention—the elevation of humanity, making life more worth living. Health and strength are important factors in usefulness and happiness. Material prosperity should be sought as a means, not an end, of existence. Consider the three days' work as a sermon divided into its appropriate heads, and as we accept its teachings, our whole State will be made richer and happier.

REPORT OF THE POMOLOGIST.

P. M. AUGUR.

The year 1883 has been in many respects to the fruit-grower a peculiar one.

Generally through our State, as also in the country, the apple crop has been to a great extent a failure, and yet in almost every State, and in parts of our own, there have been exceptional orchards, that have yielded abundantly. Orchards in good condition that failed to bear in 1882, and that escaped the ravages of the canker worm and other unfavorable influences, gave a good crop. Cultivated orchards, especially where dressed with a good superphosphate, in some instances bore a full crop. On the whole, the old experience, "good care, good success," has been reiterated, though not in every instance.

The Pear gave a most bountiful crop, of special excellence; many of the free-bearing varieties, like the Bartlett, Seckel, Beurre d'Anjou, Vicar, Duchesse, Louise Bonne de Jersey, and Lawrence bore so marvelously as to demonstrate the practicability of pears being a common fruit for the masses. The blight has appeared in here and there a locality, but not to such an extent as to offer any material discouragement to the general planting of this noble fruit. Still, the occasional attacks of this disease are sufficient to warn us not to over-stimulate our trees, but to obtain only a moderate healthy growth of well-ripened wood; and we should be warned to secure proper drainage, where needed, and to apply to our orchards an occasional dressing of lime broadcast, to counteract acidity in the soil, or any fungus growth, possibly leading to blight.

The Peach has given an abundant crop, of great excellence. We believe that in no single year has our State ever produced so many baskets of choice peaches. There has never been more to encourage future planting than at present. The warm days of December last, followed by the severe cold of Dec. 23d, have spoiled a portion of the blossom buds for the coming crop, but there are many yet left sound, and there is a probability of a moderate crop, while it is demonstrated that we can raise as good peaches as any to be found.

It is true that we may suffer sometimes from disease in ou orchards, but by securing good trees and planting on new land, with judicious management, we hope, to a great extent, to escape its ravages.

The peach-borer is completely under control; so there is no reason why we may not hopefully plant peaches.

THE QUINCE AND PLUM both succeed in so many instances as to encourage future planting, both for home use and market.

THE GRAPE.

Connecticut is a land of the vine. So abundant was it found by the early settlers that it was adopted as an emblem on our State escutcheon, the Labrusca, the Aestivalis, and the Cordifolia all being found within our limits. True, owing to the imperfect flowers of many wild vines, they are often barren, but in very many instances the yield is abundant. This also is certain, viz.: that the grape finds a congenial home in our soil, and readily responds to good care and culture.

No fruit, except the apple, stands before it as an article of food, or in ease of production, or in the certainty of a crop. That it has been too much neglected on the farms of our State is very evident to all.

No farm, village, or city garden should be without the grape; the brick or stone building, on its sunny sides, should be covered by the vine; even the tight board fence offers a good place for a projecting trellis for the grape. Vines do better so sheltered than in open culture. A cheap cold grapery can be so made as to offer an excellent place for hens in winter and Hamburg grapes in summer, paying full interest and premium on either. Suffice it to say, where farmers, or farmers' sons, or farmers' wives and daughters desire anything of the kind, you may, without folly or extravagance, adopt it; it will pay.

VINEYARD PRACTICE.

A southerly slope offers a good site for a vineyard; soil being dry and warm. The lines of trellis should not run up and down the slope, but longitudinally with it, to avoid washing. Vines may be planted 8 feet by 9 or 10 feet, as desired; 8 by 9 will give about 600 vines per acre, which, with an average of 20 lbs. per vine, may yield 12,000 lbs. per acre, or 6 tons. In the best vineyards, this yield has been realized, which at 3 cents, wholesale, is $360 per acre.

Shallow culture only should be given. This may be mostly done by horse and cultivator, which, when well done, leaves very little hand-work; but it should be often repeated during the summer. For all the vigorous, hardy varieties, the Kniffen system of pruning and training is probably best (see Fig. 1), which represents a line of posts and two wires, respectively 3 feet and 5½ feet from the ground, with an arm of young wood, 4 feet long, running each way on each wire. Now if we have 6 shoots on each arm, and a pound of grapes on each shoot, you see we have our 20 lbs. and to spare; indeed, sometimes 40 lbs. are produced, but 20 are enough.

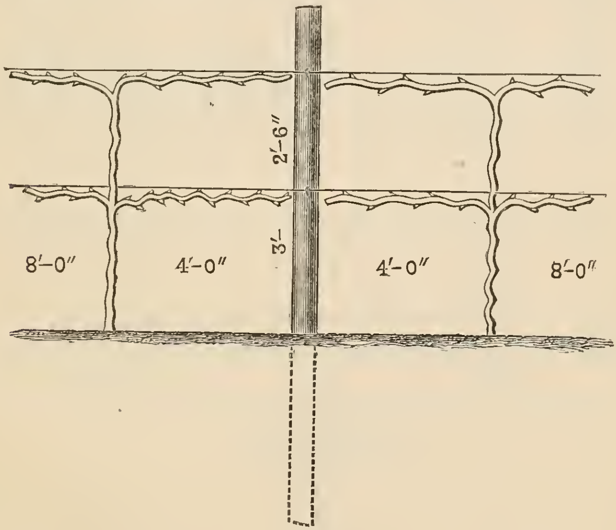

FIG. 1.

After the fall of the leaf in November and December, prune out the bearing arms, leaving 4 new arms for the bearing wood of the coming crop.

For the Delaware, Prentiss, and similar vines, a different mode is better, viz. : as seen in Fig. 2. Here we have our vines 6 feet apart in the row, with only a single arm of 1 year's growth, trained vertically (see A), 6 feet high. The laterals from these upright arms, A B, bear the fruit, C C, and after fruiting are cut away near the ground at D, and renewed by young arms each year for the next crop, as at A. By this method 10 lbs. are expected, and fruit of the best quality. This class of vines requires better fertilization and culture, and, doing well, yield a better profit; 800 vines per acre, yielding 10 lbs. each, make a total of 8,000 lbs., which, at 12 cents,

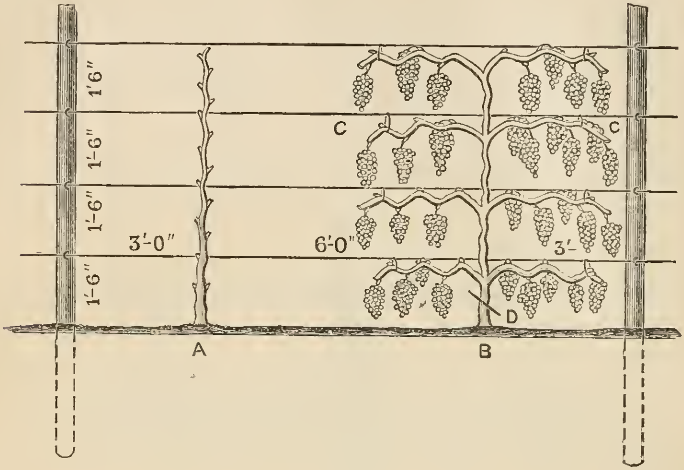

Fig. 2.

equals $960. This handsome return has been exceeded in some vineyards on the Hudson, but only by best soil and culture.

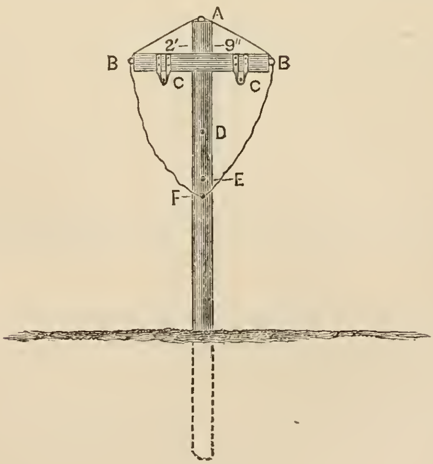

Fig. 3.

Where grape-rot and mildew cause trouble, or where birds and rose-bugs attack the vines or fruit, we offer the following plan :

Set posts, as elsewhere. At $5\frac{1}{2}$ feet from the ground, spike on a cross-arm (B B, Fig. 3), 2 feet 9 inches long, at right angles with the line of trellis, on the top of each post, 6 feet from ground; at A, and at B B end of cross-arms run No. 10 galvanized wire, fastened by staples; over these three wires pin an awning of cheap cotton cloth, to guard against grape-rot and mildew; from B B drop side-curtains of musquito bar and pin to the wire F, to exclude insects and birds.

As soon as the danger is past, remove these fabrics and store for future use.

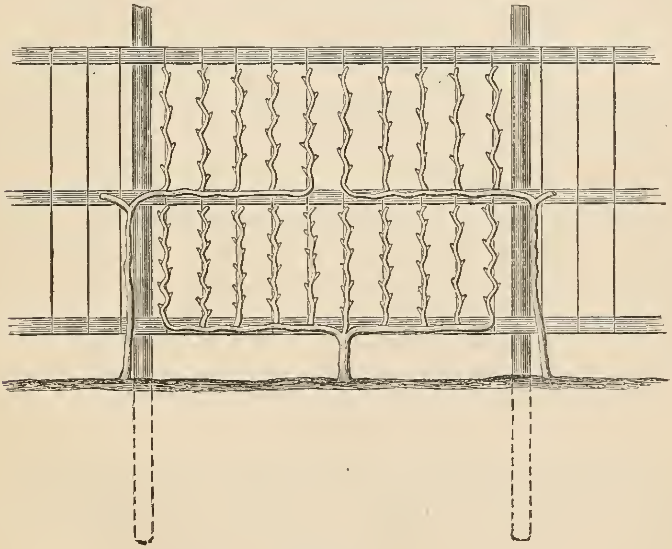

FIG. 4.

The plan contemplated, as represented by a cross section, as in Fig. 3, is to have wires at C C, D, E, as preferred, to which vines may be trained, and the whole enclosed as described. As a still greater safeguard, all the fabric before being put on might be dipped in sulphur-water, to keep itself and the vines beneath from attacks of mildew.

For similar reasons avoid fermenting manures, and use *sulphate* of ammonia to supply what nitrogen is needed. We believe that in this way the finer American grapes (and perhaps Black Hamburgs) may be raised successfully, and by this extra protection bring prices sufficient to warrant the experiment in a small way at least.

The expense of all the fabrics for top and sides would, at present factory prices, be about 12 cents per running yard. If thereby we can escape insects, birds, grape-rot, and mildew, and at the same time raise some of the finer grapes, it will compensate for the trouble; remembering that the same material may, by careful usage, be put on again and again for the same object. While the above is not needed, and would not pay, for Concord, Ives, and Hartfords, at 3 to 5 cents, wholesale, it might do to use it on the Salem, Wilder, Iona, or Croton, at 12 to 15 cents, wholesale.

In city gardens, where space is very limited and close occupation is important, the plan shown in Fig. 4 may be adopted, of planting 4 feet or 5 feet apart, and giving each vine a double spread of 8 or 10 feet, one set on the lower arms, and the alternate set on the middle arms, renewing all the horizontal arms each year. If any, like the Agawam or Salem, prove a little shy of setting fruit, give them the lower arm, and the more perfect flowering kinds, as Concord and Worden, the upper. Then, when in bloom, jar the upper arms, which may help fertilize the whole with pollen. With the above described method, the ground, or border, should be good and fed with sufficient fertilizer, as it will be closely occupied; with abundant room, we would not advise this plan.

VARIETIES.

The Concord is the grape for the million, and can be raised almost anywhere and everywhere. A good list of black grapes is E. Victor, Moore's Early, Telegraph, Hartford, Worden, Concord, Herbert, or Rogers No. 44, and Wilder, Rogers No. 4.

Red Grapes.—Brighton, Wyoming, Delaware, Lindley, Salem, Jefferson, Vergennes.

White Grapes.—Martha, Lady, Pocklington, Prentiss, Duchesse. There are others nearly or quite as good, but these are in the main hardy and productive.

FERTILIZERS.

Good, unleached wood-ashes are always suitable for any kind of fruit, especially the grape. Finely-ground bone is excellent, but a good superphosphate is still better, and tends to early and perfect ripening of the fruit. Thoroughly composted stable manure is suitable in moderate quantities, but not too much at once. An occasional dressing of lime is excellent. For ammonia or nitrogen, we would advise 150 lbs. of unadulterated Peruvian guano, or 100 lbs. of sulphate of ammonia.

A good grape manure would be, per acre, potash sulphate, 150 lbs.; keiserite, 25 lbs.; dissolved bone-black, 250 lbs.; sulphate of ammonia, 100 lbs. If land had been previously dressed, use only half. If these are mixed, the mixing should be very thorough.

Where, by experiment, the land is known to want more or less of any of these ingredients, act accordingly.

INSECTS

Our most damaging insects are the canker worm, apple maggot, common apple worm, currant worm, cranberry worm, the slug of the pear, cherry, and quince, curculio, rose-bug. and the aphides of different families.

Many of these insects can be destroyed by *Paris Green* or *London Purple*, used in the following manner: Mix at the rate of 3 to 6 ounces to a 40-gallon cask of water, and spray the trees or plants affected.

An application even so weak is said, when done at the right time (soon after the fruit is set), to be thoroughly effective.

S. D. Willard of Geneva, N. Y., last spring, with 3 ounces to 40 gallons of water, in one application was wholly successful, and had a perfect crop of apples. For the currant worm and gooseberries, white hellebore, one tablespoonful to a pail of water, is better; but on the strawberry or raspberry and blackberry these poisons should not be used at all, and for the apple, pear, quince, and plum, only as above.

Whitman's fountain pump is probably one of the best implements for its application.

The application should not be made where the drippings will come upon cabbage or early fruit, or upon grass or corn after they have sent up the flower-stalk and the ligules of the leaves are formed. With discreet use these insecticides have in numerous instances proved very effectual and entirely safe.

COMMUNICATIONS CONDENSED.

From W. F. TOLLES, *Terryville, Conn.:*

Apples under general neglect, poor and wormy; pears blighted to a small extent; grape mildew quite prevalent; canker worm on the increase; curculio bosses the plum, which is a failure; currant worm plenty, but kept under by hellebore; strawberry crown-borer troubled some last year.

From ALDEN DAVIS, *West Stafford, Conn.:*

"I helped set a pine grove in 1840–41 of five acres, at $5 per acre ($25), of 5,000 trees, on sandy land; trees 4 feet by 6 feet, in furrows; young trees, 6 inches to 1 foot high. At present time trees average 50 feet high; land is valued at $65 per acre ($325). Yellow pines we planted fifteen years since are now 20 feet to 30 feet high and 5 to 6 inches through. Land we have planted to pine, white ash, and chestnut the assessors have doubled in valuation in three years. Another piece of chestnut planted forty to fifty years ago now large enough for railroad ties. Are troubled with peach yellows, pear blight, and black-knot on plum."

From P. CLARK, *of Newtown:*

In Newtown "not more than half the wood, and not more than one-fourth the timber exist that did fifty years ago. The clearing off of wood has caused great freshets in spring and severe droughts in summer. The millers find trouble from want of water increasing. The noted trees of great size have nearly disappeared."

S. J. PADDOCK, of Cromwell, has near his residence a famous white oak. At the surface of the ground the circumference is 24 feet 6 inches; at 10 feet from ground, 14 feet 6 inches; spread of top from side to side, 95 feet. A noble tree.

E. W. DURAND, *Irvington, N. J.:*

"Apple crop very poor; currant worm troublesome; slug on pear and cherry very troublesome; pear blight prevails to some extent; ditto grape mildew; the crown-borer of strawberry is worse on land heavily manured.

"Among the valuable new strawberries, I find the new 'Prince of Berries' specially excellent and reliable."

NOTE.—The excess of matter has required taking only the most important points and omitting the rest.

ROSE AND STRAWBERRY EXHIBIT.

The Rose and Strawberry Show, under the auspices of the Connecticut Board of Agriculture, was held in a vacant store near the old post-office building, Main street, Hartford, Conn., June 23d.

The front windows were decorated with fresh branches of "Hamamelis Virginica," or witch hazel. The exhibit was free, and was visited during the day by large numbers of citizens of Hartford and vicinity.

There was a beautiful collection of roses by Newton Case of Hartford, which was much admired ; twenty varieties of choice grown roses from R. A. Moore, Esq., of Kensington, which were beautiful and perfect of their kinds; a dish of roses from Mrs. Thomas Fairclough of Wolcott; another dish of roses from Warren Rowley of Hartford; one from M. Louise Hubbard; Kalmia latifolia from Mrs. Fairclough, and Kalmia augustifolia, or sheep laurel.

Roses were also exhibited by Cassius Wells; also a box of roses from A. S. Parker, South Coventry, part from the Nathan Hale place and part from the place of Samuel J. Tilden's grandfather.

STRAWBERRIES.

A splendid dish of large and perfectly ripened Sharpless berries was exhibited, by Col. D. S. Dewey of Hartford.

Thirty-six baskets of Manchester, and numerous other strawberries, were shown in their beauty by Messrs. G. H. & J. H. Hale of South Glastonbury.

Mrs. Thomas Fairclough, of Wolcott, exhibited four dishes of fine, well-grown berries.

T. C. Barnes, of Collinsville, also showed four varieties of strawberries, including fine Crescents.

Newton Case, of Hartford, some beautiful Jersey Queens.

Mr. J. B. Olcott, of the *Courant*, a full crate of strawberries from South Manchester, just as they go to market, and no wonder that he has a fame for his excellent berries.

E. W. Durand, of Irvington, N. J., sent four quarts of his Prince of Berries, which were pronounced excellent; the variety Governor Bigelow last year pronounced the best he had ever tasted.

Rev. Mr. Chapman, of Irvington, N. J., exhibited a seedling of the Crescent, called the Empress; firmer than Crescent; only ordinary in quality and wonderful in productiveness; also the Bonny-Jean and Aurora, both new and very good.

F. A. Belge, gardener for Pliny Jewell of Hartford, exhibited two baskets of unusually fine President Lincoln, which were beautiful and good.

P. M. Augur & Sons, of Middlefield, exhibited Finch's Prolific, Jersey Queen, and several other standard varieties; also twenty varieties of *Jersey Queen* seedlings of their own raising.

Prominent among these was the *Jewell No.* 19, named in honor of Governor Jewell. This is a seedling of *J. Queen*, fertilized by Late-Prolific. The plant is strong, with foliage unusually large and healthy. The flower pistillate, *cone* very strong and easily fertilized. This fruit was the largest on exhibition. When first colored the fruit is rather acid, but when fully ripened is very rich and delicious. A small bed of this new seedling yielded in 1883 at the rate of four hundred bushels per acre.

Also *No.* 125, a strong bi-sexual variety of great productiveness and excellence; also No. 32, 65, 87, 118, 24, 130, 133, 135, 70, and several others, which are very promising.

This exhibit, though like former ones, *impromptu,* was full of interest, especially as an occasion of free interchange of views among the growers of fruits and flowers.

EXHIBIT OF FRUITS, GRAIN, AND VEGETABLES AT THE WINTER MEETING AT WATERBURY.

An exhibit of fruits, grains, and vegetables is a specialty of the Connecticut Board of Agriculture's meetings. This commenced as far back as the meeting at Meriden in 1873, when a ten-foot table was used, until now at Waterbury 190 feet of table were required to display the articles offered.

The farmers from all parts of the State made such contributions as they could for comparison. T. S. Gold, Secretary of the Board, exhibited thirty-nine varieties of apples and seven of winter pears, all of superior merit and worthy of careful study and examination; also a fine sample of sorghum syrup and a barrel head presser.

The Green's Farms Agricultural Club exhibited as follows:

H. B. Wakeman—Three dishes apples; half-dozen beets; two varieties potatoes; one dish of wheat; one sample white onions; one sample corn.

Chas. B. Meeker—Red onions; white onions; white oats.

J. B. Mills—Three varieties potatoes.

L. P. Wakeman—Probstier oats, which yielded eighty bushels per acre.

Walter Jennings—Clawson wheat, and two kinds of corn.

John Elwood—Corn, beets, and onions.

T. B. Wakeman—Two kinds white onions, corn, and wheat.

Chas. Mills—Onions and Queen of Valley otatoes.

A. S. Jennings—Mediterranean wheat.

S. B. Sherwood—Five varieties of corn, one of oats, and one of Clawson wheat.

H. G. Birge—Longfellow corn; two kinds potatoes; one of wheat.

A. C. Taylor—One wheat; one oats; one onions; one potatoes.

Wm. J. Jennings—Two kinds squashes; a nest of egg-gourds; one pop-corn; four kinds field corn; one evergreen sweet corn; one barley; one rye, and samples of beets.

Austin Jennings—Three samples corn; red and white onions.

Ebenezer Beers—Three kinds potatoes; one pop-corn; one white Dent corn; two dishes apples.

John H. Sherwood—One sample of field corn.

Daniel H. Sherwood—One sample carrots; one sample potatoes.

Arthur H. Sherwood—One sample onions.

Willis H. Sherwood—One sample of carrots; one of onions.

S. B. Wakeman—One sample corn; one red onions; one white onions; one yellow onions; one lima beans; one kidney beans; two onion seed; one buckwheat; one oats; one wheat.

The Green's Farms exhibit comprised eighty-four different samples or dishes, all as heretofore of marked excellence. There is authentic evidence of a product of corn, counting seventy pounds of ears per bushel, of 119 bushels shelled corn per acre, and as by trial seventy pounds actually did yield a bushel and four quarts of corn, the true yield approached near 130 bushels per acre. Aaing, a yield of eighty bushels of oats shows the high state of culture at Green's Farms. A radius of eight miles from Green's Farms shows sales of market products, fruits, and vegetables probably exceeding almost any other in our country for the like area. Green's Farms is truly the garden district.

WOLCOTT FARMERS' CLUB.

Wolcott, although a hill town, is full of thrift and enterprise. They not only furnish their Waterbury neighbors with thousands of cords of wood, but also butter, fruits, vegetables, and all farm products. Waterbury and Wolcott show a striking illustration of the natural dependence between farmer and mechanic or manufacturer. Early on Wednesday Wolcott was at the hall with a large display of their products, which were mainly as follows:

Manville Norton—One dish table beets; one white strap-leaf turnip; one citron; two squashes; seven kinds sweet corn; two kinds pop corn; one yellow corn; four kinds of peas; five varieties of beans; one early corn; one rye; one sample oats; also twenty-eight cans fruit; ten varieties potatoes; one onions; one of carrots; one orange turnips.

E. A. Todd—One sample Dutton corn; one dish apples.

Thomas Fairclough—Two varieties potatoes; two of turnips; three of beets; two of carrots.

Mrs. Thomas Fairclough—Eight dishes of beans; four of peas; three watermelons; one can of peaches, put up in 1869; one can of honey; one crook-neck squash; one cheese pumpkin; one dish potato onion sets, and four kinds of potatoes.

A. B. Pierpont—Five varieties potatoes; one Longfellow corn; one of rice pop-corn; one sweet corn, and some very large beets.

We were fully aware that Wolcott could produce fine crops of fruit and other products, and were much gratified by this exhibit, which consisted in all of 112 different samples, exceeding in extent that of any other club. We congratulate Waterbury in having such good neighbors close at hand to help feed her 25,000 inhabitants.

T. C. Barnes, of Collinsville, made a large exhibit of fine, handsome potatoes, nicely arranged and labeled, consisting of eighteen varieties, with the following:

" The weight of crop of each variety is given, grown in rows of equal length, with conditions equal, as far as could be made so; grown on a light soil—an old cultivated garden; manure, Mapes' Potato Fertilizer; seed fair size, cut to one or two eyes; drilled in one piece every ten inches.

1st row.—Mohawk	30½	lbs.	
2d " Triumph	26¾	"	
3d " Clark's No. 1	62¾	"	
4th " Genesee Beauty	40½	"	
5th " Dunmore	14	"	
6th " Burbank S.	53½	"	
7th " Bliss' Triumph	24½	"	
8th " Magnum Bonum	15½	"	
9th " Bloodheart	76¼	"	Seedling.
10th " White Star	51¼	"	
11th " Seedling No. 5	59¾	"	Colored.
12th " Beauty of Hebron	77	"	
13th " Queen of Valley	53½	"	
14th " " "	52¾	"	
15th " Belle	77½	"	
16th " Mammoth Pearl	51½	"	
17th " Pride of America	55½	"	
18th " Early Vermont	59¾	"	
19th " Seedling No. 4	65¾	"	White.

"The location, I think, was somewhat unfavorable to the 1st, 2d, 13th, and 14th rows. The seed on the 5th and 8th failed to the extent of about one-third."

Messrs. Hale, of Glastonbury, exhibited the Early Essex, a seedling of Jackson White—very handsome; also some eight varieties of strawberries, put up in alcohol; also about a dozen lithographs of new fruits.

P. M. Augur & Sons, of Middlefield, exhibited nineteen plates of apples; also about twenty-six lithographs of fruits.

S. W. S. Skilton, from Prospect Farm, Morris, exhibited the Litchfield County premium white corn from the thirty-first successive crop of that variety grown on that farm without changing the seed. Crop this year, ninety bushels of shelled corn per acre; has raised 112 bushels per acre heretofore in best crops.

E. Williams, of Montclair, N. J., showed fine specimens of two varieties of Dent corn.

I. Gallup, of Ledyard, Conn., five varieties of excellent corn.

D. H. Van Hoosear, of Wilton, good specimen ears of the Barrett corn.

O. E. Pettiss, of Lebanon, five dishes of apples; also potatoes and onions.

Amos G. Hake, of Bethlehem, Conn., specimens of Dutton and Cap corn.

George T. Platt, of Milford, four varieties of corn.

N. S. Platt, of Cheshire, Conn., eighteen varieties of apples, very fine; also two kinds of corn.

N. S. Hollister, of Glastonbury, sixteen varieties potatoes; also Rowley corn.

G. N. Miner, of Waterville, six varieties potatoes; six cans of fruit; two squashes.

Storrs School Farm, a fine sample of oats, onions, potatoes, and corn, highly creditable to the farm.

J. G. Burrow, propagator of the Jefferson grape, three fine clusters of Jefferson grapes, in good condition and of fine quality.

Rev. W. W. Meech, of Vineland, N. J., three very large Meech's Prolific

Quince in a glass jar of brine. The peculiarities of this quince are rapid growth, early bearing, great productiveness, and excellent flavor. He also showed two photographs of his orchard and two photographs of his style of pruning.

B. C. Patterson, Torrington, from "Golden Farm," exhibited a variety of apple for name. Name not known; called the Forbidden Fruit. A delicious apple.

The Cooley Creamer and Davis Swing Churn were also on exhibition, and approved samples of beautiful butter, from the Newington Creamery, were also exhibited.

L. F. Scott, of Bethlehem, also showed butter from his farm, which was very nice.

D. K. Crofut, of Derby, exhibited a new clevis of merit.

G. M. Pratt, of Middletown, Conn., an alarm gun for peach orchards, melon beds, chicken roosts, and city yards. It attracted much attention and was highly approved.

The model of the Pennock Road Scraper was exhibited and admired. This is one of the valuable improvements which should be generally adopted by Connecticut towns.

Samples of ensilage were exhibited by James Hoyt of New Canaan, and Amos E. Cobb of Norwich. A nice corn-stalk binder was shown (card lost); also a leader for cows, attaching to the horns (card lost).

S. R. Gridley of Bristol, fruits, vegetables, etc., in their usual excellence. Also, extra large hickory nuts.

Robertson's Swinging Stanchion, for cattle fastening, was on hand and examined by numerous visitors, and generally approved. J. B. Olcott, South Manchester, horse-shoes with adjustible cau

Mr. Jeffries also had samples of bees and comb, and instructed all interested in bees, as he had opportunity.

Messrs. S. M. Buckingham, A. N. Burrit, and Mr. Elton would severally have made fine contributions of greenhouse plants, but on account of the storm and low temperature, they found it too hazardous to risk the exposure of the plants, and they were justly excusable.

Most of the vegetables were at my disposal, and were placed in the hands of Mr. Judd of Waterbury, who dispenses provisions to the worthy poor, which, with a fine lot of twenty turkeys, then in his possession, were distribnted for their Christmas dinners.

The articles on the tables were the occasion of much observation and continuous discussion a all hours when the hall was open between the hours of session.

REPORT OF THE COMMISSIONERS ON DISEASES OF DOMESTIC ANIMALS.

We are happy to report the general good health of all kinds of farm stock in the State.

TUBERCULOSIS in neat stock continues with its usual fatality, and warns against using as breeders animals with this tendency, for while under certain circumstances it is contagious, it is also hereditary. With the exercise of prudent caution it should rarely occur.

ABORTION in cows travels about, invading new herds and leaving others. There is no known remedy or preventive, but one precautionary measure should be to avoid introducing any animals from infected herds.

THE FOULS, though not generally considered contagious, is fast gaining this estimation. We have found that when one animal in a herd is affected many other cases are apt to follow—hence a strict quarantine of the afflicted should be maintained.

It varies so much in its severity from a mere cutaneous affection, or irritation between the toes, to a deep-seated affection of the bones, as to require very different treatment, according to its severity. No general prescription can be given, but each case must be treated by itself. Cleanliness and attention to the general health are always in order.

Your Commission has had numerous calls—as in case of sudden death from suspected poison; of disease of the lungs, where contagious pleuro-pneumonia was feared—which have proved false alarms, except in one notable case at Salem, where we found an outbreak of true *contagious pleuro-pneumonia*, or

LUNG PLAGUE.

August 7th we were informed of the existence of a fatal disease in the herd of Mr. H. E. Williams of Salem, and on the 8th the case received our attention. We found that two cows had died July 23d, and at the date of our visit there were three very sick animals; five others comprising the herd.

As two of the sick were typical cases of pleuro-pneumonia, we quarantined the herd, and the next day called Dr. F. E. Rice. On our arrival we found one cow dead, and on post-mortem examination, our previously-expressed opinion was confirmed.

The herd were all thoroughbred Jerseys, except one pair of oxen. One of these oxen, which was quite sick, was killed and buried a few days after by the owner.

The same day we examined a sick cow of Capt. D. H. Seaman, a neighbor of Mr. Williams; a clear case of the malady. Mr. Seaman's herd was also quarantined. A few days after this cow was killed and buried by the owner, and no other cases have occurred on his farm.

Our attention was immediately directed to ascertain, if possible, the source of contagion. All the animals in the herd of Mr. Williams had been on the place over a year, except one cow, which, according to his statement, he had purchased of a friend in New Jersey, whose name he could not remember. This cow, though apparently well, excited our suspicions as the source of the malady, and no pains were spared to trace her history. Mr. Williams gave her name as Molly Lathrop. By reference to the Jersey Herd-Book, we found her name to be Molly Lathrop 3d, No. 7,627, and through numerous transfers, we traced her to the possession of Charles De Clyne of New Durham, N. J., and through a third party we learned that he had sold her to Mr. Williams.

On visiting Mr. De Clyne to get the further history of the cow, he told us that all his cows had died of some disease, except one cow, which he had sold to Connecticut. He had called in veterinary surgeons from New York, and they had pronounced the disease pleuro-pneumonia. We also learned from Mr. De Clyne that he had received a cow from Mr. Williams in April in exchange for Molly.

Immediate notice of the nature of the outbreak was sent to Dr. Thayer, Boston, Mass., of the United States Treasury Commission, and also to Hon. George B. Loring, Commissioner of Agriculture at Washington, with a request to Dr. Thayer to meet the Commission for further examination.

Dr. Thayer, Dr. Rice, and Dr. Parkinson, with the Commission, examined the herd August 14th. At this time we failed to get an appraisal, though attempted, and could make no arrangements for post-mortem, owing to the fact that under the law as it now stands, there is no provision to compel town assessors to make appraisal should they decline to do so when requested; which refusal, as in the present case, prevents the slaughtering of the cattle, and the Commission is confined to quarantine alone.

At this time we found that one ox had been killed and buried by Mr. Williams, as also a cow belonging to Capt. Seaman had been disposed of in a similar manner. Another cow of Mr. Williams was found to be seriously afflicted, and the remaining three animals, including Molly Lathrop 3d, were pronounced by the veterinarians as affected with some lung difficulty, undoubtedly pleuro-pneumonia, and the immediate slaughter of the whole herd was advised. Owing to the obstacles thrown in our way by Mr. Williams, we were unable to secure an appraisal or to make any arrangement to accomplish this object.

August 29th, Dr. D. E. Salmon, Department of Agriculture, Washington, visited the herd, and endeavored to purchase the surviving sick ox of Mr. Williams for pathological examination, but failed to make any terms.

Sept. 7th the Commission again visited Salem, accompanied by Drs. Thayer, Salmon, Rice, and Parkinson. At this time, though the veterinarians were all agreed as to the nature of the malady, we failed to get an appraisal, so that the fact could be settled by a post-mortem examination. One assessor was sick, and another, after notice, absented himself from his place of business and could not be found.

We arranged to make another effort Sept. 10th and 11th, and found the sick animals locked in the barn, so that we could not get access to them.

Returning to Colchester, on consultation we decided to send a special messenger, who served written notices upon each of the assessors to meet at Mr. Williams's to appraise the cattle. We also sent notice to Mr. Williams to unlock his barn and have his cattle ready for our inspection.

This notice was not served, as Mr. Williams refused to admit the messenger. On our arrival on the morning of the 12th, we were told that Mr. Williams had gone to New York. The barns were still locked and in charge of Mr. Williams, his brother.

He proposed that he would open the barn and consent to the appraisal of one animal for slaughter, provided the Commissioners would engage to go no further. This proposition was promptly rejected, and we notified him that we should make no compromise, but should enter the barn. We found that the assessors would not act at all, except on the proposition of Mr. Williams to slaughter but one animal.

We agreed, on consultation, to accept the proposition of the assessors to appraise but one animal that day, but held to the right to demand the appraisal for slaughter of any or all the animals at any future day.

Though the ox was not the most clearly marked case, yet he was selected, as the other two animals were thoroughbred Jerseys, and highly prized by the owner. The appraisal was made at seventy dollars, and on slaughtering it proved to be a typical case of contagious pleuro-pneumonia. The veterinarians present were Drs. Salmon, Rice, and Parkinson.

Sept. 17th we were notified by telegram from the selectmen of Salem of a new case of the disease. This case received immediate attention. We found a cow, owned by Mr. Amos Williams, that had pastured adjoining the herd of Mr. H. E. Williams, plainly developing the disease. Mr. Amos Williams met us frankly, and terms for slaughter were easily arranged. Our opinion as to the nature of her disease was confirmed.

Oct. 15th we again visited the herd of Mr. H. E. Williams, at his call, as he said the stock were perfectly well. We found the Jersey bull in the last stages of the disease, and November 3d we heard that he had killed and buried this bull on the night of Oct. 27th, having given up all hopes of his recovery.

We visited Salem again Nov. 6th, and examined the herd.

An examination was again made of the herd Dec. 13th. The remaining animal of the three in the barn was still suffering with the disease; the other three, which had been quarantined in a separate place, appeared in usual health.

We have been thus particular in giving the history of this case, from the serious nature of the disease and the difficulties which it discloses in carrying out the provisions of the statute for its extermination. Fortunately, it has been confined to this one herd and vicinity. The long period which elapses after apparent recovery, in which the disease may be communicated, renders its extermination, except by slaughter of all infected and exposed animals, very protracted, so that all those familiar with its history advise this course, both in the interests of the owner and for the protection of the community. The State assumes the burden and pays two-thirds of the assessed value of the animals to the owner.

As authority on this question, we append an

Extract from Special Report by Dr. James Law, Department Agriculture, No. 22.

CONTAGIOUS DISEASES OF DOMESTIC ANIMALS.

"A diseased animal is more likely to infect a healthy one at that period when the fever runs highest, and the lung is being loaded with the morbid exudation. Proof appears to be wanting as to the infecting nature of the affection during the incubation stage, but it must not be inferred that with the subsidence of the fever the danger is removed. It is a matter of frequent observation that animals that have passed through the fever and are again thriving well, and giving a free supply of milk, and to ordinary observers appear in perfect health, retain the power of transmitting the disease to others. This may continue for three, six, nine, twelve, or according to some, even fifteen months after all signs of acute illness have disappeared."* P. 147.

Dr. Salmon wrote the Commissioners on this subject, February 6, 1884:

"I should not consider it safe to raise the quarantine so long as the cow which was sick at our last visit remains alive. The calf should also remain under supervision for some months. As this is a herd of Jersey cattle, the individuals of which are liable to be shipped to remote points of the country as soon as the quarantine is removed, it is a matter of importance, not only to your State, but to the country at large, that every precaution be taken to prevent the dissemination of the disease."

The Report of Dr. F. E. Rice is appended to this report. Drs. Thayer and Salmon have already reported to the Department at Washington.

In closing this report your Committee would respectfully suggest the advisability of taking into consideration the amending of the present laws regarding contagious diseases of animals, so they should be of more practical use and conform more to those of adjoining states, Massachusetts for instance; at any rate, they would strongly urge that the present law relating to that subject, Chapter LXXIII of the Public Acts, be so amended as to render it efficient. As it now stands, the refusal of town assessors to

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*"Australia was infected in 1850 by an imported Short-horn cow. '*This cow had had a slight attack* (in England) some two years previously, of which she was declared at the time to be perfectly cured.'—In 1873, one million four hundred and four thousand and ninety-seven, or forty per cent. of the cattle of the island, perished, amounting, at thirty dollars per head, to a total value of $43,500,000." Prof. R. S. Huidekoper, D. V. S., in Report of Penn. Board of Agriculture, 1883, p. 185.

appraise animals when requested to do so by the Commissioners, prevents any action beyond quarantine, and renders the law inoperative and of no avail to *extirpate* the disease.

E. H. HYDE,
T. S. GOLD,
J. W. ALSOP,
Commissioners on Diseases of Domestic Animals.

HARTFORD, Feb. 27, 1884.

REPORT OF DR. F. E. RICE.

To the Commissioners on Diseases of Domestic Animals:

I have the pleasure to submit herewith a report of the outbreak of pleuro-pneumonia contagiosa as occurring in Salem, in this State.

The animals affected by this outbreak were seven cows, two steers, and one bull, all the property of Mr. H. E. Williams, and all pure breed Jerseys except the steers; several cows, the property of Capt. D. H. Seaman, together with one heifer, the property of Mr. Amos Williams. My first visit to these herds was made August 9th, in company with your commission.

I found that two of Mr. Williams's herd had died of the disease July 23d, and one on the night preceding our visit. Of the remaining animals of the herd, a bull and a cow, Sallie S., furnished well-defined manifestations of the disease, while one steer was suffering very acutely.

Of Capt. Seaman's herd, one cow was sick, and on examination, one lung was found to be largely consolidated, while the other gave evidence of having been recently invaded, and from the acuteness of the symptoms, and the rapidity with which new lung tissue was becoming involved, I was led to conclude that the case must terminate in death at an early time.

I next proceeded to make a post-mortem examination of the case that died the previous night. The cavity containing the lungs furnished complete evidence of the existence of disease as well as of its nature, and without attempting to burden this report by a recital of pathological technicalities, I may say that the chest cavity contained the products of inflammation in abundance; the lungs were solid, of marbled appearance when cut across, more or less adherent to the chest walls, and in a word presented the changes peculiar to LUNG PLAGUE so clearly that no possible doubt could exist as to the presence of that disease. I advised immediate slaughter of both herds, but as this was found impracticable, quarantine was substituted.

The second visit, August 14th, was made with your Commission, and Dr. E. F. Thayer of the U. S. Treasury Cattle Commission, and Dr. George Parkinson of Middletown.

On our arrival we learned that immediately after our departure on the 9th, Capt. Seaman had slaughtered the cow to which allusion has been made, and on the 10th, Mr. Williams had slaughtered the steer, which had been pronounced so badly diseased.

The veterinarians present examined all the animals easily accessible, some being in a distant pasture. As a result of this examination we concurred in advising the slaughter of the diseased and exposed animals. We then withdrew pending negotiations between your Commission and Mr. Williams.

Friday, September 7th, a third visit was made, Dr. D. E. Salmon, of the Department of Agriculture, Washington, D. C., being added to the party. As veterinarians, we were agreed as to the urgent necessity for slaughter of all animals affected by this outbreak; but as no appraisal could be secured, as the assessors declined to act, evidently influenced by the owner, we again withdrew.

Sept. 7th, your Commission, in company with Drs. Salmon, Parkinson, and myself, made a fourth visit to Mr. Williams's place, only to find the barns locked.

Sept. 12th, your Commission, with last named veterinarians, visited the place, and having secured the attendance of the assessors, a steer, the property of Mr. Williams, was appraised and slaughtered, and notwithstanding the fact that the animal was not one that the veterinarians present would have selected as best calculated to demonstrate the disease on post-mortem, and did not seem to the owner and others at all badly diseased, his lungs presented the typical change of an advanced stage of pleuro-pneumonia, and to an extent that would have seemed sufficient to cause death.

This animal was of a kind, in the manifestation of the disease, very apt to mislead the laity and become a fruitful source of contagion.

In conclusion, I beg to call attention to the importance of existing statutes regarding contagious diseases, and to a need of more general dissemination of knowledge concerning the nature of contagious and infectious diseases. To inform the people in this regard, and more especially as to the extreme subtlety of the poison of such diseases, is to greatly aid in the work of their extermination.

F. E. RICE, M. R. C. V. S.

OFFICIAL LIST OF AGRICULTURAL SOCIETIES IN CONNECTICUT, 1883–84.

NAME OF SOCIETY.	PRESIDENT.	SECRETARY.	TREASURER.
Connecticut State,	James A. Bill, Lyme,	H. C. Hull, Meriden,	William H. Gross.
Hartford County,*	J. C. Capen, Bloomfield,	Warren Rowley, Hartford,	William H. Gross.
New Haven County,*	D. N. Clark, Woodbridge,	C. P. Augur, Whitneyville,	Frank S. Platt.
New London County,	James B. Palmer, Jewett City,	Joah B. Rogers, Norwich,	F. L. Gardner.
Fairfield County,	Edwin Hoyt, New Canaan,	Henry T. Shelton, Bridgeport,	William A. Curtiss.
Windham County,	George M. Holt, Hampton,	Theo. D. Pond, Brooklyn,	Thomas J. Evans.
Litchfield County,*	Harry Sedgwick, Cornwall Hollow,	D. C. Kilbourn, Litchfield,	E. C. Jones.
Middlesex County,*	J. M. Hubbard, Middletown,	G. W. Wilson, Middletown,	G. W. Wilson.
Tolland County,	Norman B. Perkins, Mansfield Center,	F. R. Tucker, Rockville,	O. C. West.
Bloomfield,*	H. G. Fish, Bloomfield,	J. E. Cox, Bloomfield,	H. W. Rowley.
Chester,	J. E. Silliman, Chester,	E. G. Smith, Chester,	E. G. Smith.
Clinton,	G. E. Elliot, Clinton,	S. P. Hull, Clinton,	E. E. Post.
Danbury,	Henry Crofut, Danbury,	B. C. Lynes, Danbury,	J. W. Bacon.
East Granby,*	C. H. Hanchett, East Granby,	H. L. Clark, East Granby,	J. W. Thompson.
Farmington Valley,	J. Howard Foote, Collinsville,	E. A. Hough, Collinsville,	Oliver F. Perry.
Guilford,	Arthur S. Fowler, Guilford,	J. Seymour Benton, Guilford,	George B. Spencer.
Harwinton,	James Mather, Harwinton,	Addison Webster, Harwinton,	Addison Webster.
Killingworth,	L. L. Nettleton, Killingworth,	N. H. Evarts, Killingworth,	W. E. Griswold.
Meriden,*	W. J. Ives, Meriden,	L. E. Coe, Meriden,	L. H. W. Yale.
Milford and Orange,	A. N. Clark, Milford,	E. G. Miles, Milford	Charles F. Smith.
New Milford,	Nicholas Staub, New Milford,	D. E. Soule, New Milford,	D. E. Soule.
Oxford,*	Wooster B. McEwen, Oxford,	William W. Hughes, Oxford,	E. B. Treat.
Pequabuck,	S. D. Newell, Bristol,	G. A. Gowdy, Bristol,	G. A. Gowdy.
Ridgefield,*	E. H. Smith, Ridgefield,	E. L. Smith, Ridgefield,	D. Smith Sholes.
Simsbury,	E. A. Hoskins, Simsbury,	Phelps Tuller, West Simsbury,	Phelps Tuller.
Southington,	Enos E. Stow, Plantsville,	William H. Cummings, Milldale,	Wm. H. Cummings.
Suffield,*	M. J. Sheldon, Suffield,	H. F. Fuller, Suffield,	H. F. Fuller.
Tolland County, East,	W. Holman, West Willington,	R. S. Hicks, Stafford Springs,	R. S. Hicks.
Torrington,*	E. T. Weston, Torrington,	E. A. Hayes, Torrington,	C. James.
Union (Falls Village),*	M. H. Robbins, Lakeville,	M. U. Dean, Huntsville,	O. M. Brinton.
Union (Somers, etc.),	Charles B. Sikes, Ellington,	J. T. McKnight, Ellington	Charles M. Abbe.
Union (Monroe, etc.),	Wesley B. Coan, Birmingham,	J. Tomlinson, Birmingham,	S. H. Blackman.
Waterbury,*	Samuel Root, Waterbury,	C. N. Hall, Waterbury,	G. S. Parsons.
Watertown,	William G. French, Watertown,	Alanson Warren, Watertown,	C. T. Hickox.
Westbrook,	R. H. Stannard, Westbrook,	G. A. Post, Westbrook,	T. D. Post.
Willimantic,	Eugene S. Boss, Willimantic,	O. H. K. Risley, Willimantic,	Wm. C. Jillson.
Woodbridge and Bethany,	T. A. Todd, Westville,	S. G. Davidson, Bethany,	S. G. Davidson.
Woodbury,	Levi H. Curtiss, Woodbury,	F. P. Root, Woodbury,	G. P. Crane.
Woodstock,	M. F. Towne, Thompson,	W. I. Bartholomew, Putnam,	E. T. Warner.

*No Fair.

RETURNS OF AGRICULTURAL SOCIETIES, 1883.—FINANCES—RECEIPTS.

SOCIETIES.	Cash on Hand.	Single Admission Tickets.	Membership or Season Tickets.	Grand Stand.	Donations and Unclaimed Premiums.	Entrance Fees, Trials of Speed.	Other Entrance Fees.	Rent of Grounds.	State Appropriation, 1882.	Other Sources.	TOTAL.	State Appropriation, 1883.
Connecticut State,	$3,610.67	$4,362.99	$730.50	....	....	$660.00	$17.50	....	$2,500.00	$141.15	$12,022.81	$2,500.00
New London County,	270.00	2,188.20	65.00	$130.95	$29.21	6[illegible]2.00	56.00	$674.00	310 85	....	....	276.20
Fairfield County,	722.72	2,100.05	....	205.50	....	325 00	61.00	1,370.35	287.53	[1] 94.31	5,166.46	260.57
Windham County,	....	1,209.21	....	49.75	8.00	108.00	48.00	325.00	343.18	[2] 29.00	2,120.14	308.78
Tolland County,	8.38	623.28	143.74	55.95	....	120.00	....	190.00	141.88	....	1,283.23	177.54
Chester,	37.51	76.75	20.25	....	5.05	....	....	2.00	103.14	3.60	248.30	104.18
Clinton,	136.13	124.70	76.50	....	7.30	....	3.50	8.00	145.10	[3] 89.00	590.23	127.98
Danbury,	5,629.03	8,890.50	20.00	1,263 30	....	983.71	....	2,012 40	631.43	[4] 125.15	19,555.52	646.32
Farmington Valley,	46.10	1,002.47	....	89.55	....	170.00	43.50	187.70	....	[5] 3,516.75	5,056.07	119.09
Guilford,	20.00	106.00	55.00	....	40.00	....	....	....	139.69	[3] 80.00	440.69	135 09
Harwinton,	19.92	....	1.25	....	1.50	....	....	207.59	132 63	2.25	364.51	102.38
Killingworth,	....	145.50	....	....	130.00	....	....	....	....	[6] 375.50	651.00	106.64
Milford and Orange,	113.46	455.30	103.00	48.40	....	80.00	12.00	202.00	126.76	[7] 60.00	....	135.36
New Milford,	5.88	1,067.00	....	71.80	....	297.88	....	163 75	219.37	[8] 50.00	....	175.44
Pequabuck,	89.50	523.70	....	....	....	75.00	24.00	90.00	166.97	[9] 665.82	1,634.99	174 17
Simsbury,	315.36	423.43	19.00	29.84	....	78.50	....	37.00	133.59	....	....	124.09
Southington,	....	1,712.50	287.50	272.00	....	815.00	14.00	437.60	204.08	[10] 201.00	3,943.68	172.51
Suffield,	....	....	....	....	....	....	....	....	112.42	....	....	....
Tolland County, East,	....	1,992.59	....	168.46	....	348.00	....	301.51	203.54	103.89	3,117.99	186.62
Union (Somers, etc.),	57.64	....	16.00	....	28.25	....	....	....	109.81	12.75	224.25	111.19
Union (Monroe, etc.),	1.30	734.79	198.00	44.56	31.00	86.00	14.00	87 00	203.55	[12] 379.50	1,779.70	197.75
Watertown,	235.75	1,976.23	....	182.55	....	390.00	24.00	420.49	268.72	161.00	3,658.74	312.65
Westbrook,	11.85	181.69	121.00	....	15.60	....	7.00	4 00	160.30	[13] 188.13	689.57	153.31
Willimantic,	....	2,506.10	[14] 80.60	263.85	....	465.00	61.32	36.98	....	[15] 778 92	4,192.77	233.95
Woodbridge and Bethany,	....	211.90	76.00	....	....	....	4 00	....	158.00	140.60	590.00	153.63
Woodbury,	....	269.91	63.00	....	....	405.00	....	95.00	101.17	....	934.08	133.38
Woodstock,	85.47	1,245.59	186.00	79.65	....	10.64	90.36	151.50	274.14	[16] 128.00	2,251.35	261.36

[1] National Trotting Association, $22.56, and Rent for Pasture, $50.00; Oats, $4 25; Advertising, $17.50. [2] Horse Stalls, $16.00; Grass on Grounds, $13 00 [3] Advertising in Premium List. [4] Interest. [5] Rent of Grounds—sundry entertainments, $268.88; Grass, etc., 66.62; Sale of Capital Stock, $1,181.25; Cash Borrowed on Notes, $2,000.00. [6] Restaurants, $187.00; Advertising, $188.50. [7] Grass. [8] Trotting Premium withheld for Settlement. [9] Advertising, $53.00; Borrowed, $550.00; Treasurer Overpaid, $62.82. [10] Advertising and Horse Feed. [11] No Fair. [12] Advertising, $82.50; Borrowed Money, $250.00; National Trotting Association, $25.00; Sundry, $22.00. [13] Advertising, $137.50; Refreshments, $50 63. [14] Railroads. [15] Meals, $551.42; Advertising, $227.50. [16] Grass, $80.50; Advertising, $47.50.

RETURNS OF AGRICULTURAL SOCIETIES, 1883.—Finances, Continued.

SOCIETIES.	Expenses of Fair.	Premiums for Speed and Amusements.	Other Premiums and Gratuities.	Permanent Improvements.	Other Expenses.	Cash on Hand.	Total.	Indebtedness of Society.	Real Estate.	Personal Estate.	Number of Members.	No. of Stockholders—Joint Stock.	Capital Stock.	Estimated Attendance.	[21] Admission Tickets	Season Tickets.	Grand Stand.
Connecticut State,.......	$3,427.03	$1,365.00	$3,757.75	....	$94.08	$4,196.45	$12,022.81	....	....	....	....	....	....	[1] 14,100	$0.50	$1 50	$0.15
New London County,....	516.20	1,506.00	895.85	$150.00	481.91	16.37	....	$6,300.00	$10,000.00	$300.00	319	....	....	7,000	.35	....	.15
Fairfield County,........	2,513.66	915.00	825.25	....	715.25	197.20	5,166.46	10,200.00	20,901.04	....	....	162	$30,000.00	[2] 6,700	35 & 15	....	....
Windham County,........	262.94	220.00	1,043.00	50.86	197.75	....	1,824.55	....	4,500.00	....	393	....	....	[3] 5,600	.25	....	.10
Tolland County,..........	407.53	172.25	450.25	25.00	....	....	1,355.03	1,072.80	2,000.00	200.00	250	....	....	[4] 3,000	.25	1.00	.10
Chester,.................	66.70	14.50	118.90	....	5.35	42.85	248.30	....	....	....	57	....	....	825	.10	....	....
Clinton,.................	164.16	....	226.40	....	....	199.67	590.23	....	....	70.00	153	....	....	2,000	.10	.50	....
Danbury,.................	5,307.27	2,177.50	2,567.60	3,417.16	2,560.00	3,525.99	19,555.52	....	10,000.00	2,000.00	....	192	8,000.00	[5] 36,690	.25	....	.25
Farmington Valley,......	134.78	450.00	186.25	4,159.41	123.15	1.48	5,056.07	2,654 92	[6] 8,545.22	....	....	72	4,950.00	[7] 3,400	[8]	....	.25
Guilford,................	155.00	....	258.50	....	....	27.19	....	....	....	700.00	110	....	....	2,000	.15	....	....
Harwinton,..............	326.83	....	110.75	....	....	....	....	....	....	340.25	86	....	....	6,000	....	....	....
Killingworth,...........	113.50	....	130 00	....	* [8] 37.00	370.50	651.00	423.28	2,500.00	....	....	....	....	....	.10	....	....
Milford and Orange,......	654.41	360.00	259.75	....	....	....	1,274.16	200.00	1,200.00	....	....	40	1,000.00	[9] 1,275	.50	1.00	.15
New Milford,............	431.51	685.25	440.78	....	196.13	123.01	1,876 68	2,766 85	3,406.94	508.28	....	149	7,957 50	[10] 4,268	.25	....	.15
Pequabuck,..............	441.35	225.00	435.00	....	[11] 533.64	....	1,631.99	329.18	....	1,000.00	150	....	....	[12] 1,580	.25	....	....
Simsbury,............	107.73	225.50	203.81	162.00	....	214 08	913.13	....	....	....	140	....	....	[13] 2,000	.25	....	....
Southington,............	598.47	1,618.00	427.50	1,000.00	....	....	....	....	7,800 00	200.00	....	100	7,000.00	[14] 5,000	.50	1.25	.25
Tolland County East,....	728.22	1,180.00	491.25	893.69	....	....	3,273.16	2,727.01	3,500.00	600.00	....	....	....	[15] 11,000	.25	.50	.10
Union (Somers, etc.),.....	15.75	....	150.55	....	....	58 15	224.25	....	....	1,000.00	325	....	....	3,000	....	....	....
Union (Monroe, etc.),....	473.73	271.00	541.50	....	461.29	33.18	1,779.70	850.00	2,500.00	....	430	....	....	[16] 3,050	25 & 15	1.00	.15
Watertown,..............	893.49	1,000.00	1,060.50	....	[17] 37.50	286.06	....	1,775.73	8,045.87	50.00	....	148	7,000.00	10,000	.25	....	.25
Westbrook,..............	235.16	....	340.80	....	....	113.61	689.57	....	....	....	242	....	....	2,500	.10	....	....
Willimantic,.............	1,569.00	1,014.00	705.00	14,500.00	....	....	....	5,000.00	14,500.00	....	....	211	[18] 10,000.00	[19] 10,000	.25	....	.25
Woodbridge and Bethany,	275.60	13.00	342.25	....	....	....	....	....	....	....	76	....	....	....	.25	1.00	....
Woodbury,...............	....	550.00	250.75	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Woodstock,..............	571.99	152.00	828.82	....	300.70	397.84	2,251.35	....	6,000.00	150.00	377	....	....	[20] 5,800	.25	.75	.15

[1] Tuesday, 3,000; Wednesday, 6,000; Thursday, 3,300; Friday, 1,800. [2] Tuesday, 200; Wednesday, 250; Thursday, 250; Friday, 4,000; Saturday, 2,000. [3] Tuesday, 600; Wednesday, 3,000; Thursday, 2,000. [4] Tuesday, 700; Wednesday, 2,300. [5] Monday, 500; Tuesday, 300; Wednesday, 3,362; Thursday, 12,775; Friday, 15,686; Saturday, 4,067. [6] 150 acres and buildings. [7] Monday, 1,200; Tuesday, 2,200. [8] First day, 25 and 10 cents; Second day, 50 and 25 cts. *[8] Band. [9] Tuesday, 400; Wednesday, 875. [10] Thursday, 1,200; Friday, 2,200; Saturday, 868. [11] Paid on loan, $500; Repaid Treasurer, $33.64. [12] Thursday, 780; Friday, 800. [13] Wednesday, 500; Thursday, 1,500. [14] Tuesday, 1,000; Wednesday, 2,300; Thursday, 1,700. [15] Wednesday, 2,000; Thursday, 9,000. [16] Thursday, 1,050; Friday, 2,000. [17] Insurance. [18] $8,950 paid in. [19] Tuesday, 300; Wednesday, 8,000; Thursday, 700; Friday, 1,000. [20] Wednesday, 3,000; Thursday, 2,800. [21] Park and Hall, State Fair.

NUMBER OF ANIMALS EXHIBITED.

SOCIETIES.	Bulls.	Milch Cows.	Heifers.	Calves.	Working Oxen (pairs).	Steers (pairs).	Fat Cattle.	Horses—except speed.	Horses—speed.	Sheep.	Swine.	Poultry (coops).	All other Stock.
Connecticut State,	39	89	81	67	*23	23	11	99	..	195	5	155	..
New London County,	18	85	36	..	37	25	10	60	39	180	40	18	..
Fairfield County,	5	1	1	1	8	2	1	23	6	11	2	78	..
Windham County,	18	6	33	35	19	24	2	65	..	130	10	27	173
Tolland County,	8	40	11	6	40	9	6	125	25	20	15	37	..
Chester,	..	..	..	..	..	..	..	..	..	..	..	..	..
Clinton,	5	20	3	8	17	10	4	17	..	38	13	32	..
Danbury,	20	63	48	12	128	47	6	44	46	12	6	208	50
Farmington Valley,	..	..	..	..	..	..	..	..	..	..	..	..	..
Guilford,	..	..	..	..	..	..	..	..	..	..	..	27	..
Harwinton,	..	..	..	..	..	..	..	..	..	..	..	..	..
Killingworth,	..	..	..	..	..	..	..	..	..	..	..	..	..
Milford and Orange,	2	2	5	5	15	4	4	10	18	10	1	16	..
New Milford,	..	..	..	..	..	..	..	..	..	..	..	..	..
Pequabuck,	18	35	23	19	44	6	3	3	10	17	16	35	7 rabb's
Simsbury,	6	30	23	10	50	20	..	25	..	20	25	3	..
Southington,	14	31	7	10	60	7	..	23	..	7	15	58	..
Tolland County, East,	..	..	..	..	..	..	..	..	..	..	..	..	..
Union (Somers, etc.),	4	13	9	5	50	30	4	35	..	11	3	7	..
Union (Monroe, etc.),	11	24	..	..	9	12	2	41	..	21	..	..	..
Watertown,	..	..	..	..	..	..	..	..	..	..	..	..	..
Westbrook,	8	35	14	17	140	5	8	19	..	108	20	46	..
Willimantic,	11	97	27	11	20	55	12	56	15	58	6	46	..
Woodbridge and Bethany,	..	..	..	..	9	3	..	..	..	..	..	15	..
Woodbury,	..	..	..	..	..	..	..	..	..	..	..	..	..
Woodstock,	17	43	33	26	34	23	..	71	11	36	..	55	..

*Trains not included here and in some other reports.

ANALYSIS OF PREMIUMS AND GRATUITIES PAID.

FARM STOCK.

SOCIETIES.	Bulls.	Milch Cows.	Heifers.	Calves.	Working Oxen.	Steers.	Fat Cattle.	Horses—except speed.	Horses—speed.	Sheep.	Swine.	Poultry.	All other Stock.	TOTAL.
Connecticut State,	$283.00	$413.00	$164.50	$113.00	$197.00	$91.00	$24.00	$378.00	$1,365.00	$266.00	$27.00	$142.00	$4.00	$3,467.50
New London County,	41.25	159.00	79.75	6.50	76.50	12.75	12.00	137.75	1,506.00	116.75	31.50	9.00	.....	2,198.75
Fairfield County,	30.25	4.00	3.00	.50	55.00	8.00	10.00	101.00	100.00	15.00	5.00	48.00	.....	379.75
Windham County,	57.00	9.00	45.00	45.00	75.00	28.00	6.00	146.00	220.00	50.00	24.00	8.50	143.00	856.50
Tolland County,	25.00	36.75	15.00	8.00	34.00	23.00	4.00	100.00	400.00	14.00	10.00	32.00	.....	701.75
Chester,	1.50	6.00	1.50	2.50	9.00	.....	.....	6.50	....	.....	1.50	1.00	.50	30.00
Clinton,	4.50	11.50	5.50	7.00	15.50	4.50	3.25	12.00	....	19.00	9.50	10.50	.....	102.75
Danbury,	54.00	155.00	38.00	11.00	109.00	41.00	8.00	132.00	2,177.50	23.00	20.00	143.00	198.00	3,109.50
Farmington Valley,	27.50	17.00	16.50	7.00	20.00	10.00	5.00	32.50	450.00	4.00	6.00	4.50	13.00	613.00
Guilford,	2.00	2.00	1.00	1.25	52.00	11.50	3.00	20.00	....	1.00	13.00	9.75	.....	116.50
Harwinton,	.....	.....	.....	.....	84.00	.....	.....	.....	....	.....	3.00	1.00	.....	88.00
Killingworth,	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....	.....	....
Milford and Orange,	4.00	5.00	2.50	2.50	58.00	3.00	2.00	43.00	360.00	5.00	3.00	15.00	.....	503.00
New Milford,	21.00	85.50	20.00	21.50	112.68	28.00	3.00	48.00	680.00	8.00	2.00	3.50	3.00	1,036.18
Pequabuck,	22.00	31.00	5.00	13.00	147.00	8.00	4.00	7.00	225.00	10.00	8.00	31.00	5.50	516.50
Simsbury,	10.00	30.00	9.00	5.00	40.00	10.00	.....	50.00	225.50	15.00	12.00	2.75	.....	410.25
Southington,	25.00	52.00	9.00	11.00	77.00	10.00	.....	42 00	1,540.00	4.00	21.00	40.00	.....	1,831.00
Tolland County, East,	.....	.....	.....	.....	.....	.....	.....	163.50	730.00	.....	.....	.....	.....	1,098.25
Union (Somers, etc.),	10.40	7.10	16.30	4.00	22.50	22.50	5.00	18.00	....	2.25	1.00	3.00	.....	112.05
Union (Monroe, etc.),	14.00	29.00	.....	1.50	16.00	23.00	4.00	70.00	235.00	18.00	....	31.50	45.00	487.00
Watertown,	36.00	79.00	16.00	26.00	139.00	47.00	10.00	150.00	1,000.00	33.00	8.00	115.25	21.00	1,575.00
Westbrook,	9.50	22.50	10.50	6.15	17.50	9.00	6.00	18.25	....	33.00	8.00	14.70	.....	155.10
Willimantic,	45.00	109.00	25.00	19.00	35.00	40.00	15.00	215.00	800.00	23.00	10.00	83.00	.....	1,419.00
Woodbridge and Bethany,	5 50	23.50	.....	.....	11.00	5.00	12.00	29.00	15.00	7.00	.....	13.00	.....	119.00
Woodbury,	7.00	11.00	9.00	2.75	68.00	31.00	.....	71.00	550.00	2.50	.....	1.50	.....	744.25
Woodstock,	30.00	67.00	40.00	26.00	50.00	26.00	.....	130.00	152.00	24.00	8.00	26.75	.....	579.75

ANALYSIS OF PREMIUMS AND GRATUITIES.—CONTINUED.

FARM PRODUCTS.

SOCIETIES.	Indian Corn.	Wheat.	Rye.	Barley.	Oats.	Beans.	Grass Seeds.	Potatoes.	Carrots.	Beets.	Parsnips.	Turnips.	Onions.	Other Products.	Total amount for Grain and Root Crops.
Connecticut State,..........	$21.00	$3.50	$3.50	$3.50	$3.50	$9.00	$7.00	$42.00	$5.00	$17.00	$4.00	$5.00	$10.00	$3.50	$137.50
New London County,.......	....	....	....	....	....	....	....	....	....	....	....	....	....	....	39.50
Fairfield County,............	1.00	....	3.25	....	.50	.50	....	14.50	....	1.00	....	....	3.00	63.25	87.00
Windham County,..........	4.50	....	1.50	....	1.50	5.75	....	12.00	....	1.00	....	2.00	3.00	15.75	47.00
Tolland County,............	3.00	2.00	3.00	3.00	....	....	....	*35.25	....	....	....	....	....	....	46.25
Chester,....................	.50	.75	....	....	1.25	1.55	....	9.15	.50	.80	.30	....	1.30	12.30	28.40
Clinton,....................	10.70	....	.30	.50	.30	3.50	2.10	5.95	.50	3.70	....	1.70	1.60	....	31.15
Danbury,....................	6.50	3.00	3.00	....	2.50	3.25	2.50	41.00	1.75	3.50	1.00	6.75	7.00	47.00	128.75
Farmington Valley,.........	1.25	....	.50	....	.75	.50	....	1.25	.50	1.00	.50	.50	....	....	6.75
Guilford,....................	14.75	.75	.75	.75	.75	12.00	....	11.25	.75	1.50	.50	5.25	1.75	9.00	59.75
Harwinton,.................	.75	1.25	.75	....	.75	.75	....	.75	....	.75	....	.75	1.25	1.25	9.00
Killingworth,..............	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Milford and Orange,........	.75	.50	1.25	....	.50	1.00	....	8.75	1.00	1.50	.50	1.75	2.25	1.00	20.75
New Milford,...............	1.90	.65	.75	....	.25	....	....	1.75	.55	1.10	....	.20	.55	....	7.70
Pequabuck,.................	2.25	....	.75	....	.50	.50	....	7.50	.50	.50	.50	.50	2.00	....	15.50
Simsbury,..................	2.00	.50	....	....	....	....	....	3.00	.50	.50	....	.50	1.00	....	8.00
Southington,...............	3.00	.75	.75	....	.75	2.25	....	11.00	.75	1.50	.75	1.50	2.75	10.00	35.75
Tolland County East,.......	....	....	....	....	....	....	....	....	....	....	....	....	....	....	19.50
Union (Somers, etc.)........	1.50	1.25	....	....	.75	....	....	2.25	....	....	....	.75	1.50	2.25	10.25
Union (Monroe, etc.)........	4.50	3.50	3.00	.50	2.00	2.25	....	18.50	2.00	7.25	1.50	9.00	6.00	32.50	92.50
Watertown,.................	13.25	.75	.75	....	.50	.75	.75	21.00	.75	1.75	.75	1.50	.75	17.75	61.00
Westbrook,.................	8.00	1.75	.75	.75	.75	3.40	2.50	14.90	.65	2.60	....	2.10	1.20	14.40	53.75
Willimantic,................	....	....	....	....	....	....	....	8.00	....	....	....	....	....	....	....
Woodbridge and Bethany,.	11.25	1.25	.75	.75	1.25	2.00	....	20.00	1.00	2.75	.50	11.00	2.25	....	54.75
Woodbury,..................	.75	....	....	....	.75	1.50	2.00	....	....	....	....	....	....	....	20.75
Woodstock,.................	6.50	1.50	1.50	1.50	1.50	2.00	....	11.75	1.50	2.75	....	1.50	1.50	33.75	67.25

*Potatoes and other roots.

ANALYSIS OF PREMIUMS AND GRATUITIES.—Continued.

FARM PRODUCTS.

SOCIETIES.	Fruits.	Flowers.	Other cult. Crops.	Butter.	Cheese.	Honey and Wax.	Bread and Cake.	Sugar, Syrup, Preserved Fruit.	Total amount paid Farm Products.	Agricultural Implements.	Mechanical Inventions.	Fine Arts and Fancy Articles.	Decorated Carts & Trains of Oxen.	Medals.	Diplomas.	Plowing at Exhibition.
Connecticut State, ...	$214.00	$22.50	$58.00	$20 00	$13.00	$7.00	$25.50	$25.50	$523.00	$20.00	.....	$172.25	$100.00	*31	92	.....
New London County, ...	25.85	7.25	.....	13.25	7.25	.75	2.50	.....	97.35	9.25	$59.25	15.25	.....	..	2	$13.00
Fairfield County, ...	58.50	57.00	.....	2.25	.....	1.00	35.50	6.75	279.25	38.00	34.00	216.25	.....	19	8	.....
Windham County, ...	75.50	42.50	.....	14.00	14.00	3.00	9.00	9.50	214.50	21.00	98.70	72.00	.....	..	2	.....
Tolland County, ...	25.25	.....	.....	12.00	.....	.....	.....	6.00	89.50	24.25	13.25	7.50	.....	..	..	14.00
Chester, ...	13.75	1.60	.....	.75	.30	.....	12.00	8.10	64.90	.....	5.00	11.00	8.00	..	..	.....
Clinton, ...	21.20	3.40	11.35	2.00	.....	1.25	8.30	7.20	85.85	4.00	6.50	16.55	11.00	..	..	.....
Danbury, ...	197.00	86.00	28.00	4.00	2.50	4.75	49.25	21.00	521.25	45.25	342.35	554.25	172.50	46	43	.....
Farmington Valley, ...	8.00	.....	4.00	2.00	1.00	1.50	.....	.....	23.25	.....	.....	.....	.....	.	..	.....
Guilford, ...	49.00	2.00	.....	.75	.....	.....	2.25	2.00	115.75	.....	14.75	11.50	.....	..	..	.....
Harwinton, ...	4.75	1.50	.....	.75	.50	.50	1.75	1.00	19.75	.....	2.25	.75	.....	..	..	.....
Killingworth, ...	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....	.....	130.00	..	..	.....
Milford and Orange, ...	13.00	9.00	4.25	3.00	1.00	1.00	5.00	6.25	63.75	.....	.....	33.50	20.00	..	..	.....
New Milford, ...	10.00	4.50	4.20	.50	1.00	.....	4.00	4.50	36.40	5.25	13.00	29.95	.....	..	1	.....
Peqnabuck, ...	36.50	6.00	3.00	1.50	1.50	.....	7.00	2.50	58.00	3.00	35.00	32.00	.....	..	..	.....
Simsbury, ...	3.00	.50	.....	1.00	.....	.....	.50	1 00	14.00	.....	8.00	2.00	.....	..	..	.....
Southington, ...	46.00	2.50	.....	6.00	.50	1.00	4.00	3.00	98.75	2.00	.....	30.75	5.00	..	7	.....
Tolland County, East, ...	.....	.....	.....	.....	.....	.....	.....	.....	35.20	.....	45.80	22.50	.....	..	27	.....
Union (Somers, etc.), ...	7.00	.....	.....	1.50	1.25	.....	1.25	.....	21 25	.....	7.00	10.25	.....	..	..	.....
Union (Monroe, etc.), ...	81.75	12.50	.....	10.00	.....	2.25	10.00	2.75	219.75	.....	1.50	53.25	15.00	..	..	.....
Watertown, ...	23.25	18.25	.....	3.00	1.50	.75	11.75	9.75	129.25	16.00	108.00	69.00	94.50	2	..	.....
Westbrook, ...	20.35	1.70	.....	2.00	.....	1.05	7.80	12.55	99.20	7.35	.....	27.70	48.00	..	..	3.00
Willimantic, ...	†89.00	17.00	.....	. . .	.....	.....	.....	.....	114.00	.....	20.00	22.00	.....	..	115	.....
Woodbridge and Bethany,	17.00	7.00	.....	1.50	1.50	.....	2.25	2.00	86.00	.....	105.25	.....	45.00	..	..	.....
Woodbury, ...	.....	.....	.....	.....	....	.....	.....	. ...	20.75	.....	.....	.....	.....	..	..	.....
Woodstock, ...	52.50	45.80	.....	6.00	5.00	.....	7.00	9.75	193.30	9.00	54.37	29.90	45.00	..	..	‡53.00

*11 Gold and 20 Silver Medals. † Fruits, Butter, Cheese, etc. ‡ Miscellaneous, $16.50.

OFFICIAL LIST OF FARMERS' CLUBS IN CONNECTICUT—1883-4.

NAME OF CLUB.	PRESIDENT.	SECRETARY.
New Haven County,...	Prof. Wm. H. Brewer,..	Cullen B. Foote.
Abington, ...	James A. Pickard,......	Wm. Ingalls.
Bethlehem, ...	L. F. Scott, ...	G. C. Stone.
Bristol, ...	S. R. Gridley,..........	S. R. Peck.
Cheshire, ...	C. C. Lord,......	N. S. Platt.
Chester, ...	A. H. Gilbert,..........	C. E. Lord.
Clinton, ...	George E. Elliot, ...	Sylvester Hull.
Columbia, ...	Joseph Hutchins,.......	W. H. Yeomans.
East Windsor, ...	William N. Wells,.. ...	John F. Fitts.
Greens Farms, ...	Wm. J. Jennings,.......	S. B. Sherwood.
Guilford,..............	Sidney W. Leete,... ...	R. H. Woodruff.
Hamden, ...	G. W. Bradley,.........	C. P. Augur.
Killingworth, ...	N. H. Evarts, ...	E. P. Nichols.
Lebanon, ...	Wm. Huntington, ...	O. E. Pettis.
Meriden,..............	Oliver Rice,............	L. E. Coe.
Middlefield, ...	H. W. Hurlburt,........	P. M. Augur.
Morris, ...	A. C. Tracy, ...	S. W. S. Skilton.
Mystic,................	Josiah Hammond,......	James Watrous, Jr.
Naugatuck,...........	I. B. Tolles, ...	M. S. Baldwin.
Newington,...........	H. A. Whittlesey,.......	J. S. Kirkham.
New Canaan, ...	Edwin Hoyt,...........	Charles F. Olmsted.
North Stonington,.. ..	T. W. Wheeler, ...	F. S. Peabody.
New Britain,..........	L. S. Wells,............	A. C. Blake.
Pomfret, ...	C. D. Williams,.........	B. S. Warner.
South Coventry, ...	P. H. Peterson,.........	Martin Parker.
Southington, ...	M. W. Frisbie, ...	E. A. Wood.
Tunxis,................	E. C. Ayer, ...	A. Porter.
Watertown,...........	S. H. Peck, ...	A. H. Scoville.
West Cornwall, ...	Luman Wickwire,.. ...	T. S. Gold.
Willimantic, ...	Vallette D. Stearns......	N. P. Perkins,
Wilton,................	D. N. Van Hoosear,. ...	D. H. Van Hoosear.
Wolcott, ...	Harmon Paine,.........	Edwin A. Todd.
Woodstock,...........	Col. A. Warner,...	Dr. G. A. Bowen.

THE SEASON OF 1883

was peculiar in its character, yet with a fair average degree of productiveness for Connecticut. The season was propitious in its opening; corn and other grains vegetated well; the rain-fall was moderate, yet sufficient; but the drought of the previous season had so injured the stand of grass in pastures and meadows, that the yield was generally light; a local drought affecting the middle and northeastern parts of the State, and cutting short the late summer and autumn feed; while the low temperature of mid-summer and autumn interfered much with the high promise of early summer.

Corn proved a fair average crop, the better crops being secured before the frost of September 10th.

Wheat and Rye were somewhat winter-killed in the northern portions of the State, but recovered and yielded fairly.

Oats were unusually good, and secured in fine order.

Buckwheat was a failure from drought and frost.

Potatoes were largely planted, and yielded well—quality excellent.

Apples were scarce except in a few neighborhoods.

Pears yielded abundantly, but quality was inferior.

Peaches bore abundantly, and with the exception of some late varieties were a decided success.

Plums, wherever the curculio and the black knot were successfully fought, gave good returns.

Grapes, though extending in culture, in varieties and area, in many cases failed to mature well. The frost of September 10th, and the freeze of October 4th, proving very detrimental to the crop.

The small fruits, as strawberries, raspberries, and blackberries, all did well, the huckleberry alone proving a failure.

The Dairy. The demand for cattle to stock the dairies and ranches of the West has made veal more of an object than formerly, and the current of trade in young stock and dairy cows has been Westward. Butter has been in good demand, and the prices of choice dairy and creamery has kept full pace with any improvement in quality.

Tobacco which was still in the field September 10th, was badly frost-bitten, and the season can hardly be classed as favorable to this industry.

Prices of Farmer's Produce. Corn, 75c., oats, 45c. to 60c., rye, 75c., wheat, $1.00 to $1.20, potatoes, $1.00 to $1.25, hay, $10 to $20 per ton, milk, wholesale, 2¼c. to 4c. per quart, butter, 20c. to 45c., cheese, 10c. to 15c., beef sides, 6c. to 9c., pork, 7c. to 10c., eggs, 15c. to 45c., poultry dressed, 18c. to 25c., wheat bran, $18 to $22 per ton, linseed meal, new process, $28, cotton seed meal, $27 to $29, apples, $2 to $4 per barrel, wool, 25c. to 35c., tobacco, 8c. to 15c.

Working oxen, $150 to $250, milch cows, $30 to $75, not covering choice thoroughbreds, Jerseys, Guernseys, Ayrshires, Swiss, and Holsteins, which are largely supplanting the favorite Devon and Short Horn.

The prices given above do not cover the extreme range, yet may prove of value for future comparison. The only break down in prices has been in potatoes which have flooded the market.

T. S. G.

CONNECTICUT STATE AGRICULTURAL SOCIETY.

At the annual meeting of the Society, I was directed to prepare a Report of the Society for printing in the Report of the Board of Agriculture. Space will not allow of any extended report.

The synopsis of the Report of the Treasurer and Corresponding Secretary, as contained in the tables, exhibits the financial condition of the society. The Fair at Meriden was a decided success. The improvement in the neat stock of the State, as manifested in these exhibitions during the last thirty years, is very gratifying. The show in Horticulture, and most other departments, testifies to encouraging progress. Sheep and swine are annually exhibited in decreasing numbers, yet their quality, as adapted to our present wants, is improving. The liberal premiums offered should draw out more competition, and that any premiums should be awarded without special merit, is not the fault so much of those who do exhibit and take premiums, as of those who fail to present better ones in competition. This suggestion is not made to apply especially to the small exhibits of sheep and swine, but to every class of animals, and to every article in the Dairy or Horticultural and Agricultural exhibits. To share in the fullest benefits offered by the Society, every producer in the State should exhibit his products and test their relative value in comparison with what others in the same line are producing. The varied industries of Connecticut on the farm and in the shop, furnish materials for a show only surpassed by National or World's Fairs.

T. S. GOLD,

Recording Secretary Connecticut Agricultural Society.

TREASURER'S REPORT.

ESTATE OF NATHAN HART, TREASURER, *in account with*
THE STATE BOARD OF AGRICULTURE.

RECEIVED.

Balance from Report of January 10, 1883, - - -		$423.94

PAID.

Jan. 11,	1883,	John S. Kirkham, - -	$5.00	
" 11,	"	J. L. Buck, - - - -	9.55	
" 11,	"	W. J. Sullivan, - - -	200.00	
" 11,	"	J. M. W. Yerrington, - -	138.15	
Mar. 24,	"	P. M. Augur, - - - -	50.00	
Nov. 30,	"	T. S. Gold, Treasurer, *pro tem.*, -	21.24	
				$423.94

J. S. KIRKHAM, TREASURER.

RECEIVED.

Jan. 16, 1884, Balance in Treasury		
" " " From T. S. Gold, - - - -		$21.24
" " " From State Treasurer, - - - -		2,500.00
		$2,521.24

PAID.

T. S. Gold, Salary, - -	$700.00	
Traveling expenses, -	228.00	
Postage, - -	54.67	
Freight and express, -	33.65	
Telegrams, - -	2.20	
Stationery, - -	2.86	
Strawberry show, -	12.58	
Cattle commission, -	25.78	
Scovill House, -	86.00	
Sundries at Waterbury,	12.75	
J. H. Hale, - -	25.00	
J. M. Hubbard, -	25.00	
L. P. Chamberlain, -	26.50	

	G. A. Bowen,	28.00	
	W. H. Brewer,	26.00	
	A. W. Cheever,	30.00	
	J. B. Olcott,	26.50	
	Mrs. R. T. Cooke,	25.00	
	R. S. Hinman,	23.50	
			$1,393.99
	E. H. Hyde,		286.15
	The Case, Lockwood & Brainard Co.,		195.34
	Albert Day,		53.95
	J. S. Kirkham,		8.50
	Brown & Gross,		2.00
	Alva Morgan,		5.00
	P. M. Augur,		50.00
	P. M. Augur,		16.86
	S. B. West,		20.80
	J. LeRoy Buck,		30.00
	J. W. Alsop,		4.50
	C. F. Congdon,		16.00
	A. Warner,		30.00
	J. M. Hubbard,		15.25
	J. P. Barstow,		14.30
	F. E. Rice,		74.00
	Mrs. F. M. Hart,		100.00
	James A. Bill,		22.50
Feb. 6, 1884,	Balance in Treasury,		182.10
			$2,521.24

STATE OF CONNECTICUT.

ANNUAL REPORT

OF

The Connecticut Agricultural

EXPERIMENT STATION

For 1883.

PRINTED BY ORDER OF THE LEGISLATURE.

NEW HAVEN:
TUTTLE, MOREHOUSE & TAYLOR, PRINTERS.
1884.

OFFICERS

OF

The Connecticut Agricultural Experiment Station,

1883.

STATE BOARD OF CONTROL.

Ex-officio.
HIS EXC. THOMAS M. WALLER, *President.*

	Appointed by Connecticut State Agricultural Society:	Term expires
	HON. E. H. HYDE, Stafford, *Vice-President.*	July 1, 1885.
	Appointed by Board of Trustees of Wesleyan University:	
	PROF. W. O. ATWATER, Middletown.	1885.
	Appointed by Board of Agriculture:	
	T. S. GOLD, West Cornwall.	1886.
	Appointed by Governor and Senate:	
	EDWIN HOYT, New Canaan.	1886.
Executive Committee.	JAMES J. WEBB, Hamden.	1884.
Executive Committee.	*Appointed by Governing Board of Sheffield Scientific School:*	
Executive Committee.	W. H. BREWER, New Haven, *Secretary and Treasurer.*	1884.
Executive Committee.	*Ex-officio.*	
Executive Committee.	S. W. JOHNSON, New Haven, *Director.*	

Chemists.

E. H. JENKINS, PH.D., *Vice Director.*
E. H. BOGARDUS.
C. A. HUTCHINSON, B.S.
E. H. FARRINGTON, B.S.
MILTON WHITNEY.

In charge of Buildings and Grounds.
CHARLES J. RICE.

ANNOUNCEMENT.

The Connecticut Agricultural Experiment Station was established in accordance with an Act of the General Assembly, approved March 21, 1877, "for the purpose of promoting Agriculture by scientific investigation and experiment."

The Station is prepared to analyze and test fertilizers, cattle-food, seeds, soils, waters, milks, and other agricultural materials and products, to identify grasses, weeds, and useful or injurious insects, and to give information on the various subjects of Agricultural Science, for the use and advantage of the Citizens of Connecticut.

The Station makes analyses of Fertilizers, Seed-Tests, &c., &c., for the Citizens of Connecticut *without charge*, provided—

1. That the results are of use to the public and are free to publish.
2. That the samples are taken by *consumers* from stock now in the market, and in accordance with the Station instructions for sampling.
3. That the samples are fully described on the Station "Forms for Description."

All other work proper to the Experiment Station that can be used for the public benefit will be made without charge. Work done for the use of individuals will be charged for at moderate rates. The Station will undertake no work, the results of which are not at its disposal to use or publish, if deemed advisable for the public good. See p. 17.

Results of analysis or investigation that are of general interest will be published in Bulletins, of which copies are sent to each Post Office in this State, and will be summed up in the Annual Reports made to the Legislature.

The officers of the Station will take pains to obtain for analysis samples of all the commercial fertilizers sold in Connecticut; but the organized coöperation of the farmer is essential for the full and timely protection of their interests. Farmers' Clubs and like Associations can efficiently work with the Station for this purpose, by sending in samples early during each season of trade.

It is the wish of the Board of Control to make the Station as widely useful as its resources will admit. Every Connecticut citizen who is concerned in agriculture, whether farmer, manufacturer, or dealer, has the right to apply to the Station for any assistance that comes within its province to render, and the Station will respond to all applications as far as lies in its power.

☞ Instructions and Forms for taking samples, and Terms for testing Fertilizers, Seeds, etc., for private parties, sent on application.

☞ Parcels by Express, to receive attention, should be prepaid, and all communications should be directed, not to individual officers, but simply to the

AGRICULTURAL EXPERIMENT STATION,
NEW HAVEN CONN.

☞ Station Grounds, Laboratory and Office are on Suburban St., between Whitney Avenue and Prospect St., 1⅝ miles North of City Hall. Suburban St. may be reached by Whitney Lake Horse Cars, which leave corner of Chapel and Church Sts. each hour and half hour.

☞ The Station has Telephone connection and may be spoken from the Central Telephone Office, 346 State St., or from Peck & Bishop's Office in Union R. R. Depot.

CONTENTS.

REPORT OF THE BOARD OF CONTROL.

To the General Assembly of the State of Connecticut:

Gentlemen:—The Board of Control of The Connecticut Agricultural Experiment Station herewith submits to your Honorable Body the Annual Reports of the Director and of the Treasurer, made to the Board at its Annual Meeting, held in Hartford, January 15th, 1884.

During the year the work of the Station has been carried on at its new quarters, which were already occupied and nearly ready for chemical work on the date of the previous annual meeting of the Board. The chemical laboratory was ready a few weeks later and has been in continuous use since. This use has confirmed the expectations of the Board as to its special adaptation to the work for which it was planned. The repairs and improvements on the place went on, however, until midsummer.

The Building Committee have still eleven hundred sixty-one (1161) dollars of the special appropriation on hand. They report that the visible needs of the Station exceed this small sum, and they have therefore delayed expending it until the coming year, by which time the experience of the Station will decide which of the several needs are the most imperative, and how the balance can be most advantageously used.

The people of the State use the Station more and more each year and the problem becomes more difficult, how to best do the varied work asked for: and to facilitate the administration of the Station affairs in the new and enlarged quarters, the Board of Control has appointed Dr. Jenkins Vice Director.

THOMAS M. WALLER,
President.

WM. H. BREWER,
Secretary.

REPORT OF THE TREASURER.

WM. H. BREWER, *in account with The Connecticut Agricultural Experiment Station, Jan. 17th to Nov. 30th, 1883.*

RECEIPTS.

Balance from account of 1882	$1,673.68	
State Treasurer (from Annual Appropriation)	6,000.00	
Licenses for sale of Fertilizers and Fees for Analyses	2,443.30	
Other receipts	8.55	
		$10,125.53

PAYMENTS.

Salaries	$5,244.98	
Laboratory Expenses	2,565.01	
Furniture and repairs on house	299.67	
The Grounds and Establishment	454.72	
Fuel	311.50	
Water	132.00	
Gas	150.30	
Insurance	39.50	
Collecting Fertilizers	70.61	
Traveling Expenses of Board of Control	19.11	
Printing	202.10	
Stationery	62.42	
Postage	108.55	
Telephone	107.55	
Library	70.15	
Miscellaneous Sundries	283.92	
Cash balance on hand	3.44	
		$10,125.53

WM. H. BREWER. *Treasurer.*

MEMORANDUM.

There is due the Station two hundred thirteen (213) dollars for analyses made in the laboratory; and an inventory of laboratory apparatus, office furniture, chamber furniture, books and publications on hand, Nov. 30th, 1883, is valued at two thousand four hundred and ninety-six (2,496) dollars.

The previous reports of the treasurer have covered fiscal years ending with the date of the annual meeting of the Board of Control, on the third Tuesday of January of each year. The above account is for the period embraced between the previous annual meeting of the Board of Control and the close of the fiscal year of the State of Connecticut. Hereafter the fiscal year of the Station will conform to that of the State.

Of the special appropriation "for the purpose of buying a lot and erecting thereon buildings, and equipping the same for the permanent use of the Station," there has been expended during the period above indicated, three thousand twenty-nine dollars and ninety-six cents ($3,029.96), leaving a balance of eleven hundred sixty-one (1,161) dollars in my hands for the completion of the work projected.

WM. H. BREWER, *Treasurer.*

REPORT OF THE DIRECTOR.

During the winter of 1882–83 the Station was without laboratory facilities. On the first of March, 1883, the new laboratory was so nearly completed that chemical work could be begun, and in the following pages is given an account of this work from March 1st to December 1st, so far as it is of interest to the public. Much time and pains have necessarily been given to testing analytical methods and controlling results, in order to insure the utmost accuracy, but, in most cases, this work having no general interest, is not suited to publication.

The fertilizer law requires the Director of this Station to "cause one or more analyses of each fertilizer to be made and published annually." This has considerably increased the work on fertilizers, and during the last nine months 219 analyses have been made, nearly one-half of them on samples of complex composition, each one requiring six determinations in duplicate. In connection with the fertilizer work, various investigations have been made, with a view to securing greater accuracy in work and rapidity in its execution. Some valuable results have been obtained, which are noticed on subsequent pages.

Fifteen partial or complete analyses of milk have been made for creameries and individual dairymen.

A modification of Liebermann's method for determining the fat in milk has been devised, which makes it possible to execute a large number of fat determinations in a short time, and which, it is believed, will be of service in work for the creameries of the State or in dairy experiments.

Three samples of butter, suspected of adulteration, have been tested with negative results.

Of fodders, twenty analyses have been made.

In connection with them a table has been prepared, giving the average composition (with the maximum and minimum figures) of American fodders and feeding stuffs, compiled from all analyses which could be secured up to September 1st, 1883. The separate analyses are collected and preserved at the Station, with references to the journals in which they were first published.

One toxical examination has been made, which showed the presence of arsenic and copper (Paris green) in the bowel of a horse which had died suddenly.

One hundred and twenty-one seed examinations have been made, chiefly on onion seed, and some experiments on the best temperature for the germination of onion seed are reported in their proper place.

The Bulletins of the Station have been only four in number, but they have aggregated thirty-four carefully printed pages of the style of this Report, and were stitched for convenience of preservation. As required by law, two copies at least (usually a larger number) have been sent to each post-office in the State in special envelopes, on which was printed the following:

"The Director of the Connecticut Agricultural Station shall, from time to time, as Bulletins of said Station may be issued, mail, or cause to be mailed two copies at least of such Bulletins to each post-office in the State."

Section 10 *of "An Act Concerning Commercial Fertilizers," passed by the General Assembly, to take effect Sept.* 1, 1882.

☞ The postmaster will greatly serve the public by distributing the enclosed bulletins to farmers. ☜

The Bulletins have also been sent as usual to all of the Agricultural Societies and Farmers' Clubs, and to all the newspapers in the State. They have been reprinted in the *Connecticut Farmer* and in agricultural papers in other States.

FERTILIZERS.

THE CONNECTICUT FERTILIZER LAW.

The General Assembly at its session in 1882 passed a new Fertilizer Law, which went into effect September 1, 1882, and which repeals and takes the place of all previous legislation on this subject in this State.

Since a full understanding of the provisions and penalties of this law is important to all parties who buy or sell commercial fertilizers, attention is specially directed to the following points:

1. In case of fertilizers that retail at ten dollars or more per ton, the law of 1882 holds the *seller* responsible for affixing a correct label or statement to every package or lot sold or offered, as well as for the payment of an analysis fee of ten dollars for each fertilizing ingredient which the fertilizer contains or is claimed to contain, unless the manufacturer or importer shall have provided labels or statements and shall have paid the fee. Sections 1 and 3.

2. The law also requires, in case of any fertilizer selling at ten dollars or more per ton, that a certified statement of composition, net weight in package, etc., shall be filed with the Director of the Experiment Station, and that a sealed sample shall be deposited with him. Section 2.

3. It is also provided that every person in the State who sells *any commercial fertilizer of whatever kind or price* shall annually report certain facts to the Director of the Experiment Station, and on demand of the latter shall deliver a sample for analysis. Section 4.

Here follows the full text of the law, with explanatory footnotes by the Director:

AN ACT CONCERNING COMMERCIAL FERTILIZERS.

General Assembly,
January Session, A. D. 1882.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. Every person or company who shall sell, offer, or expose for sale, in this State, any commercial fertilizer or manure, the retail price of which is ten dollars, or more than ten dollars per ton, shall affix conspicuously to every package thereof a plainly printed statement, clearly and truly certifying the number of net pounds of fertilizer in the package, the name, brand, or trade-mark under which the fertilizer is sold, the name and address of the manufacturer, the place of manufacture and the chemical composition of the fertilizer, expressed in the terms and manner approved and currently employed by the Connecticut Agricultural Experiment Station.*

If any such fertilizer be sold in bulk, such printed statement shall accompany and go with every lot and parcel sold, offered, or exposed for sale.

Sec. 2. Before any commercial fertilizer, the retail price of which is ten dollars, or more than ten dollars per ton, is sold, offered, or exposed for sale, the manufacturer, importer, or party who causes it to be sold, or offered for sale, within the State of Connecticut, shall file with the director of the Connecticut Agri-

* A statement of the per cents. of Nitrogen, Phosphoric Acid (P_2O_5) and Potash (K_2O), and of their several states or forms, will suffice in most cases. Other ingredients may be named if desired.

In all cases the per cent. of *nitrogen* must be stated. Ammonia may also be given when actually present in ammonia salts, and "ammonia equivalent to nitrogen" may likewise be stated.

The per cent. of soluble and reverted phosphoric acid may be given separately or together, and the term "available" may be used in addition to, but not instead of soluble and reverted.

Insoluble phosphoric acid may be stated or omitted.

In case of Bone, Fish, Tankage, Dried Meat, Dried Blood, etc., the chemical composition may take account of the two ingredients: Nitrogen, Phosphoric Acid.

For Potash Salts give always the per cent. of Potash (potassium oxide); that of Sulphate of Potash or Muriate of Potash may also be stated.

The chemical composition of other fertilizers may be given as found in the Station Reports.

cultural Experiment Station two certified copies of the statement named in section one of this act, and shall deposit with said director a sealed glass jar or bottle containing not less than one pound of the fertilizer, accompanied by an affidavit that it is a fair average sample thereof.*

SEC. 3. The manufacturer, importer, agent, or seller of any commercial fertilizer, the retail price of which is ten dollars or more than ten dollars per ton, shall pay on or before the first of May, annually, to the director of the Connecticut Agricultural Experiment Station, an analysis fee of ten dollars for each of the fertilizing ingredients† contained or claimed to exist in said fertilizer: *provided*, that whenever the manufacturer or importer shall have paid the fee herein required for any persons acting as agents or sellers for such manufacturer or importer, such agents or sellers shall not be required to pay the fee named in this section.

SEC. 4. Every person in this State who sells, or acts as local agent for the sale of any commercial fertilizer of whatever kind or price, shall annually, or at the time of becoming such seller or agent, report to the director of the Connecticut Agricultural Experiment Station his name, residence, and post-office address, and the name and brand of said fertilizer, with the name and address of the manufacturer, importer, or party from whom such fertilizer was obtained, and shall, on demand of the director of the Connecticut Agricultural Experiment Station, deliver to said director a sample suitable for analysis of any such fertilizer or manure then and there sold or offered for sale by said seller or agent.‡

SEC. 5. No person or party shall sell, offer, or expose for sale, in the State of Connecticut, any pulverized leather, raw, steamed, roasted, or in any form, as a fertilizer or as an ingredient of any

*The analysis of samples sent in accordance with section two is discretionary with the Station. Such samples are intended for preservation as manufacturers' standards.

† The Station understands "the fertilizing ingredients" to be those whose determination in an analysis is necessary for a valuation, viz: Nitrogen, Phosphoric acid and Potash. The analysis-fees in case of any fertilizer will therefore be ten, twenty or thirty dollars, according as one, two or three of these ingredients are contained or claimed to exist in the fertilizer. On receipt of statements, samples and analysis-fees, the Station will issue Certificates of compliance with the law.

‡ Blanks for Dealers' Reports will be mailed to applicants.

fertilizer or manure, without explicit printed certificate of the fact, such certificate to be conspicuously affixed to every package of such fertilizer or manure, and to accompany and go with every parcel or lot of the same.

SEC. 6. Every manufacturer of fish guano, or fertilizer of which the principal ingredient is fish or fish-mass from which the oil has been extracted, shall, before manufacturing or heating the same, and within thirty-six hours from the time such fish or mass has been delivered to him, treat the same with sulphuric acid or other chemical, approved by the director of said experiment station, in such quantity as to arrest decomposition: *provided*, however, that in lieu of such treatment such manufacturers may provide a means for consuming all smoke and vapors arising from such fertilizers during the process of manufacture.

SEC. 7. Any person violating any provision of the foregoing sections of this act shall be fined one hundred dollars for the first offense, and two hundred dollars for each subsequent violation.

SEC. 8. This act shall not affect parties manufacturing, importing, or purchasing fertilizers for their own private use, and not to sell in this State.

SEC. 9. The director of the Connecticut Agricultural Experiment Station shall pay the analysis-fees received by him into the treasury of the station, and shall cause one or more analyses of each fertilizer to be made and published annually. Said director is hereby authorized, in person or by deputy, to take samples for analysis from any lot or package of manure or fertilizer which may be in the possession of any dealer.

SEC. 10. The director of the Connecticut Agricultural Station shall, from time to time, as bulletins of said station may be issued, mail or cause to be mailed two copies, at least, of such bulletins to each post-office in the State.

SEC. 11. Title sixteen, chapter fifteen, sections fifteen and sixteen, and title twenty, chapter twelve, section five of the general statutes, and chapter one hundred and twenty of the public acts of 1881, being an act concerning commercial fertilizers, are hereby repealed.

SEC. 12. This act shall take effect on the first day of September, 1882.

Observance of the Fertilizer Law.

Here follows a list of those manufacturers who up to Dec. 1, 1883, have essentially complied with Sections 2 and 3 of the above Act concerning Commercial Fertilizers, the names of the goods whose sale has thus been made legal, and the time of compliance.

Firm.	Articles.	Date.
Atlantic & Va. Fertilizing Co.	The Long Islander Ammoniated Superphosphate of Lime with Potash.	May 24.
	The Orient Complete Manure.	"
H. J. Baker & Bro., 215 Pearl St., New York.	Castor Pomace.	Apr. 26.
	Pelican Bone Fertilizer.	"
	A. A. Ammoniated Superphosphate.	"
	Complete Manure for Corn.	"
	" " Potatoes.	"
	" " Tobacco.	"
	Kainit.	May 16.
J. P. Barstow & Co., Norwich, Conn.	Rafferty and Williams Americus Bone Meal.	July 2.
P. W. Bennett, Rock Fall, Conn.	Ground Rone.	Oct. 5.
Bosworth Bros., Putnam, Conn.	Superphosphate of Lime.	May 8.
	Bone Meal.	"
Bowker Fertilizer Co., 43 Chatham St., Boston, Mass.	Stockbridge Grain Manure.	Apr. 12.
	" Vegetable Manure.	"
	" Forage Crop "	"
	Bowker's Hill and Drill Phosphate.	"
	" Brighton "	"
	" Fish and Potash.	"
	" Fine Ground Dry Fish.	"
	" Fresh Milled Kainit.	"
Bradley Fertilizer Co., 27 Kilby St., Boston, Mass.	Bradley's Superphosphate.	March 21.
	B. D. Sea Fowl Guano.	"
	Original Coe's Superphosphate.	"
	English Lawn Fertilizer.	June 27.
Robert B. Brown Oil Co., St. Louis.	I. X. L. Castor Pomace.	May 31.
Clark's Cove Guano Co., New Bedford, Mass.	Bay State Fertilizer.	March 6.
	Great Planet "A."	May 25.
E. Frank Coe, 16 Burling Slip, New York.	Ammoniated Bone Superphosphate.	Apr. 25.
	Dissolved Bones.	"
Russell Coe, Linden, N. J.	Russell Coe's Ammoniated Bone Superphosphate.	March 8.
Collier White Lead and Oil Co., St. Louis. By F. Ellsworth, Hartford.	Collier White Lead and Oil Co., Castor Pomace.	May 22.
Buffalo Fertilizer and Chemical Works, L. L. Crocker, Buffalo, N. Y.	Ammoniated Bone Superphosphate.	March 20.
	Potato, Hop and Tobacco Phosphate.	"
L. B. Darling & Co., Pawtucket, R. I.	Ground Bone.	March 22.
	Animal Fertilizer.	"
G. W. Dickinson, Essex, Conn.	Ivory and Bone Dust.	Sept. 20.
Dole's Common Sense Fertilizer Co., 42 Congress St., Boston, Mass.	Common Sense Fertilizer, No. 2.	May 5.
	" " No. 3.	"

Firm.	Articles.	Date.
Glidden & Curtis, Boston, Mass.	Soluble Pacific Guano.	Oct. 6, '82.
Geo. L. Harris & Son, Eagleville, Conn.	Pure Bone Phosphate.	Apr. 20.
	Pure Ground Bone.	"
Lister Brothers, Newark, N. J.	Ground Bone.	May 9.
	Potato Fertilizer.	"
	Ammoniated Dissolved Bone.	"
Manhattan Chemical Co., 276 Pearl St., N. Y.	Cooke's Blood Guano.	May 23.
The Mapes' Formula and Peruvian Guano Co., 158 Front St., N. Y.	The Mapes' Potato Manure.	May 2.
	" Corn "	"
	" Complete Manure for light soils.	"
	" Tobacco Manure, Connecticut Brand.	"
	" Tobacco Manure for use with stems.	"
	" Grass and Grain Spring Top Dressing.	"
	" Complete Manure, "A" Brand.	"
	Plain Superphosphate, High Grade.	"
The Geo. W. Miles Co., Milford, Conn.	I. X. L. Ammoniated Bone Superphosphate.	Apr. 9.
	"C" Island Dry Fish Guano.	"
	Fish and Potash.	"
Geo. W. Miller, Middlefield, Ct.	Raw Bone Phosphate.	June 18.
	Ground Bone	"
A. Mitchell, Linden, N. J.	Standard Superphosphate.	June 22.
National Fertilizer Co., Bridgeport, Conn.	Chittenden's Complete Fertilizer for Roots, Potatoes and Vegetables.	May 26.
	Chittenden's Complete Manure for Grain.	"
	Chittenden's Ammoniated Bone Superphosphate.	"
	Chittenden's Fish and Potash.	"
New Haven Fertilizer Co., New Haven, Conn.	Ammoniated Superphosphate.	May 9.
Peck Brothers, Northfield, Ct.	Ground Bone.	May 31.
Preston Fertilizer Co., Greenpoint Station, Brooklyn, N. Y.	Ammoniated Bone Superphosphate.	March 26.
	Dried and Ground Fish Guano.	"
	Ground Bone.	"
Quinnipiac Fertilizer Co., New London, Conn.	Quinnipiac Phosphate.	Apr. 30.
	Dry Ground Fish.	"
	Fish and Potash, crossed Fishes Brand.	"
	Fish and Potash, plain Brand.	"
Quinnipiac Co., Wallingford, Ct.	Meat and Plaster.	May 7.
	Quinnipiac Co's Bone.	"
Read & Co., 34 Beaver St., N. Y.	Farmers' Friend Fertilizer.	May 14.
	Matchless Tobacco Manure.	"
The Rogers & Hubbard Co., Middletown, Conn.	Pure Raw Knuckle Bone Meal.	June 1.
	Pure Raw Knuckle Bone, Fine, "A."	"
M. L. Shoemaker, Philadelphia. By F. Ellsworth, Hartford.	Swift-sure Bone Meal.	May 26.
St. Louis Lead and Oil Co. By F. Ellsworth, Hartford.	St. Louis Lead & Oil Co., Castor Pomace.	May 22.
F. C. Slade, Oakville, Conn.	Ground Bone.	June 1.
Edmund Smith, So. Canterbury, Conn.	Ground Bone.	June 11.

Firm.	Articles.	Date.
Paul Thompson, 238 State St., Hartford, Conn.	Mineral Manure for Tobacco and other Crops.	May 18.
Williams, Clark & Co., 109 Pearl St., New York.	Fish and Potash.	March 22.
	Universal Ammoniated Dissolved Bone.	"
	Americus Ammoniated Bone Superphosphate.	"
	Muriate of Potash.	May 21.
	Kainit.	May 15.

FERTILIZERS.*

Analyses.

In respect to its terms, the Station makes *two classes* of analyses of fertilizers and fertilizing materials: the first for the benefit of farmers, gardeners, and the public generally; the second for the private use of manufacturers and dealers. Analyses of the *first class* are made gratuitously, and the results are published as speedily and widely as possible for the guidance of purchasers and consumers. Those of the *second class* are charged for at moderate rates, and their results are not published in a way to interfere with their legitimate private use. The Station, however, distinctly reserves the liberty to use at discretion, for the public benefit, all results obtained in its laboratory, and in no case will enter into any privacy that can work against the public good.

During 1883, two hundred and nineteen (219) samples of fertilizers have been analyzed. Of these, 17 were examined for private parties, and the remainder, 102, for the general use of the citizens of the State.

The samples analyzed for the public benefit have in a few cases only been sent in by purchasers and consumers. Most of them have been supplied by agents of the Station who during the spring and early summer endeavored to visit all sections of the State, to take one or more samples of every brand of fertilizer offered for sale in the State, and to take them from the stock of dealers in remote places as well as from centers of trade.

* The matter of this and of several subsequent pages, explanatory of the sampling and valuation of fertilizers, is copied with a few appropriate alterations from the Report for 1881. This repetition appears to be necessary for the use of readers who have not seen former Reports.

The Station agents are instructed when drawing samples to open at least three packages of each brand of goods in every case, and if the number of packages is large, to take a portion from every tenth one. The contents of bags or barrels are rapidly and accurately sampled by means of a brass sampler made by McFadden and Dooley, New Brunswick, N. J., on a pattern suggested by Dr. A. T. Neale of the New Jersey Experiment Station. In the past the Station has been in several instances seriously embarrassed on account of the carelessness of those who have drawn and sent in samples for analysis. This trouble is avoided by the present system which could not earlier be adopted for lack of means.

The Station none the less desires the coöperation of farmers and farmers' clubs in calling its attention to the appearance of new brands of fertilizers in the State and in securing samples of all goods offered for sale. All such samples are understood to be taken in accordance with the printed instructions which the Station supplies to all applicants. Here follows a copy of these instructions.

THE CONNECTICUT
AGRICULTURAL EXPERIMENT STATION.

Instructions for Sampling Commercial Fertilizers.

The *Commercial Value* of a high-priced Fertilizer can be estimated, if the amounts *per cent.* of its principal fertilizing elements are known. Chemical analysis of a small sample, so taken as to fairly represent a large lot, will show the composition of the lot. The subjoined instructions, if faithfully followed, will insure a fair sample. Especial care should be observed that the sample neither gains nor loses *moisture* during the sampling or sending, as may easily happen in extremes of weather, or from even a short exposure to sun and wind, or from keeping in a poorly closed vessel.

1. Provide a tea cup, some large papers, and for each sample a glass fruit-can or tin box, holding about *one quart*, that can be tightly closed—all to be clean and dry.

2. Weigh separately at least three (3) average packages (barrels or bags) of the fertilizer, and enter these *actual weights* in the "Form for description of Sample."

3. Open the packages that have been weighed, and mix well together the contents of each, down to one-half its depth, emptying out upon a clean floor if needful, and crushing any soft, moist lumps in order to facilitate mixture, but leaving hard, dry lumps unbroken, so that the sample shall exhibit the texture and mechanical condition of the fertilizer.

4. Take out five (5) equal cupfulls from different parts of the mixed portions of each package. Pour them (15 in all) one over another upon a paper, intermix again thoroughly but quickly to avoid loss or gain of moisture, fill a can or box from this mixture, close tightly, *label plainly*, and send, charges prepaid, to

The Conn. Agricultural Experiment Station,
New Haven, Conn.

The foregoing instructions may be over-nice in some cases, but they are not intended to take the place of good sense on the part of those who are interested in learning the true composition of a fertilizer. Any method of operating that will yield a *fair sample* is good enough.

In case of a fine, uniform and moist or coherent article, a butter-tryer or a tin tube, like a dipper handle, put well down into the packages, in a good number of places will give a fair sample with great ease. With dry, coarse articles, such as ground bone, there is likely to be a separation of coarse and fine parts on handling. Moist articles put up in bags or common barrels may become dry on the outside. It is in these cases absolutely necessary to mix thoroughly the coarse and fine, the dry and the moist portions before sampling. Otherwise the analysis will certainly misrepresent the article whose value it is intended to fix.

The quantity sent should not be too small. When the material is fine and uniform, and has been carefully sampled, a pint may be enough, but otherwise and especially in the case of ground bone, which must be mechanically analyzed, the same should not be *less than one quart.*

It is also important that samples for analysis should be taken at the time when the fertilizer is purchased, and immediately dispatched to the station. Moist fish, blood or cotton seed will soon decompose and lose ammonia, if bottled and kept in a warm place. Superphosphates containing much nitrogen will suffer reversion of their soluble phosphoric acid under similar circumstances. Most of the moist fertilizers will lose water unless tightly bottled, but some of the grades of potash salts will gather moisture from the air and become a slumpy mass if not thoroughly protected.

These changes in the composition of a sample not suitably preserved must invalidate any conclusions from its analysis, and work serious injustice either to the manufacturer or to the consumer.

It doubtless often happens that a purchaser on laying in a stock of fertilizers decides that he will not then trouble the Station to analyze the goods he has obtained, but will set aside samples which he can send for examination in case the crops report adversely as to their quality. It is always better to send all samples at once to the Station where they can be directly analyzed or so prepared that they will keep without chemical change.

With the Instructions for Sampling, the Station furnishes a blank form for Description of Sample, a copy of which is here given.

THE CONNECTICUT

AGRICULTURAL EXPERIMENT STATION,

NEW HAVEN, CONN.

FORM FOR DESCRIPTION OF SAMPLE.

Station No. ---------- Rec'd at Station, ---------------- 18

Each sample of Fertilizer sent for gratuitous analysis must be accompanied by one of these Forms, with the blanks *below* filled out fully and legibly.

The filled out Form, if wrapped up with the sample, will serve as a label.

Send with each sample a specimen of any printed circular, pamphlet, analysis or statement that acompanies the fertilizer or is used in its sale.

Brand of Fertilizer, --

Name and address of Manufacturer, ------------------------

Name and address of Dealer from whose stock this sample is taken, --

Date of taking this sample, ---------------------------------

Selling price per ton or hundred, bag or barrel, --------------

Selling weight claimed for each package weighed, ------------

Actual weight of packages opened, -------------------------

Here write a copy of any analysis or guaranteed composition that is fixed to the packages.

Signature and P. O. address of person taking and sending the sample.

On receipt of any sample of fertilizer from the open market, the filled out "Form for Description" which accompanies it is filed in the Station's Record of Analyses, and remains there as a voucher for the authenticity of the sample and for the fact that it has been taken fairly, or, at least, under suitable instructions. It is thus sought to insure that manufacturers and dealers shall not suffer from the publication of analyses made on material that does not correctly represent what they have put upon the market.

The "Form for Description," when properly filled out, also contains all the data of cost, weight, etc., of a fertilizer which are necessary for estimating, with help of the analysis, the commercial value of its fertilizing elements, and the fairness of its selling price. Neglect to give full particulars occasions the Station much trouble, and it is evident that want of accuracy in writing up the description may work injustice to the manufacturers or dealers, as well as mislead consumers. It is especially important that the *brand* of a fertilizer and its *selling price* should be correctly given. The price should be that actually charged by the dealer of whom it is bought, and if the article be purchased in New York or other distant market, that fact should be stated, and the cost at the nearest point to the consumer, on rail or boat, should be reported also.

In all cases, when possible, *ton prices* should be given, and if the sale of an article is only by smaller quantities, that fact should be distinctly mentioned.

When a sample of fertilizer has been analyzed, the results are entered on a printed form, which is filed in the Station Record of Analyses, facing the "Description of Sample" that was received with the fertilizer to which it pertains, and there remains for future reference.

A copy of the analysis is also immediately reported to the party that furnished the sample, the report being entered on one page of another printed form and facing a second printed page of "Explanations," intended to embody the principles and data upon which the valuation of fertilizers is based.

These Explanations are essential to a correct understanding of the analyses that are given on subsequent pages, and are, therefore, reproduced here, as follows:

EXPLANATION OF FERTILIZER-ANALYSIS AND VALUATION.

Nitrogen is commercially the most valuable fertilizing element. It occurs in various forms or states. *Organic nitrogen* is the nitrogen of animal and vegetable matters generally, existing in the albumen and fibrin of meat and blood, in the uric acid of bird dung, in the urea and hippuric acid of urine, and in a number of other substances. Some forms of organic nitrogen, as that of blood and meat, are highly active as fertilizers; others, as that of hair and leather, are comparatively slow in their effect on vegetation unless these matters are reduced to a fine powder or chemically disintegrated. *Ammonia* and *nitric acid* are results of the alteration of *organic nitrogen* in the soil and manure heap, and are the most active forms of nitrogen. They occur in commerce—the former in sulphate of ammonia, the latter in nitrate of soda.

Seventeen parts of ammonia, or 66 parts of pure sulphate of ammonia, contain 14 parts of nitrogen.

Eighty-five parts of pure nitrate of soda also contain 14 parts of nitrogen.

Soluble phosphoric acid implies phosphoric acid or phosphates that are freely soluble in water. It is the characteristic ingredient of superphosphates, in which it is produced by acting on "insoluble" or "reverted" phosphates with oil of vitriol. It is not only readily taken up by plants, but is distributed through the soil by rains. Once well incorporated with soil, it shortly becomes reverted phosphoric acid.

Reverted (*reduced or precipitated*) *phosphoric acid* strictly means phosphoric acid that was once freely soluble in water, but from chemical change has become insoluble in that liquid. It is freely taken up by a strong solution of ammonium citrate, which is therefore used in analysis to determine its quantity.* "Reverted phosphoric acid" implies phosphates that are readily assimilated by crops, but generally have less value than soluble phosphoric acid, because they do not distribute freely by rain.

Insoluble phosphoric acid implies various phosphates not freely soluble in water or ammonium citrate. In some cases the phos-

*To determine "reverted phosphoric acid," this Station continues to employ the method first described by Fresenius, Neubauer and Luck (known in this country also as the Washington method, because adopted by the Convention of Agricultural Chemists, held at Washington, in July, 1880), modified in a single particular, viz: manufactured phosphates are not pulverized.

phoric acid is too insoluble to be rapidly available as plant food. This is true of South Carolina rock phosphate, of Navassa phosphate, and especially of Canada apatite. The phosphate of coarse raw bones is at first nearly insoluble in this sense, because of the animal matter of the bone which envelopes it, but when the latter decays in the soil, the phosphate remains in essentially the "reverted" form.

Potash signifies the substance known in chemistry as potassium oxide, which is the valuable fertilizing ingredient of "potashes" and "potash salts." It is most costly in the form of sulphate, and cheapest in the shape of muriate or chloride.

The valuation of a fertilizer signifies estimating its worth in money, or its trade value; a value which, it should be remembered, is not *necessarily* proportional to its fertilizing effects in any special case.

Plaster, lime, stable manure, and nearly all the less expensive fertilizers have variable prices, which bear no close relation to their chemical composition; but guanos, superphosphates and other fertilizers, for which $30 to $80 per ton are paid, depend chiefly for their trade value on the three substances, *nitrogen*, *phosphoric acid* and *potash*, which are comparatively costly and steady in price. The money value per pound of these ingredients is easily estimated from the market prices of the standard articles which furnish them to commerce.

The average trade values, or cost in market per pound, of the ordinarily occurring forms of nitrogen, phosphoric acid and potash, as found in the Connecticut and New York markets, and employed by the Station during the last three years, have been as follows:

TRADE-VALUES FOR 1881, 1882 AND 1883.

	1881.	1882.	1883.
	—Cents	per	pound.—
NITROGEN in nitrates,	26	26	20
" in ammonia salts,	22½	29	26
" in Peruvian Guano, fine steamed bone, dried and fine ground blood, meat and fish, superphosphates and special manures,	20	24	23
" in coarse or moist blood, meat or tankage, in cotton seed, linseed and Castor Pomace,	16	18	18
" in fine ground bone, horn and wool dust,	15	17	17
" in fine medium bone,	14	15	15
" in medium bone,	13	14	14
" in coarse medium bone,	12	13	13
" in coarse bone, horn shavings, hair and fish scrap,	11	11	11

	1881.	1882.	1883.
	—Cents	per pound.—	
PHOSPHORIC ACID soluble in water,	12½	12½	11
" " "reverted" and in Peruvian Guano,	9	9	8
" " insoluble, in fine bone, fish guano and superphosphates,	6	6	6
" " insoluble, in fine medium bone,	5½	5½	5½
" " " in medium bone,	5	5	5
" " " in coarse medium bone,	4½	4½	4½
" " " in coarse bone, bone ash and bone black,	4	4	4
" " insoluble, in fine ground rock phosphate,	3½	3	2¼
POTASH in high grade sulphate,	7½	7	7
" in low grade sulphate and kainit,	5½	5	4¼
" in muriate or potassium chloride,	4½	5	4¼

These "trade-values" of the elements of fertilizers are not fixed, but vary with the state of the market, and are from time to time subject to revision. They are not exact to the cent or its fraction, because the same article sells cheaper at commercial or manufacturing centers than in country towns, cheaper in large lots than in small, cheaper for cash than on time. These values are high enough to do no injustice to the dealer, and properly interpreted, are accurate enough to serve the object of the consumer.

To Estimate the Value of a Fertilizer we multiply the per cent. of nitrogen, etc., by the trade-value per pound, and that product by 20; we thus get the values per ton of the several ingredients, and adding them together we obtain the total estimated value per ton.

In case of *Ground bone*, the fineness of the sample is graded by sifting, and we separately compute the nitrogen value of each grade of bone which the sample contains, by multiplying the pounds of nitrogen per ton in the sample, by the per cent. of each grade, taking one one-hundredth of that product, multiplying it by the estimated value per pound of nitrogen in that grade, and taking this final product as the result in cents. Summing up the separate values of each grade, thus obtained, together with the values of each grade for phosphoric acid, similarly computed, the total is the estimated value of the sample of bone. For further particulars, see page 47.

The uses of the "Valuation" are, 1st, to show whether a given lot or brand of fertilizer is worth as a commodity of trade what it costs. If the selling price is no higher than the estimated value, the purchaser may be quite sure that the price is reasonable. If the selling price is but \$2 to \$3 per ton more than the estimated value, it may still be a fair price; but if the cost per ton is $5 or more over the estimated value, it would be well to look further. 2d, Comparisons of the estimated values and selling prices of a number of fertilizers will generally indicate fairly which is the best for the money. But the "estimated value" is not to be too literally construed, for analysis cannot always decide accurately what is the *form* of nitrogen, etc., while the mechanical condition of a fertilizer is an item whose influence cannot always be rightly expressed or appreciated.

The Agricultural value of a fertilizer is measured by the benefit received from its use, and depends upon its fertilizing effect, or crop-producing power. As a broad, general rule, it is true that Peruvian guano, superphosphates, fish-scraps, dried blood, potash salts, plaster, etc., have a high agricultural value which is related to their trade-value, and to a degree determines the latter value. But the rule has many exceptions, and in particular instances the trade-value cannot always be expected to fix or even to indicate the agricultural value. Fertilizing effect depends largely upon soil, crop and weather, and as these vary from place to place and from year to year, it cannot be foretold or estimated except by the results of past experience, and then only in a general and probable manner.

For the above first-named purpose of valuation, the trade-values of the fertilizing elements which are employed in the computations should be as exact as possible, and should be frequently corrected to follow the changes of the market.

For the second-named use of valuation, frequent changes of the trade-values are disadvantageous, because two fertilizers cannot be compared as to their relative money-worth, when their valuations are estimated from different data.

Experience leads to the conclusion that trade-values adopted at the beginning of a year should be adhered to as nearly as possible throughout the year, notice being taken of considerable changes in the market, in order that due allowance may be made therefor. It should be remembered that, in an Annual Report, the fluctuations in trade-value that may occur within the year cannot be accurately followed, and the comparisons of estimated values are mostly in retrospect.

The valuations for 1883 were adopted in consultation with Dr. Goessmann, Director of the Massachusetts Agricultural Experiment Station, Prof. Cook, Director of, and Dr. Neale, Chemist to, the New Jersey Agricultural Experiment Station, and have been employed by these gentlemen in their official Reports for 1883.

ANALYSES AND VALUATION OF FERTILIZERS.

The classification of the Fertilizers analyzed in the Station Laboratory from March 1st, to November 1st, 1883, is as follows:

5 native phosphates.
4 bone char.
6 plain (non-nitrogenous) superphosphates.
75 nitrogenous (ammoniated) superphosphates and guanos.*
31 special fertilizers or "formulas."
1 bat guano.
23 bone manures.
8 dry ground fish.
2 nitrate of soda.
2 sulphate of ammonia.
2 dried blood.
1 meat and plaster.
1 slaughter house refuse.
10 castor pomace and cotton-seed meal.
13 potash salts.
1 alkali deposit.
9 plaster.
4 limestone rocks.
1 rock.
2 quick lime.
1 waste slaked lime from paper mill.
2 infusorial earth.
2 ashes of cotton-seed hulls.
4 wood ashes.
3 leached ashes.
1 farm manure.
1 compost.
4 mucks.

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219

Of this number 14 were analyzed for private parties and are not noticed in the following pages, since the results are not of general interest or value.

* Including "fish and potash."

NATIVE PHOSPHATES.

915. Fine-ground Crude Navassa Phosphate, Navassa Phosphate Co's agent, No. 12 Cliff street, New York. Sampled and sent by J. M. Milbank, Greenfield Hill.

993. Ground Phosphate Rock. Sold by A. E. Scribner & Co., 35 Broadway, N. Y. Sample obtained from Usher & Tinker, Plainville.

ANALYSES.

	915	993
Phosphoric acid soluble in ammonium citrate,	4.09	.37
Phosphoric acid insoluble in " "	25.81	34.85
Cost per ton,	$17.00†	$30.00*

Both of these samples are quite fine and readily pass through a sieve having $\frac{1}{50}$ inch meshes.

BONE CHAR.

Four samples of this material have been analyzed. **873** and **889** were sent to the Station by the purchaser. **1033** and **1042** were obtained from manufacturers in New Haven by the Station. They are all waste materials which have been used for case-hardening iron.

ANALYSES.

	873	889	1033	1042
Water,		25.91	2.38	
Carbonic acid,	2.15			1.18
Phosphoric acid,	29.17	28.34	16.63	21.34

This bone char is little more active as a fertilizer than fine ground phosphate rock, when applied directly to land. When properly treated with oil of vitriol, however, it makes an excellent superphosphate. See the following page.

PLAIN (NON-NITROGENOUS) SUPERPHOSPHATES.

This class includes fertilizers which are made by treating some phosphate (rock phosphate, bone ash, bone char, etc.), with a very

* $22.00 per ton wholesale in N. Y.

† f. o. b. in N. Y., $18.00 to $18.50 in Southport.

strong acid, usually oil of vitriol, without the addition of nitrogenous matter or potash salts. They are valuable commercially only for the soluble phosphoric acid which they contain.

Six articles of this class have been analyzed.

877. Home Made Superphosphate. Sample taken 48 hours after it was prepared.

890A. Home Made Superphosphate. The same stock as **877**, but taken after it had lain in a pile one week.

890 B. The same after standing six months in a tightly closed jar.

916. Navassa Acid Phosphate. Made by the Navassa Phosphate Co., 12 and 14 Cliff street, New York. Sampled and sent by J. M. Milbank, Greenfield Hill.

942. Acid Phosphate of Lime. Made by the Bowker Fertilizer Co. From stock of Wilson & Burr, Middletown. Sampled and sent by J. M. Hubbard, Middletown.

987. High Grade Superphosphate. Made by the Mapes Formula & Peruvian Guano Co., N. Y. From stock of the Mapes Branch, Hartford. Sampled by the Station Agent.

1036. Packard's Concentrated Superphosphate. Imported by H. J. Baker & Bro., N. Y. Sample sent by the importers at the request of the Station.

ANALYSES.

	877	890A	890B	916	942	987	1036
Phosphoric acid soluble in water,	13.04	14.46	13.15	5.56	10.72	34.94	39.10
Reverted* Phosphoric acid,		3.07		6.43	1.08	1.43	6.70
Insoluble phosphoric acid,				4.55	2.84	1.56	.71
Cost per ton,				$23.00	24.00	70.00	
Cost of soluble phosphoric acid per 100 lbs.,					$11.20†	10.02	
					$9.66‡	9.57	

877 was made from the bone char **873** whose analysis is given on the previous page, in the following way:

100 parts by weight of char were spread in a mortar bed and wet with 42 parts of water. 55 parts of strong oil of vitriol, "66° acid," were then added and the whole was thoroughly mixed with a hoe. The solvent action of the oil of vitriol contin-

* See page 23.

† Making no allowance for reverted and insoluble phosphoric acid.

‡ Allowing 8c. per lb. for reverted and 2¾c. for insoluble phosphoric acid.

ued for some time, as is shown by the higher percentage of soluble phosphoric acid in the material after lying for a week. As far as concerns its mechanical condition the superphosphate prepared as above was inferior to the best "acid phosphates" in our market. It was somewhat lumpy and could not be conveniently drilled without sifting. The lumps were very soft, however, and easily pulverized. Constant stirring with a hoe while the mixture is cooling does much to prevent the forming of lumps. In this case the operation was decidedly economical, for by it soluble phosphoric acid was got for about $8.00 per 100 lbs., while in market it was selling for from $10 to $12, and its fertilizing effect was satisfactory. Generally speaking the farmer can buy acid phosphate cheaper than he can make it. Home manufacture is only advisable when farm work is slack and the raw phosphate can be got at a very low price.

Ground bone is used considerably in case-hardening small articles of iron, and where the consumption is not large, manufacturers throw away the spent char, or will sell it at a low price. Such material it may be very profitable to utilize for superphosphate manufacture on the farm.

916 is made from the Navassa rock which contains much iron and alumina. A larger share of the phosphoric acid may have been soluble in water when the goods were first manufactured, but if so, a portion has reverted, or been made again insoluble in water. This effect is with great probability attributed to the iron and alumina present.

987 contains more than double the amount of soluble phosphoric acid usually found in high grade superphosphates and at $70 per ton retail we believe is the cheapest source of soluble phosphoric acid in our market. **1036** is an article of still higher grade than the last mentioned, but is not in the retail trade. **987** is manufactured in this country, **1036** is imported from England.

Nitrogenous (Ammoniated) Superphosphates and Guanos.

Here are included all those superphosphates which contain nitrogen in any form—excepting the formulas or "special manures," to be noticed in the next section—as well as guanos, either in their natural state or manipulated. The articles of this class with few exceptions also contain more or less potash and such are known as "complete manures."

75 samples of this class of fertilizers have been analyzed during the year, 7 of them for private parties. The analyses and valuations of 63 of them are given on pages 33 to 38.

34 are called by the manufacturers "phosphate" or "superphosphate;" 10, "Fish and Potash;" 4, "Mineral Manure;" 3, "Peruvian Guano;" 3, "Complete Manure," and 2, "Common Sense Fertilizer." The other 12 are "Alkalized Guano," "Menhaden Guano," "Fish Guano," "Sea Fowl Guano," "Blood Guano," "Soluble Pacific Guano," "Animal Fertilizer," "Pelican Bone Fertilizer," "Farmer's Friend Fertilizer," "Bay State Fertilizer" and "Great Planet A."

On page 38 are given the analyses of 5 superphosphates, whose retail prices were not reported. For that reason the analyses could not be arranged with reference to the relation of cost to estimated value as the others have been.

Chlorine has been determined in most cases in order to decide whether the potash in the fertilizer exists as muriate or sulphate. Potash is in all cases reckoned as muriate if sufficient chlorine is present in the fertilizer to combine with it. If there is more potash present than will combine with the chlorine, then this excess of potash is reckoned as sulphate.

998 "Alkalized Guano" is stated by the manufacturers to be an artificial guano made of ammonia salts, sulphate of potash and phosphoric acid "from organic sources." That portion of the guano which is insoluble in water has much the appearance of the phosphates that come from the West Indies, Curaçao, Mona Island, etc.

863 Chittenden's Fish and Potash is made from fish scrap which has not been acidulated. For that reason, only nitrogen and total phosphoric acid were determined at the time when the sample came, and the results were published in Bulletin No. 73, p. 13. The valuation then given was $25.20. For comparison with other brands of fish and potash it was necessary to separately determine phosphoric acid in the three forms and to change the valuation accordingly, which has been done in the table on page 37.

855, 856, 875 and **948** are samples of Paul Thompson's Mineral Manure for Tobacco and Other Crops. **856** was sampled and sent by W. A. Burr, West Hartford. The others were sampled by the manufacturer and the station agent. The analyses indicate a series of unsuccessful experiments in manufacture, and not a marketable article of tolerably uniform composition.

Analyses and Valuations.

Station No.	Nitrogen of Ammonia Salts.	Nitrogen of Organic Matters.	Soluble Phos. Acid.	Reverted Phos. Acid.	Insoluble Phos. Acid.	Potash.	Estimated value per ton.	Cost per ton.
875		1.14	2.63	.84	.39	.25	17.26	25.00
948		.80	.16	1.12	.38	1.31	10.56	25.00
855	.08	.19	none	1.76	.72	.16	5.19	25.00
856		.29		2.51				

The average cost of the nitrogenous superphosphates excluding the four just mentioned, is $41.42; the average estimated value is $34.92, and the average difference between cost and valuation is $6.50.

For the last four years the average cost and the average difference between cost and estimated value have been as follows:

	1880.	1881.	1882.	1883.
Average cost, ...	$39.00	43.00	40.58	41.42
Average difference, ...	$3.00	4.00	1.89	6.50

Since the trade values used by the Station in computing estimated values have been prepared yearly from the market reports and always in the same manner this larger discrepancy in the present year between cost and valuation cannot be due to any arbitrary change in our trade values. It is most likely explained by the fact that the prices of manufactured goods have not gone down during the last eighteen months while many of the raw materials used in their manufacture have been steadily becoming cheaper. A further discussion of this matter will be found in the Review of the Fertilizer Market.

About one-third (23) of the samples have not contained the full minimum amounts of nitrogen, phosphoric acid and potash, guaranteed by the makers. In most cases, however, the difference between the composition and guarantee was quite small and only involved a single ingredient.

The Comparison of Different Superphosphates of the Same Brand and of the Analyses with the Guarantees, on pages 39 to 43, serves to show first the variations in samples of the same brand which are caused by carelessness in the preparation of the goods or in their storage, errors in sampling, etc., and second, how nearly the actual composition of the superphosphates agrees with what is claimed for them by their manufacturers.

Nitrogenous Superphosphates and Guanos.

Station No.	Name or Brand.	Manufacturer.	Dealer.	Sampled and Sent by
964	Peruvian Guano.		Mapes F. & P. G. Co., N. Y.	C. H. Cables, Thomaston.
998	Alkalized Guano.	Hurtado & Co., New York.	Southmayd & Gardiner, Middletown.	Station Agent.
921	Quinnipiac Phosphate.	Quinnipiac Fertilizer Co., New London.	John S. Morgan, Groton.	B. A. Copp, Groton.
912	Menhaden Guano.	Jas. Church & Co., Tiverton, R. I.	Manufacturers.	Geo. D. Harrison, Lakeville.
969	Pure Bone Phosphate.	G. H. Harris & Son, Eagleville.	"	Station Agent.
1011	Darling's Animal Fertilizer.	L. B. Darling & Co., Pautucket, R. I.	T. P. Pease & Sons' Co., Windsor Locks.	" "
918	Mapes' Complete Manure ("A" Brand)	Mapes F. & P. G. Co., N. Y. City.	Mapes F. & P. G. Co's Branch, Hartford.	" "
954	Ammon. Dissolved Bone Phosphate.	Lister Bros., Newark, N. J.	R. B. Bradley & Co., N. Haven.	" "
961	Bay State Fertilizer.	Clark's Cove Guano Co., New Bedford, Mass.	F. Ellsworth, Hartford.	" "
924	E. Frank Coe's Ammon. Bone Super.	E. Frank Coe, New York.		Andrew Kingsbury, Coventry.
962	Original Coe's Superphos. of Lime.	Wm. Bradley, Boston, Mass.	T. P. Pease & Sons' Co., Windsor Locks.	Station Agent.
991	World of Good Ammoniated Bone Superphosphate.	Thompson & Edwards, Chicago, Ill.	John S. Wells, Hebron.	" "
885	Fish and Potash, Crossed Fishes Brand.	Quinnipiac Fertilizer Co., New London.	Raymond Bros., Norwalk.	" "
974	Mapes' Complete Manure.	Mapes F. & P. G. Co., N. Y. City.	R. B. Bradley & Co., N. Haven.	" "
922	Bradley's Superphosphate.	Bradley Fertilizer Co., Boston.	Smith & Sons.	T. S. Gold, West Cornwall.
1013	Quinnipiac Phosphate.	Quinnipiac Fertilizer Co., New London.	Olds & Whipple, Hartford.	Homer C. Roberts, Silver Lane.
1001	G. W. Miles' Fish Fertilizer and Potash.	Geo. W. Miles Co., Milford.	S. J. Hall, Meriden.	Station Agent.
971	Bosworth Bros. Superphos. of Lime.	Bosworth Bros., Putnam.	J. A. Paine, Danielsonville	" "
886	Quinnipiac Phosphate.	Quinnipiac Fertilizer Co., New London.	Raymond Bros., Norwalk.	" "
1015	Fish and Potash, Crossed Fishes Brand.	Quinnipiac Fertilizer Co., New London.	Olds & Whipple, Hartford.	Olin Wheeler, Buckland.
957	Pelican Bone Fertilizer.	H. J. Baker & Bro., N. Y. City.	S. J. Hall, Meriden.	Station Agent.

NITROGENOUS SUPERPHOSPHATES.—*Continued.*

Station No.	Name or Brand.	Manufacturer.	Dealer.	Sampled and Sent by
904	A. A. Ammoniated Superphosphate.	H. J. Baker & Bro., N. Y. City.	Tolles & McEwen, Naugatuck.	Station Agent.
1005	G. W. Miles' I. X. L. Ammoniated Bone Superphosphate.	Geo. W. Miles & Co., Milford.	S. J. Hall, Meriden.	" "
955	Americus Brand Ammoniated Bone Superphosphate.	Williams, Clark & Co., New York.	F. Ellsworth, Hartford.	" "
967	Fish and Potash, Plain Brand.	Quinnipiac Fertilizer Co., New London.	A. W. Allen, Jr., Thompsonville.	" "
920	A. A. Ammoniated Superphosphate.	H. J. Baker & Bro., New York.	W. R. Perry & Co., N. London.	C. A. Copp, Groton.
868	Bradley's Superphosphate of Lime.	Bradley Fertilizer Co., Boston.	Raymond & Bro., So. Norwalk.	F. Sherwood, Green's Farms.
1023	Quinnipiac Phosphate.	Quinnipiac Fertilizer Co., New London.	Olds & Whipple, Hartford.	Station Agent.
952	Ammoniated Bone Superphosphate.	Preston Fertilizer Co., Greenpoint, L. I.	J. B. Merrow & Sons, Merrow.	" "
869	Baker's A. A. Ammoniated Superphosphate.	H. J. Baker & Bro., New York.	John Alvord, Green's Farms.	F. Sherwood, Green's Farms.
982	Great Planet Brand "A."	Clark's Cove Guano Co., New Bedford, Mass.	Manufacturer.	Manufacturer.
956	The Long Islander Ammoniated Superphosphate of Lime with Potash.	Atlantic & Virginia Fertilizer Co., Orient, L. I., and Richmond, Va.	S. J. Hall, Meriden.	Station Agent.
925	Quinnipiac Phosphate.	Quinnipiac Fertilizer Co., New London.	W. B. Williams, Bolton Centre.	Andrew Kingsbury, Coventry.
898	Ammoniated Bone Superphosphate.	Geo. W. Miles Co., Milford.	Apothecaries' Hall, Waterbury.	Station Agent.
887	Soluble Pacific Guano.	Glidden & Curtis, Boston, Mass.	Raymond Bros., Norwalk.	" "
997	Bowker's Dissolved Bone.	Bowker Fertilizer Co., Boston and New York.	J. A. Paine, Danielsonville.	" "
927	Farmer's Friend Fertilizer.	Read & Co., New York.	A. C. Sternburg, Hartford.	" "
900	Bowker's Fish and Potash.	Bowker Fertilizer Co., New York.	Curtis & Abbott, Birmingham.	" "
988	No. 1 Peruvian Guano, Standard.	Hurtado & Co., New York.	Southmayd & Gardiner, Middletown.	" "
863	Chittenden's Fish and Potash.	Nat'l Fertilizer Co., Bridgeport.	Manufacturer.	" "
897	Geo. W. Miles' Fish and Potash.	Geo. W. Miles Co., Milford.	Apothecaries' Hall, Waterbury.	" "
893	Russell Coe's Ammoniated Bone Superphosphate.	Russell Coe, Linden, N. J.	Curtis & Abbott, Birmingham.	" "

NITROGENOUS SUPERPHOSPHATES.—*Continued.*

Station No.	Name or Brand.	Manufacturer.	Dealer.	Sampled and Sent by
891	Chittenden's Universal Phosphate.	Nat'l Fertilizer Co., Bridgeport.	Manufacturer.	Station Agent.
958	The Orient Complete Manure.	Atlantic & Virginia Fertilizer Co., Orient, L. I., and Richmond, Va.	W. C. Reynolds, East Haddam.	" "
866	Chittenden's Ammoniated Bone Superphosphate.	Nat'l Fertilizer Co., Bridgeport.	Manufacturer.	" "
1010	Chittenden's Fish and Potash.	" " "	Southmayd & Gardiner, Middletown.	" "
977	Bowker's Hill and Drill Phosphate.	Bowker Fertilizer Co., New York and Boston.	Coburn & Gale, Hartford.	" "
923	Ammoniated Bone Superphosphate.	Russell Coe, Linden, N. J.	Smith & Sons, W. Cornwall.	T. S. Gold, West Cornwall.
896	" " "	Buffalo Fertilizer and Chemical Works.	Ruggles & Clark, Shelton.	Station Agent.
983	Dole Common Sense Fertilizer, No. 3.	Dole Common Sense Fertilizer Co., Boston, Mass.	Manufacturer.	Manufacturer.
901	Brighton Phosphate.	Bowker Fertilizer Co., N. Y. City.	Curtis & Abbott, Birmingham.	Station Agent.
960	Cook's Blood Guano.	Manhattan Chemical Co., N. Y.	A. C. Sternburg, Hartford.	" "
907	New Haven Fertilizer Co's Superphosphate.	New Haven Fertilizer Co.	Manufacturer.	" "
999	No. 1 Peruvian Guano, Lobos.	Hobson, Hurtado & Co, 63 Pine street, New York, Importers.	Southmayd & Gardiner, Middletown.	" "
861	Raw Bone Superphosphate.	G. W. Miller, Middlefield.	Manufacturer.	Jas. H. Barker, Branford.
1008	" Superphosphate.	" " "	C. E. Chapman, Westbrook.	Station Agent.
984	Dole's Common Sense Fertilizer, No. 2.	Dole Common Sense Fertilizer Co., Boston, Mass.	Manufacturer.	Manufacturer.
994	Mitchell's Standard Superphosphate.	Mitchell Standard Works, Linden, N. J.	John A. Paine, Danielsonville.	Station Agent.
980	Bradley Fertilizer Co's Sea Fowl Guano.	Bradley Fertilizer Co., Boston.	Manufacturer.	Manufacturer.
816	G. W. Miles Co's I. X. L. Phosphate.	Geo. W. Miles Co., Milford.	"	"
844	G. W. Miller's Raw Bone Phosphate.	G. W. Miller, Middlefield.	"	"
845	"C." Island Dry Fish Guano.	G. W. Miles Co., Milford.	"	"
847	G. W. Miles Co's Fish and Potash, XX.	" " "	"	"

NITROGENOUS SUPERPHOSPHATES.

Station No.	NAME.	Nitrogen of Nitrates.	Nitrogen of Ammonia Salts.	Nitrogen of Organic Matters.	Soluble Phos. Acid.	Reverted Phos. Acid.*	Insoluble Phos. Acid.	Potash.	Chlorine.	Estimated value per ton.	Cost per ton.	Valuation exceeds Cost.
964	Mapes Peruvian Guano	.15	3.18	1.57	5.73	6.38	10.00	5.37	2.40	$64.95	$54.00*	$10.95
998	Hurtado & Co's Alkalized Guano	.14	6.33	.15	.61	5.33	8.20	5.28	1.25	61.40	60.00	1.40
921	Quinnipiac Fertilizer Co's Phosphate	.64	....	2.85	7.47	2.28	1.75	2.66	2.34	40.11	40.00	.11
912	James Church & Co's Menhaden Guano	....	....	4.96	1.83	3 24	1.10	.29	....	33.60	33.60	
												Cost exceeds valuation.
969	Harris' Pure Bone Phosphate	....	....	2.92	5.54	3.19	5.73	....	....	37.60	38.00	$0.40
1011	L. B. Darling & Co's Animal Fertilizer	....	.47	3.44	1.19	5.26	8.71	4 68	3.50	43.73	45.00	1.27
918	Mapes' Complete Manure (" A " Brand)	.66	.72	1.30	7.58	2.91	3.22	2.89	1.98	40.16	42.00	1.84
954	Lister Bro's Ammoniated Dissolved Bone Phosphate	....	....	1.69	9.76	.98	.94	1.89	2.02	33.55	35.00	1.45
961	Clark's Cove Guano Co's Bay State Fertilizer	.96	.76	1.13	8.99	.95	1.11	3.08	3.09	38.24	40.00	1.76
924	E. Frank Coe's Ammoniated Bone Superphosphate	....	....	2.19	7.31	2.22	3.73	....	....	34.18	36.00	1.82
962	Wm. Bradley's Original Coe's Superphosphate of Lime	.50	.20	2.11	8.61	1.37	3.06	.31	.24	37.81	40.00	2.19
991	World of Good Ammoniated Bone Superphosphate	....	....	1.90	8.59	1.74	3.62	....	....	34.76	37.00	2.24
885	Quinnipiac Fertilizer Co's Fish and Potash, Crossed Fishes Brand	1 38	.44	2.48	.83	4.12	3.62	4.38	7.31	35.70	38.00	2.30
974	Mapes Complete Manure (for light or sandy soil)	1.42	2.63	1.24	6.01	1.83	1.12	6.61	.41	51.51	54.00	2.49
922	Bradley Fertilizer Co's Superphosphate	.32	....	2.47	8.22	1.19	2.44	1.89	1.87	37.16	40.00	2.84
1013	Quinnipiac Fertilizer Co's Phosphate	....	1.68	1.80	5.15	1.78	2.48	2.77	....	36.53	40.00	3.47
1001	G. W. Miles' Fish Fertilizer and Potash	....	.25	2.49	3.88	1.63	1.94	3.84	3.47	29.49	33.00	3.51
971	Bosworth Bros' Superphosphate of Lime	....	.09	1.74	4.84	3.67	7.90	2.23	2.02	36.37	40.00	3.63
886	Quinnipiac Fertilizer Co's Phosphate	....	.52	2.48	5.81	3.11	2.31	2.02	2.15	36.36	40.00	3.64
1015	Quinnipiac Fertilizer Co's Fish and Potash (Crossed Fishes Brand)	....	1.48	2.60	.60	4.78	3.02	4.72	....	36.26	40.00	3.74
957	H. J. Baker & Bro's Pelican Bone Fertilizer	....	1.08	1.10	7.09	1.26	.56	2.65	4.10	31.21	35.00	3.79

* $49.00 per ton in New York, in 5 ton lots. † See page 23.

NITROGENOUS SUPERPHOSPHATES.—*Continued.*

Station No.	NAME.	Nitrogen of Nitrates.	Nitrogen of Ammonia Salts.	Nitrogen of Organic Matters.	Soluble Phos. Acid.	Reverted Phos. Acid.*	Insoluble Phos. Acid.	Potash.	Chlorine.	Estimated value per ton.	Cost per ton.	Cost exceeds valuation.
904	H. J. Baker & Bro's A. A. Ammoniated Superphosphate	....	1.88	.76	9.88	.17	.36	2.58	3.30	$37.91	$42.00	$4.09
1005	Geo. W. Miles' I. X. L. Ammoniated Bone Superphosphate	....	.37	1.67	7.23	1.09	3.29	1.93	1.26	32.84	37.00	4.16
955	Williams, Clark & Co's Americus Brand Ammoniated Bone Superphos.	....	....	2.27	7.03	1.06	4.98	2.38	2.28	35.60	40.00	4.40
967	Quinnipiac Fertilizer Co's Fish and Potash, Plain Brand	....	.44	2.14	.70	4.44	4.05	5.35	7.91	30.18	35.00	4.82
920	H. J. Baker & Bro's A. A. Ammoniated Superphosphate	....	1.99	.72	8.81	.68	.47	2.78	3.71	37.05	42.00	4.95
868	Bradley Fertilizer Co's Superphosphate of Lime	.45	....	2.33	7.97	1.30	2.56	1.97	1.77	36.88	42.00	5.12
1023	Quinnipiac Fertilizer Co's Phosphate	....	.51	2.45	5.75	1.97	2.03	2.89	...	34.62	40.00	5.38
952	Ammoniated Bone Superphosphate (Preston's)	....	.45	1.50	6.46	1.19	3.31	1.08	2.18	30.24	36.00	5.76
869	H. J. Baker & Bro's A. A. Ammoniated Superphosphate	....	1.92	.56	8.52	.59	.64	2.88	3.91	35.46	42.00	6.54
982	Clark's Cove Guano Co's Great Planet Brand "A"	.09	1.46	1.53	6.75	.31	1.81	8.90	4.89	41.40	48.00	6.60
956	Atlantic & Virginia Fertilizer Co's Ammoniated Superphos. of Lime	....	....	.99	6.98	1.78	2.57	5.31	4.65	30.35	37.00	6.65
925	Quinnipiac Fertilizer Co's Phosphate	.90	....	1.87	2.66	5.98	3.19	2.18	2.94	33.30	40.00	6.70
898	Geo. W. Miles Co's Ammoniated Bone Superphosphate	....	....	2.26	7.03	1.25	3.07	1.84	2.75	33.11	40.00	6.89
887	Glidden & Curtis' Soluble Pacific Guano	.61	.17	1.82	5.08	1.73	5.66	2.54	2.60	34.59	42.00	7.41
997	Bowker's Dissolved Bone	....	.14	1.53	7.44	.85	2.10	2.73	3.93	30.34	38.00	7.66
927	Read & Co's Farmers' Friend Fertilizer	1.14	....	1.03	7.07	.94	1.93	1.48	3.18	29.93	38.00	8.07
900	Bowker Fertilizer Co's Fish and Potash	....	....	2.52	2.85	2.46	2.10	4.08	9.20	27.79	36.00	8.21
988	Hurtado & Co's No. 1, Peruvian Guano Standard	.11	7.36	.74	5.14	2.68	4.81	.90	1.26	64.24	73.00	8.76
863	Chittenden's Fish and Potash	....	....	2.92	.26	4.38	1.85	4.67	8.57	27.20	36.00	8.80
897	Geo. W. Miles' Fish and Potash	....	....	2.64	4.69	1.15	2.69	3.68	4.90	30.66	40.00	9.34
893	Russell Coe's Ammoniated Bone Superphosphate	...	....	2.60	6.56	.78	1.42	1.20	4.52	30.36	40.00	9.64
891	Chittenden's Universal Phosphate	.68	....	1.81	7.55	.87	.83	2.60	4.37	32.26	42.00	9.74
958	Atlantic & Virginia Fertilizer Co's Orient Complete Manure	....	....	.93	7.34	1.73	2.97	1.51	3.57	28.04	38.00	9.96
866	Chittenden's Ammoniated Bone Superphosphate	....	....	1.74	5.19	1.21	2.14	2.38	4.40	25.94	36.00	10.06
1010	Chittenden's Fish and Potash	....	....	2.48	.37	2.60	3.46	4.91	3.38	24.94	36.00	11.06
977	Bowker Fertilizer Co's Hill and Drill Phosphate	....	.19	1.62	5.40	1.77	3.58	1.59	2.93	28.80	40.00	11.20

* See page 23.

NITROGENOUS SUPERPHOSPHATES.—*Continued.*

Station No.	NAME.	Nitrogen of Nitrates.	Nitrogen of Ammonia Salts.	Nitrogen of Organic Matters.	Soluble Phos. Acid.	Reverted Phos. Acid.*	Insoluble Phos. Acid.	Potash.	Chlorine.	Estimated value per ton.	Cost per ton.	Cost exceeds valuation.
923	Russell Coe's Ammoniated Bone Superphosphate	....	....	2.00	6.63	1.20	1.58	1.27	2.43	$28.69	$40.00	$11.31
896	Buffalo Fertilizer and Chemical Works' Ammoniated Bone Superphos.	....	....	2.87	6.20	1.18	3.14	1.16	1.35	33.49	45.00	11.51
983	Dole's Common Sense Fertilizer, No. 3	....	.43	2.21	.97	4.26	1.26	4.93	4.43	27.06	40.00	12.94
901	Bowker Fertilizer Co's Brighton Phosphate	....	....	1.37	6.90	1.20	1.61	1.71	3.72	26.78	40.00	13.22
960	Cook's Blood Guano	....	1.05	.74	5.84	1.56	.91	1.48	1.72	26.56	40.00	13.44
907	New Haven Fertilizer Co's Superphosphate	1.18	....	.93	5.59	.88	2.87	1.98	1.22	27.83	42.00	14.17
999	Hurtado & Co's No. 1, Peruvian Guano, Lobos	....	3.63	.74	.99	6.82	9.28	1.88	.86	48.52	63.00	14.48
861	G. W. Miller's Raw Bone Superphosphate	....	....	2.80	3.16	3.57	4.10	5.13	....	34.82	50.00	15.18
1008	G. W. Miller's Raw Bone Superphosphate	....	....	2.88	2.80	3.29	4.08	5.86	5.53	34.55	50.00	15.45
984	Dole's Common Sense Fertilizer, No. 2	....	.70	.65	.55	3.51	2.16	2.69	2.61	18.34	35.00	16.66
994	Mitchell's Standard Superphosphate	....	.10	.86	5.97	.90	1.33	2.85	7.87	23.07	40.00	16.93
980	B. D. Sea Fowl Guano	....	.76	1.89	7.31	1.44	2.48	3.35	3.39	36.85	......	......
846	Geo. W. Miles Co's I. X. L. Phosphate	....	....	2.04	7.11	.75	3.51	1.61	....	31.80	......	......
844	G. W. Miller's Raw Bone Phosphate	....	3.74	3.08	2.80	3.21	2.80	5.91	....	33.84	......	......
845	G. W. Miles Co's "C" Island Dry Fish Guano	....	....	4.32	2.47	3.09	2.09	2.52	....	34.89	......	......
847	G. W. Miles Co's Fish and Potash, XX	....	....	2.89	4.81	1.55	2.11	3.60	....	31.94	......	......

* See page 23.

Comparison of Analyses of Superphosphates of the same Brand, and of the Analyses with the Guarantee.

Station No.	Name or Brand.		Nitrogen.	Phosphoric Acid: Soluble.	Phosphoric Acid: Reverted.†	Phosphoric Acid: Insoluble.	Potash.
		Guaranteed	**2.5–3.3**	**10–12**			**2–3**
904	Baker's A. A. Superphosphate	Found	2.6	9.9	.2	.4	2.6
920			2.7	8.8	.7	.5	2.8
869			2.5	8.5	.6	.6	2.9
		Guaranteed	**2.3–3.1**	**7–10**		**2–3**	**1.5–2.5**
922	Bradley's Superphosphate	Found	2.8	8.2	1.2	2.4	1.9
868			2.8	8.0	1.3	2.6	2.0
		Guarauteed	**2.5–4.1**	**6–8***			**4–6**
863	Chittenden's Fish and Potash	Found	2.9	.3	4.4	1.9	4.7
1010			2.5	.4	2.6	3.5	4.9
		Guaranteed	**2.5–3.5**	**5–8**			**3–5**
1001	Miles Co's Fish and Potash	Found	2.7	3.9	1.6	1.9	3.8
897			2.6	4.7	1.2	2.7	3.7
847			2.9	4.8	1.6	2.1	3.6
		Guaratneed	**2–3**	**8–12**			**1–3**
1005	Miles Co's Superphosphate	Found	2.0	7.0	1.1	3.1	1.9
898			2.3	7.0	1.3	3.1	1.8
846			2.0	7.1	.8	3.5	1.6
		Guaranteed	**3.1**	**6.0**		**2.8**	**5.9**
1008	Miller's Superphosphate	Found	2.9	2.8	3.3	4.1	5.9
861			2.8	3.2	3.6	4.1	5.1
844			3.1	2.8	3.2	2.8	5.9

* Total Phosphoric Acid. † See page 23.

Comparison of Analyses of Superphosphates of the same Brand, and of the Analyses with the Guarantee—*Continued.*

Station No.	Name or Brand.		Nitrogen.	Phosphoric Acid Soluble.	Phosphoric Acid Reverted.‡	Phosphoric Acid Insoluble.	Potash.
	Quinnipiac Fertilizer Co's Phosphate	Guaranteed	**2.5–3.5**	**8–10**		**1–3**	**2–3**
921		Found	3.5	7.5	2.3	1.8	2.7
886		Found	3.0	5.8	3.1	2.3	2.0
1023		Found	3.0	5.8	2.0	2.0	2.9
1013		Found	3.5	5.2	1.8	2.5	2.8
925		Found	2.8	2.7	6.0	3.2	2.2
	Quinnipiac Fish and Potash	Guaranteed	**3.3–4.3**	**3–5**		**2.0**	**3–5**
885		Found	4.3	.8	4.1	3.6	4.4
1015		Found	4.1	.6	4.8	3.0	4.7
	Russell Coe's Superphosphate	Guaranteed	**1.7–2.7**	**10–12**		**3**	***2½–4**
923		Found	2.0	6.6	1.2	1.6	1.3
893		Found	2.6	6.6	.8	1.4	1.2

Comparison of the Analyses of Nitrogenous Superphosphates with the Guarantee.

Station No.	Name or Brand.		Nitrogen.	Phosphoric Acid Soluble.	Phosphoric Acid Reverted.‡	Phosphoric Acid Insoluble.	Potash.
891	Chittenden's Universal Phosphate	Guaranteed	**2–2.9**	**8–10**			**2–4**
		Found	2.5	7.6	.9	.8	2.6
866	Chittenden's Ammoniated Bone Superphosphate	Guaranteed	**1.6–2.5**	**6–8**		**2**	**2–3**
		Found	1.7	5.2	1.2	2.1	2.4
1011	Darling & Co's Animal Fertilizer	Guaranteed	**4–6**			**10–12†**	**5–6**
		Found	3.9	1.2	5.3	8.7	4.7

* As Sulphate. † Total Phosphoric Acid. ‡ See page 23.

Comparison of the Analyses of Nitrogenous Superphosphates with the Guarantee—*Continued.*

Station No.	Name or Brand.		Nitrogen.	Phosphoric Acid Soluble.	Phosphoric Acid Reverted.†	Phosphoric Acid Insoluble.	Potash.
984	Dole's Common Sense Fertilizer, No. 2	Guaranteed	**3–6**			**4–6***	**3–5**
		Found	1.4	.6	3.5	2.2	2.7
983	Dole's Common Sense Fertilizer, No. 3	Guaranteed	**3–6**			**5–7***	**4–6**
		Found	2.6	1.0	4.3	1.3	4.9
924	E. Frank Coe's Ammoniated Bone Superphosphate	Guaranteed	**1.6–2.5**	**9–12**		**2–3**	
		Found	2.2	7.3	2.2	3.7	
887	Glidden & Curtis' Soluble Pacific Guano	Guaranteed	**2–3**	**8–11**			**2–3.5**
		Found	2.0	5.1	1.7	5.7	2.5
969	Harris' Pure Bone Phosphate	Guaranteed	**2.9**	**4.9**	**7.1**	**2.7**	
		Found	2.9	5.5	3.2	5.7	
998	Hurtado & Co's Alkalized Guano	Guaranteed	**6.6–7.4**			**13–15***	**5**
		Found	6.8	.6	5.3	8.2	5.3
988	Hurtado & Co's No. 1 Peruvian Guano, Standard	Guaranteed					
		Found	8.1	5.1	2.7	4.8	.9
999	Hurtado & Co's No. 1 Peruvian Guano, Lobos	Guaranteed	**4.9**				
		Found	4.4	1.0	6.8	9.3	1.9
954	Lister Bros. Ammoniated Dissolved Bone Phosphate	Guaranteed	**1.6–2**	**8–10**		**2–3**	**1.5–2**
		Found	1.7	9.8	1.0	.9	1.9
964	Mapes' Peruvian Guano	Guaranteed					
		Found	4.9	5.7	6.4	10.	5.4
918	Mapes' Complete Manure ("A" Brand)	Guaranteed	**2.5–3.3**	**10–12**		**2–4**	**2.5–3.5**
		Found	2.7	7.6	2.9	3.2	2.9
974	Mapes' Complete Manure (for light or sandy soils)	Guaranteed	**5–6.6**			**7–9***	**6–8**
		Found	5.3	6.0	1.8	1.1	6.6

* Total Phosphoric Acid. † See page 23.

Comparison of the Analyses of Nitrogenous Superphosphates with the Guarantee—*Continued.*

Station No.	Name or Brand.		Nitrogen.	Phosphoric Acid Soluble.	Phosphoric Acid Reverted.‡	Phosphoric Acid Insoluble.	Potash.
994	Mitchell's Standard Superphosphate	Guaranteed	**1.6–2.9**			**8–10***	**2–3**
		Found	1.0	6.0	.9	1.3	2.9
956	Atlantic & Virg. Fert. Co's Ammon. Superphos. of Lime	Guaranteed	**.8–1.6**	**8–11**		**2–3**	**5.7**
		Found	1.0	7.0	1.8	2.6	5.3
958	Atlantic & Virginia Fert. Co's Orient Complete Manure	Guaranteed	**1.6**	**8**			**1**
		Found	.9	7.3	1.7	3.0	1.5
971	Bosworth Bro's Superphosphate of Lime	Guaranteed	**2–2.5**	**11–13**		**2–5**	**2–3**
		Found	1.8	4.8	3.7	7.9	2.2
997	Bowker's Dissolved Bone	Guaranteed	**1.6–2.5**	**8–10**		**2**	**2–4†**
		Found	1.7	7.4	.9	2.1	2.7
900	Bowker Fertilizer Co's Fish and Potash	Guaranteed	**2.5–3.5**			**8–10***	**4–6**
		Found	2.5	2.9	2.5	2.1	4.1
977	Bowker Fertilizer Co's Hill and Drill Phosphate	Guaranteed	**2–2.9**	**8–10**		**2**	**2–4†**
		Found	1.8	5.4	1.8	3.6	1.6
901	Bowker Fertilizer Co's Brighton Phosphate	Guaranteed	**1.6–2.5**	**7–9**		**2**	**4–6†**
		Found	1.4	6.9	1.2	1.6	1.7
896	Buffalo Fertilizer Co's Ammoniated Bone Superphosphate,	Guaranteed	**2.5–3.5**	**8–10**		**1–2**	**2–3†**
		Found	2.9	6.2	1.2	3.1	1.2
980	B. D. Sea Fowl Guano	Guaranteed	**2.5–3.2**	**7–8**	**2–3**	**2–3**	**2–3**
		Found	2.7	7.3	1.4	2.5	3.4
962	Bradley's Original Coe's Superphosphate of Lime	Guaranteed	**2.1–2.9**	**7–8**	**2–3**	**2–3**	
		Found	2.8	8.6	1.4	3.1	.3
957	Baker's Pelican Bone Fertilizer	Guaranteed	**1.8–2.3**	**8–10**			**2.2–2.7**
		Found	2.2	7.1	1.3	.6	2.7

* Total Phosphoric Acid. † As Sulphate. ‡ See page 23.

COMPARISON OF THE ANALYSES OF NITROGENOUS SUPERPHOSPHATES WITH THE GUARANTEE—*Continued.*

Station No.	Name or Brand.		Nitrogen.	Phosphoric Acid: Soluble.	Phosphoric Acid: Reverted.†	Phosphoric Acid: Insoluble.	Potash.
912	Church & Co's Menhaden Guano	Guaranteed	**4.7**	**4.9**			**.3**
		Found	5.0	1.8	3.2	1.1	.3
961	Clark's Cove Guano Co's Bay State Fertilizer	Guaranteed	**2.1–2.8**	**8–11**		**3**	**2–3**
		Found	2.9	9.0	1.0	1.1	3.1
982	Clark's Cove Guano Co's Great Planet Brand "A"	Guaranteed	**2.5–3.3**	**7–8**			**9–11**
		Found	3.1	6.8	.3	1.8	8.9
960	Cook's Blood Guano	Guaranteed	**1.6–2.5**	**7**		**3**	
		Found	1.8	5.8	1.6	.9	1.5
845	Miles Co's "C" Island Dry Fish Guano	Guaranteed					
		Found	4.3	2.5	3.1	2.1	
907	New Haven Fertilizer Co's Superphosphate	Guaranteed					
		Found	2.1	5.6	.9	2.9	2.0
952	Preston's Ammoniated Superphosphate	Guaranteed	**2.5–3.5**	**10–12**		**1–2**	**2**
		Found	2.0	6.5	1.2	3.3	1.1
967	Quinnipiac Fertilizer Co's Fish and Potash (plain brand)	Guaranteed	**2–3**	**4–6**		**2**	**4–6**
		Found	2.6	.7	4.4	4.1	5.4
927	Read & Co's Farmer's Friend Fertilizer	Guaranteed	**1.6–2**	**8–10**		**2**	**.8–1**
		Found	2.2	7.1	.9	2.0	1.5
991	World of Good Ammoniated Bone Superphosphate	Guaranteed	**1.6–2**	**8–10**		**2**	
		Found	1.9	8.6	1.7	3.6	
955	Williams, Clark & Co's Ammoniated Bone Superphos.	Guaranteed	**1.6–2.5**	**6–8**	**3–4**	**1–3**	**1–2**
		Found	2.3	7.0	1.1	5.0	2.4

† See page 23.

Special Fertilizers.

Station No.	Name or Brand.	Manufacturer.	Dealer.	Sampled and Sent by
972	Tobacco Manure (for use with stems).	Mapes' F. & P. G. Co., New York.	Mapes' F. & P. G. Co's Br'ch, Hart.	Station Agent.
965	Complete Tobacco Manure.	H. J. Baker & Bro., "	------------------------	" "
1043	Chittenden's Fertilizer for Corn and other Grain.	Nat'l Fertilizer Co., Bridgeport.	John S. Kirkham, Newington.	Dealer.
992	Grass Manure.	H. J. Baker & Bro., New York.	Olds & Whipple, Hartford.	Station Agent.
975	Potato Manure.	Mapes' F. & P. G. Co., "	R. B. Bradley & Co. N. Haven.	" "
1046	Chittenden's Potato Fertilizer.	Nat'l Fertilizer Co., Bridgeport.	Manufacturer.	John S. Kirkham, Newington.
1045	Chittenden's Tobacco Fertilizer.	" " "	"	" " "
882	Tobacco Fertilizer, Conn. Brand.	Mapes' F. & P. G. Co., New York.	David Beers, Danbury.	Station Agent.
1003	Stockbridge Seeding-Down Manure.	Bowker Fert. Co., Boston, Mass.	J. A. Paine, Danielsonville.	" "
926	Matchless Tobacco Manure.	Read & Co., 34 Beaver St., N. Y.	A. C. Sternburg, Hartford.	" "
959	Potato Fertilizer.	Lister Bros., Newark, N. J.	R. B. Bradley & Co., N. Haven.	" "
1044	Potato Manure.	Mapes' F. & P. G. Co., New York.	Mapes' Branch, Hartford.	John S. Kirkham, Newington.
906	Corn Manure.	H. J. Baker & Bro., "	Tolles & McEwen, Naugatuck.	Station Agent.
905	Potato Manure.	" " "	"	" "
913	Chittenden's Root Fertilizer.	Nat'l Fertilizer Co., Bridgeport.	Manufacturer.	" "
914	Chittenden's Grain Fertilizer.	" " "	"	" "
979	Stockbridge Grain Manure.	Bowker Fert. Co., N. Y. & Boston.	E. A. Watrous, Meriden.	" "
976	Stockbridge Forage Crop Manure.	Bowker Fertilizer Co., New York.	J. A. Paine, Danielsonville.	" "
973	Grass and Grain Spring Top Dressing.	Mapes' F. & P. G. Co., "	R. B. Bradley & Co., N. Haven.	" "
902	Stockbridge Manure for Corn.	Bowker Fertilizer Co., "	Apothecaries' Hall, Waterbury.	" "
895	Potato, Hop and Tobacco Phosphate.	Buffalo Fert. and Chemical Works.	Ruggles & Clark, Shelton.	" "
899	Stockbridge Grass Top Dressing and Forage Crop Manure.	Bowker Fertilizer Co., New York.	Apothecaries' Hall, Waterbury.	" "
903	Stockbridge Manure for Potatoes and Vegetables.	" " "	" "	" "
1000	Bowker's Lawn Dressing.	Bowker Fert. Co., Boston & N. Y.	E. A. Watrous, Meriden.	" "
989	English Lawn Fertilizer.	Wm. L. Bradley, Boston, Mass.	J. L. Butler, Torrington.	" "

Special Fertilizers—*Continued.*

Station. No.	Name.	Nitrogen of Nitrates.	Nitrog. of Ammonia Salts.	Nitrog. of Organic Matters.	Phosphoric Acid.			Potash.	Chlorine.	Estimated value per ton.	Cost per ton.	Cost exceeds Valuation
					Soluble	Reverted.*	Insoluble.					
972	Mapes' Tobacco Manure (for use with stems)....	1.20	2.90	1.21	7.52	2.08	1.31	4.35	1.02	$52.24	$54.00	$ 1.76
965	Baker's Tobacco Manure	.10	4.15	.60	3.41	1.52	.39	9.03	.77	47.22	50.00	2.78
1043	Chittenden's Fertilizer for Corn and other Grain,	....	3.25	1.39	7.71	.91	.60	5.59	4.14	47.18	50.00	2.82
992	Baker's Grass Manure	....	4.30	.57	4.33	.96	1.22	8.19	8.04	44.47	47.50	3.03
975	Mapes' Potato Manure	.45	1.58	2.52	5.44	3.44	1.84	6.39	4.06	47.27	51.00	3.73
1046	Chittenden's Potato Fertilizer	....	3.14	1.00	7.69	.59	.62	5.07	.67	46.15	50.00	3.85
1045	Chittenden's Tobacco Fertilizer................	....	3.31	.89	7.27	.97	.60	4.98	.71	46.02	50.00	3.98
882	Mapes' Tobacco Manure, Conn. Brand...........	2.98	1.86	.57	4.88	2.76	1.20	6.70	1.02	49.45	54.00	4.55
1003	Stockbridge Seeding-Down Manure	.36	....	3.01	6.45	1.01	3.46	5.88	4.83	40.25	45.00	4.75
926	Read & Co's Matchless Tobacco Manure	2.96	1.86	.32	5.66	1.17	1.24	4.18	1.75	43.36	50.00	6.64
959	Lister's Potato Fertilizer	....	.79	3.00	7.30	.83	.74	8.43	7.88	43.36	50.00	6.64
1044	Mapes' Potato Manure.........................	.70	2.14	1.06	3.90	3.19	4.25	6.72	3.75	44.25	51.00	6.75
906	Baker's Corn Manure	....	3.38	.77	6.10	.40	.78	7.91	9.79	42.84	50.00	7.16
905	Baker's Special Potato Manure.................	....	2.59	.67	6.87	.67	.43	9.76	7.75	41.55	50.00	8.45
913	Chittenden's Root Fertilizer	.09	....	3.74	6.33	1.07	1.27	6.49	5.79	40.24	50.00	9.76
914	Chittenden's Complete Manure for Grain	.11	....	3.73	7.02	.86	1.09	5.15	4.86	40.11	50.00	9.89
979	Stockbridge Grain Manure......................	.48	.13	2.78	6.43	.99	3.39	5.31	5.10	39.70	†50.00	10.30
976	Stockbridge Forage Crop Manure................	.21	.17	2.91	6.48	.77	3.61	4.06	2.08	39.11	50.00	10.89
973	Mapes' Grass and Grain Spring Top Dressing ...	1.47	.66	1.98	4.32	2.77	2.67	5.98	4.97	40.83	52.00	11.17
902	Stockbridge Corn Manure	....	....	3.83	6.63	.49	2.57	2.79	3.93	38.44	50.00	11.56
895	Buffalo Fert. & Chem. Works, Pot., Hop & Tob. Phos.	....	....	2.11	6.74	.77	2.08	4.74	4.32	32.30	45.00	12.70
899	Stockbridge Grass Top Dressing & Forage Crop Man.,	1.86	....	2.18	5.85	.55	1.49	4.05	3.72	36.45	50.00	13.55
903	Stockbridge Potato and Vegetable Manure......	....	....	2.94	5.86	.79	1.83	6.10	4.05	35.45	50.00	14.55
1000	Bowker's Lawn Dressing.......................	1.65	.21	2.06	6.10	.53	4.18	4.11	3.50	39.95	‡	....
989	Bradley's English Lawn Fertilizer	4.30	....	.11	5.78	1.14	0.97	3.42	3.80	36.32	....	....

* See page 23. † Reckoned from cost per bag of 200 lbs. ‡ $3.00 per bag of 100 lbs.

Special Fertilizers or "Formulas."

Thirty-one samples of this class of nitrogenous superphosphates have been analyzed during the year; a part of them for private parties. The analyses and valuations of those which have general interest are given on pages 44 and 45. Numbers **989** and **1000** are Lawn Fertilizers. The demand for them is relatively small and they are usually sold in lots of 100 to 200 lbs. Ton prices are not given.

Leaving out of account these lawn fertilizers, the average cost of 23 special fertilizers has been $49.98, the average estimated value $42.53 and the difference between cost and valuation $7.45.

For the last four years the average cost and the difference between cost and valuation have been as follows:

	1880.	1881.	1882.	1883.
Cost,	48.00	48.04	50.22	49.98
Difference between cost and valuation,	3.35	4.93	3.29	7.45

It will be noticed that the average difference between the cost and valuation of the special fertilizers is about one dollar per ton more than what it is in the case of the ammoniated superphosphates: that is, the fertilizing ingredients have been cheaper the past year in the latter than in the former goods.

On page 47 is a table compiled from all the analyses of the special manures there named, which have been made in this Station and in the New Jersey Station since 1878. It shows the average composition of each brand as well as the fluctuations in the composition of each. It also shows that there is no uniform and striking difference between the composition of fertilizers which are claimed to be specially adapted to the demands of one particular crop and the composition of those made for another crop. The term "special" is meaningless and there is no apparent reason for calling one of the samples an Onion manure rather than a corn or potato manure, for it would be impossible for any one to decide from its composition either what crop it was best suited for, or for what crop its manufacturer designed it. The special manures are to be regarded simply as superphosphates of higher grade than others. Their cost is greater, their estimated value is higher, and pound for pound they may fairly be expected to produce a larger yield than goods of lower grade.

Corn Manure.

	No. of Analyses.	Nitrogen. Av.	Max.	Min.	Phos. Acid.* Av.	Max.	Min.	Potash. Av.	Max.	Min.
H. J. Baker's	3	4.5	5.0	4.2	5.6	5.8	5.4	8.0	9.5	8.0
Forrester's	6	4.9	5.5	3.9	6.6	8.0	5.3	9.8	14.6	6.6
Mapes'	8	3.7	4.0	3.4	9.4	11.7	5.4	7.0	11.2	4.6
Stockbridge's	7	4.8	6.2	3.8	6.1	7.4	3.8	6.0	7.0	3.9
Williams, Clark & Co's	1	5.2			5.2			6.0		

Potato Manure.

	No. of Analyses.	Nitrogen. Av.	Max.	Min.	Phos. Acid.* Av.	Max.	Min.	Potash. Av.	Max.	Min.
H. J. Baker's	4	4.7	7.4	3.5	5.4	6.3	4.9	10.3	12.9	9.1
Forrester's	7	4.5	5.7	3.4	6.0	7.6	5.3	10.2	11.4	9.0
Lister's	1	4.1			7.2			9.0		
Mapes'	5	3.7	3.9	3.4	8.0	10.3	4.6	8.0	14.8	5.0
Stockbridge's	7	3.3	3.5	2.9	7.0	7.6	6.4	6.3	10.2	4.9
Williams, Clark & Co's	3	2.9	3.3	2.5	6.2	7.3	5.4	10.7	11.9	8.6

Tobacco Manure.

	No. of Analyses.	Nitrogen. Av.	Max.	Min.	Phos. Acid.* Av.	Max.	Min.	Potash. Av.	Max.	Min.
H. J. Baker's	2	4.6	4.7	4.4	3.9	5.2	2.7	10.3	12.0	8.6
Forrester's	1	5.5			3.9			9.7		
Mapes'	4	5.0	5.9	3.6	7.1	7.8	5.6	6.3	9.0	4.4
Stockbridge's	2	5.9	6.1	5.7	3.8	6.1	1.4	6.5	7.4	5.6

Onion Manure.

	No. of Analyses.	Nitrogen. Av.	Max.	Min.	Phos. Acid.* Av.	Max.	Min.	Potash. Av.	Max.	Min.
H. J. Baker's	1	5.0			6.2			9.6		
Forrester's	5	6.2	7.4	5.1	5.1	6.2	4.5	6.7	7.4	5.7
Mapes'	1	5.7			6.2			7.5		
Stockbridge's	2	3.5	3.9	3.1	5.9	6.4	5.3	8.1	8.3	7.9

Bone Manures.

Method of Valuation.

For the benefit of those who have not the previous reports of the Station at hand, a detailed account of the method employed for the valuation of bone manures is here given, being in large part reproduced from former Reports.

Experience has led us to distinguish, for the purpose of valuation, five grades of ground bone, the proportions of which are found by a mechanical analysis, *i. e.*, by passing a weighed sample of the bone through a system of four sieves. These five grades have the dimensions, and during 1883, have had the trade-values below specified, viz:

* Soluble and reverted.

Grade.	Dimensions.	1883. Estimated value per pound. Nitrogen.	Phos. Acid.
Fine,	smaller than one $\frac{1}{50}$ inch,	17 cts.	6 cts.
Fine medium,	between $\frac{1}{50}$ and $\frac{1}{25}$ inch,	15 "	$5\frac{1}{2}$ "
Medium,	" $\frac{1}{25}$ and $\frac{1}{12}$ inch,	14 "	5 "
Coarse medium,	" $\frac{1}{12}$ and $\frac{1}{6}$ inch,	13 "	$4\frac{1}{2}$ "
Coarse,	larger than $\frac{1}{6}$ inch,	11 "	4 "

The chemical and mechanical analysis of a sample of ground bone being before us, we separately compute the nitrogen value of each gráde of bone which the sample contains, by multiplying the pounds of nitrogen per ton in the sample by the per cent. of each grade, taking $\frac{1}{100}$th of that product, multiplying it by the estimated value per pound of nitrogen in that grade, and taking this final product as the result in cents. Summing up the separate values of each grade, thus obtained, together with the values of each grade for phosphoric acid, similarly computed, the total is the estimated value of the sample of bone.

To illustrate, Rogers and Hubbard's Raw Knuckle Bone, A, Extra fine, No. **860**, contains 3.92 per cent. of nitrogen or 78.4 lbs. per ton, and 23.61 per cent. of phosphoric acid or 472.2 lbs. per ton. The mechanical analysis showed:

Fine,	35 per cent.
Fine medium,	33
Medium,	24
Coarse medium,	8
Coarse,	0
	100

The calculations are as follows:

$$78.4 \times 35 \div 100 \times 17 = \$4.67$$
$$78.4 \times 33 \div 100 \times 15 = 3.88$$
$$78.4 \times 24 \div 100 \times 14 = 2.63$$
$$78.4 \times 8 \div 100 \times 13 = .82$$

Estimated value of nitrogen, $12.00

$$472.2 \times 35 \div 100 \times 6 = \$9.92$$
$$472.2 \times 33 \div 100 \times 5\tfrac{1}{2} = 8.57$$
$$472.2 \times 24 \div 100 \times 5 = 5.67$$
$$472.2 \times 8 \div 100 \times 4\tfrac{1}{2} = 1.70$$

Estimated value of phosphoric acid, $25.86

$37.86

The result agrees with the cost price ($37.50) within 36 cents.

When the sample of bone contains foreign matters introduced as preservatives, dryers or adulterants, such as salt, salt-cake, niter-cake, ground oyster-shells, spent lime, plaster, or soil, these must be taken account of in the mechanical analysis, especially since they would be likely, on sifting, to pass chiefly or entirely into the finer grades. In such cases, the several grades as obtained by sifting must be separately examined, and the amounts of foreign matter which they contain must be suitably taken into the account if an *exact* valuation is desired.

A single examination of this kind has been made in the case of No. 884 Lister's Celebrated Ground Bone, which contains a considerable quantity of salt cake and some salt. A second mechanical analysis was made, agreeing essentially with the one given on page 53, and nitrogen and phosphoric acid were determined in each of the grades. The results were as follows reckoned on 100 lbs. of bone.

Grade.	Pounds per 100.	Per cent. of nitrogen.	Pounds of nitrogen. Per 100 lbs. bone.	Per cent. of phos. acid.	Pounds of phos. acid. Per 100 lbs. bone.
Fine,	45	1.54	.69	9.27	4.19
Fine medium,	15	2.39	.41	13.82	2.07
Medium,	17	2.92	.50	14.39	2.44
Coarse medium,	18	2.92	.53	17.46	3.15
Coarse,	5	3.35	.17	19.94	1.00
	100		2.30		12.85

The total nitrogen (2.30 pounds per hundred) and the total phosphoric acid (12.85 pounds per hundred) agree reasonably well with the amounts found by the usual method of analysis, viz: nitrogen, 2.41 ; phosphoric acid, 12.55. It will be seen that the percentage amount of nitrogen and phosphoric acid in the coarsest portion is more than twice that in the finest portion, which shows that the most of the foreign material—salt, salt-cake, etc.—sifts out with the finer part of the bone. Now, in computing the estimated value, nitrogen and phosphoric acid have a valuation which is higher in the finer grades (see page 24), and it is assumed that the percentage composition of all the grades is alike. If, as in this case, the finer grades have a lower percentage of nitrogen and phosphoric acid than the coarser, the valuation will be too high. To see whether the error is a considerable one, the valuation has been recalculated from the amounts of nitrogen and phosphoric acid actually found in each grade, and is $20.06 per ton, while calculated in the usual way it is $20.78. The difference, 72 cents, is inconsiderable; less than might be expected between two samples of the same brand.

Even where the bone is unmixed with a dryer or adulterant, it may often happen that the proportions of nitrogen and phosphoric acid are not the same in the finer and coarser portions.

There is, however, a limit beyond which it is useless to attempt to refine the processes of valuation. When they become too complicated or costly, they defeat the object which they should serve. It is sufficient that the errors of valuation are no greater than those which arise from unavoidable variations in different portions of the same lot of fertilizer, or in different lots of the same brand. A difference of two or three dollars between cost and estimated value cannot ordinarily demonstrate that either is out of the way.

Bone Manures.

Analyses.

The analyses and valuations of 23 samples will be found on pages 52 and 53.

986 was quite wet, which explains its low percentage of nitrogen and phosphoric acid. It would be excellent material for composting or immediate application to land, but could not be transported far nor stored without loss.

939 is a waste product from the glue factory. A large part of the nitrogenous animal matter has been extracted, leaving it poor in nitrogen and correspondingly rich in phosphoric acid. It retails in New York at $30.00 per ton, and freight to Southport is $1.00; but farmers, by making up an order for a lot of 10 tons, got it for $29.50 on the dock at Southport.

985 is very coarse, 90 per cent. of it being held on a sieve with one-sixth inch meshes. It is doubtful if it deserves as high a valuation as has been given it.

1016 is manufactured by the Adamson process. The water and grease are nearly or entirely removed by the vapor of benzine, leaving the bone dry, brittle and porous.

The average cost per ton of ground bone in the samples examined this year is $35.88; the average estimated value, $32.95; and the difference between cost and valuation, $2.93.

"ROTTED BONE."

871. From stock of James H. Baker, 104 Clymer street, Brooklyn. Sent by E. Hoyt, New Canaan.

ANALYSIS AND VALUATION.

Water,	29.04
Sand and insoluble,	22.02
Nitrogen,	2.65
Phosphoric acid,	1.59
Estimated value per ton,	$14.10
Cost in New York,	$16.00

ON THE SOLUBILITY OF BONE IN AMMONIUM CITRATE.

It is known that a very small part of the phosphoric acid of bones may be extracted from them with cold water, while a large amount is taken up by solution of ammonium citrate,* which is used to remove the so-called "reverted" phosphoric acid from superphosphates. Seventeen samples of bone have been extracted with ammonium citrate solution in order to learn their average solubility in it, and also to find out whether the phosphoric acid of bone which has been mixed with salt or salt-cake is more soluble than that of pure bone. Two grams of the bone, in the condition in which it came to the Station, were digested with 100 c. c. of neutral Am. Cit. solution (Sp. gr., 1.09) for half an hour at 40° C., shaken every five minutes, and then filtered at once. The samples are arranged according to their fineness, and the results are given on page 54.

An examination of the figures shows that on the average 18.9 per cent. of the phosphoric acid in the pure bones was soluble, 81.1 per cent. insoluble in Am. Cit. The solubility was greater in the finer bones *on the average.* In those which had no particles larger than one-twelfth inch, the average solubility was 24.1 per cent. Where all the particles were smaller than one-sixth inch it was 19.1 per cent.; while in the coarser samples it was 10.2 per cent. The solubility is doubtless affected by other things than the fineness. The amount of grease present, the character of the bone, whether hard (from factories where bone is worked) or soft, and the method of grinding, all have an effect in hindering or helping the solvent action of water or ammonium citrate.

* This is the substance formed by saturating or neutralizing the acid of lemons by ammonia.

Bone Manures.

Station No.	Name or Brand.	Manufacturer.	Dealer.	Sampled and Sent by
1016	Swift Sure Bone Meal.	M. L. Shoemaker & Co., Phila.	F. Ellsworth, Hartford.	F. Ellsworth, Hartford.
939	Peter Cooper's No. 2 Bone.	Peter Cooper's Glue Factory.	Manufacturer.	E. S. Spring, Green's Farms.
892	Ground Bone.	F. C. Slade, Oakville.	"	F. C. Slade, Oakville.
883	Wilson's Pure Bone Flour.	Wilson, Norwalk.	Raymond Bros., South Norwalk.	Station Agent.
908	Ground Bone.	E. Smith, South Canterbury.	Manufacturer.	Manufacturer.
986	Damp Bone Sawings.	Rogers & Hubbard Co., Middletown.	"	"
860	Raw Knuckle Bone, "A" Extra Fine.	Rogers & Hubbard Co., Middletown.	"	"
950	Ground Bone.	M. McNamara, Trumbull.	"	J. H. Jennings, Green's Farms.
981	Bosworth Bros. Ground bone.	Bosworth Bros., Putnam.	"	Manufacturer.
1009	Bone, Grade "A" Extra Fine.	Rogers & Hubbard Co., Middletown.	Southmayd & Gardiner, Middletown.	Station Agent.
859	Raw Knuckle Bone, "Meal."	Rogers & Hubbard Co., Middletown.	Manufacturer.	Manufacturer.
1050	Ground Bone.	P. W. Bennett, Rock Fall.	"	"
1004	Pure Ground Raw Knuckle Bone, Grade Meal.	Rogers & Hubbard Co., Middletown.	Southmayd & Gardiner, Middletown.	Station Agent.
1012	Darling's Fine Ground Bone.	L. B. Darling & Co., Pautucket, R. I.	J. P. Barstow & Co., Norwich.	" "
985	Ground Bone.	W. P. Lawrence, Millbrook.	Manufacturer.	Manufacturer.
1007	Miller's Bone.	G. W. Miller, Middlefield.	C. E. Chapman, Westbrook.	Station Agent.
995	Bowker's Fine Ground Bone.	Bowker Fertilizer Co., Boston and New York.	E. A. Watrous, Meriden.	" "
970	Harris & Son's Ground Bone.	G. H. Harris & Son, Eagleville.	Manufacturer.	" "
990	Thompson & Edwards' Pure Fine Ground Bone.	Thompson & Edwards, Chicago.	J. S. Wells, Hebron.	" "
953	Peck Bros.' Pure Ground Bone.	Peck Bros., Northfield.	G. H. Alford & Co., Winsted.	" "
884	Lister's Celebrated Ground Bone.	Lister Bros., Newark, N. J.	Raymond Bros., South Norwalk.	" "
951	Ground Bone.	Preston Fertilizer Co., Greenpoint.	J. B. Merrow & Sons, Merrow.	" "
996	Crescent Bone.	Lister Bros., Newark, N. J.	J. P. Barstow & Co., Norwich.	" "

Bone Manures—Analyses and Valuations.

Station No.	Name.	Nitrogen.	Phos. Acid.	Finer than $\frac{1}{50}$ inch.	Finer than $\frac{1}{25}$ inch.	Finer than $\frac{1}{12}$ inch.	Finer than $\frac{1}{6}$ inch.	Coarser than $\frac{1}{6}$ inch.	Estimated value per ton.	Cost per ton.	Valuation exceeds Cost.
1016	Shoemaker's Swift Sure Bone Meal	6.61	19.84	60	35	5	0	0	$52.58	$45.00	$7.58
939	Peter Cooper's No. 2 Bone	1.67	28.99	35	18	27	20	0	35.99	28.50	7.49
892	Slade's Ground Bone	3.97	23.52	17	24	27	23	9	35.25	32.00	3.25
883	Wilson's Pure Bone Flour	3.92	23.61	19	29	52	----	----	36.85	35.00	1.85
908	Smith's Ground Bone	4.38	20.86	24	33	26	17	----	35.27	34.00	1.27
986	Rogers & Hubbard Co's Damp Bone Sawings	2.00	15.89	95	5	----	----	----	25.73	25.00	.73
860	" " " Raw Knuckle Bone, "A" Extra Fine	3.92	23.61	35	33	24	8	----	37.65	37.50	.15
											Cost exceeds Valuation.
950	McNamara's Ground Bone	4.03	20.32	19	15	24	32	10	31.70	31.75	.05
981	Bosworth Bros.' Ground Bone	3.68	22.17	32	38	25	4	1	35.54	36.00	.46
1009	Rogers & Hubbard Co's Bone, Grade A Extra Fine	3.84	24.48	19	16	52	13	----	36.69	37.50	.81
859	" " " Raw Knuckle Bone, "Meal"	3.87	23.36	50	43	7	----	----	39.04	40.00	.96
1050	Bennett's Ground Bone	3.09	24.32	16	18	24	22	20	32.58	34.00	1.42
1004	Rogers & Hubbard Co's Pure Gr'd Raw Kn'le Bone, Meal	3.97	23.80	35	33	32	----	----	38.48	40.00	1.52
1012	Darling's Fine Ground Bone	3.28	23.77	72	21	7	0	0	38.43	42.00	3.57
985	Lawrence's Ground Bone	3,95	22.55	0	1	3	6	90	27.28	32.00	4.72
1007	Miller's Bone	3.95	24.47	15	21	49	15	----	36.80	42.00	5.20
995	Bowker's Fine Ground Bone	3.27	22.82	49	19	21	11	----	35.40	42.00	6.60
970	Harris & Son's Ground Bone	3.82	19.17	----	2	17	39	42	26.30	33.00	6.70
990	Thompson & Edwards' Pure Fine Ground Bone	1.25	22.40	66	20	10	4	----	29.76	38.00	8.24
953	Peck Bros.' Pure Ground Bone	3.60	20.22	9	18	31	28	14	29.69	40.00	10.31
884	Lister Bros.' Celebrated Ground Bone	2.41	12.55	47	17	16	20	----	21.12	33.00	11.88
951	Preston's Ground Bone	3.56	10.65	38	17	16	13	16	21.68	35.00	13.32
996	Lister Bros.' Crescent Bone	1.76	11.57	50	15	15	15	5	18.01	32.00	13.99

The three samples, **996, 884** and **951,** all have an acid reaction, doubtless due to bisulphate of soda in the salt-cake which has been added to them. It was to be expected, therefore, that the phosphoric acid in them would be more soluble than in pure bone; 45.6 per cent. of their phosphoric acid on the average is soluble, and 54.4 per cent. insoluble. One of them, **884,** furnishes more soluble phosphoric acid, pound for pound, than pure bone, but less than half as much insoluble phosphoric acid and less than two-thirds as much nitrogen.

Solubility of Bone in Ammonium Citrate.

Station No.	Mechanical Analysis.					Soluble in Am. Cit.	Insoluble in Am. Cit.
	Fine $\frac{1}{50}$ in.	Fine medium $\frac{1}{25}$ in.	Medium $\frac{1}{12}$ in.	Coarse medium $\frac{1}{6}$ in.	Coarse.		
859	50	43	7	0	0	6.60	16.76
1012	72	21	7	0	0	6.75	17.02
990	66	20	10	4	0	3.73	18.80
981	32	38	25	4	1	3.12	19.07
1004	35	33	32	0	0	4.41	19.39
860	35	33	24	8	0	5.00	18.61
908	24	33	26	17	0	6.46	14.40
939	35	18	27	20	0	6.72	22.27
883	19	29	52	0	0	4.88	18.73
1007	15	21	49	15	0	2.90	21.57
1009	19	16	52	13	0	2.72	21.76
950	19	15	24	32	10	1.25	19.07
953	9	18	31	28	14	2.43	17.79
970	0	2	17	39	42	1.69	17.48
996	50	15	15	15	5	3.52	8.00
84	47	17	16	20	0	7.75	4.80
51	38	17	16	13	16	4.73	5.92

Dry Ground Fish.

[See next page.]

A part of the samples analyzed contained acidulated fish scrap making it desirable to determine the amount of soluble and reverted phosphoric acid. To make a fair comparison of the several brands, all have been treated in the same way.

865. Chittenden's Dry Ground Fish was valued at $45.51 per ton in Bulletin No. 73 (p. 13). The higher valuation given to soluble and reverted phosphoric acid raises its valuation to $47.51 per ton.

Fish Fertilizers.

Station No.	Name or Brand.	Manufacturer.	Dealer.	Sampled and Sent by
865	Chittenden's Fine Ground Fish.	National Fert. Co., Bridgeport.	Manufacturer.	Station Agent.
968	Dry Ground Fish.	Quinnipiac Fert. Co., N. London,	R. B. Bradley & Co., N. Haven.	" "
1020	Mapes' Dry Ground Fish.	Mapes' F. & P. G. Co., N. Y. City.	Manufacturer.	Wm. C. Newton, Durham.
1006	Geo. W. Miles' Dry Fish Guano.	Geo. W. Miles Co., Milford.	F. Ellsworth, Hartford.	Station Agent.
1014	Dry Ground Fish.	Quinnipiac Fert. Co., N. London.	Olds & Whipple, Hartford.	Olin Wheeler, Buckland.
978	Bowker's Dry Ground Fish.	Bowker Fert. Co., N. Y. & Boston.	Coburn & Gale, Hartford.	Station Agent.
963	Preston & Son's Dried and Ground Fish Guano.	Preston & Sons, Greenpoint, L. I.	Wilson & Burr, Middletown.	" "

Fish Fertilizers.

Station No.	Name.	Nitrogen of Ammonia Salts.	Nitrogen of Organic Matters.	Soluble Phos. Acid.	*Reverted Phos. Acid.	Insoluble Phos. Acid.	Estimated value per ton.	Cost per ton.	Valuati'n exceeds Cost.
865	Chittenden's Fine Ground Fish	....	8.35	1.21	1.96	2.75	$47.51	$45.00	$2.51
968	Quinuipiac Fertilizer Co's Dry Ground Fish	....	8.50	1.33	3.43	2.22	50.17	48.00	2.17
1020	Mapes' Dry Ground Fish	.15	6.99	.42	2.94	3.80	43.11	42.00	1.11
1006	Geo. W. Miles' Dry Fish Guano	....	7.75	1.27	3.02	2.54	46.32	46.00	.32
									Cost exceeds Valuat'n.
1014	Quinnipiac Fertilizer Co's Dry Ground Fish	....	7.66	.87	2.95	3.25	45.77	46.00	.23
978	Bowker Fertilizer Co's Dry Ground Fish	.40	5.23	1.03	4.65	2.65	39.03	45.00	5.97
963	Preston & Son's Dried and Ground Fish Guano	1.04	1.90	2.96	1.72	.84	24.42	35.00	10.58

* See page 23.

963. Preston Sons' Dried and Ground Fish Guano contains rather less phosphoric acid and very much less nitrogen than is usually found in dried fish scraps.

The average cost of the samples analyzed (excepting **963**) is $45.33 per ton, the average estimated value $45.32.

Nitrate of Soda.

928. From stock of Mapes' Conn. Valley Branch, Hartford, stated not to be on sale in Connecticut.

941. Quinnipiac Fertilizer Co., New London. From stock of Wilson & Burr, Middletown. Sampled by J. M. Hubbard, Middletown.

Analyses.	928	941
Nitrogen,	15.48	15.46
Equivalent nitrate of Soda,	94.00	93.90
Cost,	$70.00	67.00
Nitrogen costs per 100 lbs.,	$22.61	21.67

Sulphate of Ammonia.

929. Sulphate of Ammonia from stock of Mapes' Connecticut Valley Branch, Hartford. Stated not to be on sale in Conn.

1018. Sulphate of Ammonia from Mapes F. & P. G. Co., New York. Sampled and sent by Michael Donovan, South Windsor.

Analyses.	929	1018
Nitrogen,	20.74	20.34
Equivalent sulphate of ammonia,	97.78	95.70
Cost per 100 lbs.,	$4.75	4.75
Nitrogen costs per 100 lbs.,	$22.90	$23.35

Both samples were of good quality. **1018** had a slight bluish tinge, due probably to the presence of a trace of cyanogen compounds insoluble in water. It contained no soluble cyanogen compounds [cyanides or sulphocyanides.] The soluble cyanides are poisonous to vegetation if applied in considerable quantity, but it is likely that their poisonous quality has been somewhat over-estimated. Maercker* found that one per cent. of ammonium sulphocyanide in a superphosphate did no damage, and 89 lbs. of it to the acre did not injure oats. Schumann on the other hand found that 178 lbs. per acre did serious injury to grass land.

* Centralblatt Ag. Chem., 1883, p. 497

Meat and Plaster.

919. Made by the Quinnipiac Co., of Wallingford. The sample consists of about $\frac{1}{3}$ meat and $\frac{2}{3}$ plaster. It contains 20.28 per cent. of water, 1.9 per cent. of nitrogen and about 65 per cent. of plaster. Allowing 18 cents per lb. for the nitrogen and 40 cents per 100 lb. for the plaster, its estimated value is $12.04 per ton.

Cotton Seed and Castor Pomace.

Analyses and Valuations.

880. Castor Pomace, manufactured by Robert B. Brown Oil Co., St. Louis, Mo. Sampled and sent by Geo. D. Martinez, General Agent.

935. Castor Pomace, manufactured by the Collier White Lead and Oil Co., St. Louis, Mo. Sampled from stock of Olds & Whipple, Hartford, by Station Agent.

966. Castor Pomace manufactured by H. J. Baker & Bro. Sampled from stock of A. W. Allen, Jr., Thompsonville, by Station Agent.

1002. I. X. L. Pomace, manufactured by Robt. B. Brown Oil Co., St. Louis, Mo. Sampled from stock of F. Ellsworth, by Station Agent.

876. Cotton Seed Meal, from the stock of G. C. Richards & Co., Unionville. Sampled and sent by Wm. Smith, Plainville.

1053. Cotton Seed Meal, from stock of E. Ellsworth, Hartford. Sampled and sent by H. S. Frye, Poquonock.

1054. Cotton Seed Meal, from stock of E. Ellsworth, Hartford. Sampled and sent by A. E. Holcomb, Poquonock.

Analyses and Valuations.

Station No.	Nitrogen.	Phosphoric Acid.	Potash.	Estimated value per ton.	Cost per ton.
880	5.64	1.87	.93		$23.00
935	5.76	2.07	1.03	$24.10	23.00
1002	5.50	2.10	1.06	23.22	23.00
966	4.58	1.59	1.07	19.31	20.00
876	6.95	2.51	1.91	29.65	31.00
1053	7.39	2.84	1.24	31.06	30.00
1054	7.25	3.07	1.37	30.94	30.00

Potash Salts.

Analyses and Valuations.

[See page 60.]

Four of the samples analyzed are high grade muriates, supplying potash at 3.9 to 4.4 cents per pound, and seven are kainit in which the potash costs from 5.8 to 7.4 cents per pound, or 6½ cents on the average.

During last spring kainit sold in N. Y. in ton lots at point of shipment for cash, at from \$10 to \$12.60. This included bags and cartage. (Bulletin XXVII, N. J. Experiment Station.) It was therefore possible for farmers in the central and western parts of the State at least, to get it for considerably less than \$15 to \$18, the price charged by Connecticut dealers.

Below are given complete analyses of the three potash fertilizers which are most used here at the present time. The analyses of Muriate of Potash and Double Sulphate of Potash and Magnesia were made by Dr. Goessmann, and published in Bulletin No. 3, of the Mass. Experiment Station, pp. 5 and 6. The kainit is No. **937**, analyzed at this Station.

Analyses of Potash Salts.

	Muriate.	Potash and magnesia sulphate.	Kainit.
Moisture at 100°,	2.88	4.90	15.30
Potash,	50.35	24.94	12.23
Soda,	8.33	2.09	16.05
Lime,		1.15	.43
Magnesia,	.40	11.30	11.16
Oxide of iron and alumina,			.25
Sulphuric acid,	.18	46.99	22.26
Chlorine,			27.98
Insoluble matter,	.60	.54	.26
Other matters not specified in the analysis,	37.26*	8.09	
			105.92
Deduct oxygen equivalent to chlorine,			6.31
	100.00	100.00	99.61

From these analyses it appears that the high grade muriate consists of about 80 per cent. of potassium chloride (muriate), 16 per cent. of sodium chloride (salt), and 4 per cent. of water and

* Mostly Chlorine.

various other matters. The double sulphate of potash and magnesia contains 46 to 47 per cent. of potassium sulphate, 33 to 34 per cent. of magnesium sulphate, 5 per cent. of water and 15 per cent. of sulphates of soda and lime, and other matters. Kainit contains about 85 per cent. of sulphates and chlorides of potassium, sodium and magnesium and 15 per cent. water.

Saltpeter Refuse.

853. From stock of S. J. Archer, 194 Duane street, New York. Sampled and sent by S. S. Green, New Milford, Ct.

Analysis.

*Nitric acid (N_2O_5),	4.44
Chlorine,	54.41
Potash,	4.27
Soda,	48.21
Insoluble matters,	.88
	112.21
Deduct oxygen equivalent to chlorine,	12.26
	99.95

* Nitrogen 1.15.

The compounds probably existing in this refuse are:

Potassium nitrate (saltpeter),	8.31
Potassium chloride,	.61
Sodium chloride (salt),	90.20
Insoluble matter,	.88
	100.00

It is a mixture of nine parts of salt and less than one part of saltpeter and is probably a waste product from some manufacturing process. Its cost is $10 per ton on cars in New York. Allowing 4¼ cents per lb. for the potash and 20 cents per pound for the nitrogen, its estimated value would be $8.23. It could be safely used only in moderate quantity since for every pound of saltpeter applied, 10 pounds of salt would also be applied. [If the price were lower, those who *salt* their meadows would find this an excellent material for the purpose.]

Potash Salts.

Station No.	Name.	Importer.	Dealer.	Sampled and Sent by
931	Muriate of Potash.	H. J. Baker & Bros., New York.	Southmayd & Gardiner, Middletown.	Station Agent.
930	" " 80 per cent.	----------	Mapes' Conn. Valley Branch, Hartford.	" "
943	" "	Quinnipiac Fertilizer Co., New London.	Wilson & Burr, Middletown.	J. M. Hubbard, Middletown.
932	" "	H. J. Baker & Bros., New York.	S. J. Hall, Meriden.	Station Agent.
933	Acorn Brand German Potash Salts.	Williams, Clark & Co., N. Y.	F. Ellsworth, Hartford.	" "
938	Kainit.	H. J. Baker & Bros., New York.	H. K. Brainard, Thompsonville.	J. Thompson, Broad Brook.
940	"	Bowker Fertilizer Co.	" " "	" "
937	" (Leopoldshall).	----------	Mapes' Branch, Hartford.	Station Agent.
917	"	----------	Navassa Phosphate Co., N. Y.	J. M. Millbank, Greenfield Hill.
934	"	Quinnipiac Fertilizer Co., New London.	Olds & Whipple, Hartford.	Station Agent.
936	"	----------	Usher & Tinker, Plainville.	" "

Analyses.

	931	930	943	932	933	938	940	937	917	934	936
Potash	54.26	57.82	52.29	51.55	12.59	12.97	11.80	12.23	12.24	12.45	11.52
Equivalent Muriate of Potash	85.94	91.58	82.82	81.65	----	----	----	----	----	----	----
" Sulphate of Potash	----	----	----	----	23.30	23.98	21.80	22.62	22.63	23.09	21.30
Cost	$42.00	45.00	42.00	45.00	15.00	15.00	15.00	18.00	16.00	15.00	17.00
Potash costs per 100 lbs.	$ 3.87	3.89	4.01	4.36	5.90	5.78	6.36	7.36	6.54	6.02	7.38

Plaster.

894. Plaster; ground by Knickerbocker Plaster Mills, New York; sold by Ruggles & Clark, Shelton, Ct. Sampled by Station Agent.

949. Plaster.

1028. Double Ground Land Plaster. J. B. King & Co., New York. From stock of R. B. Bradley & Co., New Haven.

849. Nova Scotia Land Plaster, ground by G. W. Miller, Middlefield.

858. Nova Scotia Land Plaster, ground by V. C. & C. V. King, New York City.

850. Onondaga Land Plaster, ground by E. B. Alvord & Co., Jamesville, N. Y.

1029. A. A. Union Ground Plaster, Whitmore Bros., Boston. From stock of J. A. Paine, Danielsonville.

1030. Nova Scotia Land Plaster, Newburgh Plaster Works, N. Y. From stock of Wilcox & Judd, Bristol.

1031. Pure Ground Nova Scotia Plaster, John Hurd, Bridgeport. From stock of G. H. Alvord & Co., Winsted.

949, 849, 858, and **850** were sent by Harvey Elliott, North Guilford, the other samples were taken by Station agents.

It will be noticed that **894** and **949** consist of burned and unburned plaster in approximately equal proportions.

Onondaga Plaster, **850,** contains, as usual, over 20 per cent. of carbonates. The Nova Scotia variety is a purer sulphate of lime. **1030** has a larger percentage of carbonate than is commonly present in Nova Scotia plaster.

A correspondent inquires:

"1st. What is the comparative value of Cayuga and Nova Scotia plaster as fertilizers?

"2d. Are the carbonates found in Cayuga plaster of any value in agriculture, and if so, how much?"

It was replied in substance: Commercially considered, the plaster that gives us the most sulphate of lime for the money is the best, provided the pulverization is equal; agriculturally the same is true in general. Carbonate of lime sometimes, no doubt, may act well where sulphate of lime would be pronounced useless and in such a case the Cayuga plaster would be better than the Nova

Plaster-Analyses.

	894	949	1028	849	858	850	1029	1030	1031
Sulphuric acid	52.20	52.08	46.08	43.65	43.98	34.38	44.66	40.84	44.86
Water	8.57		19.30				19.85	18.47	20.02
Insoluble in acids	.98	.51	.54	1.88	2.67	4.64	2.56	.99	2.57
Lime		(36.61)							
Undetermined	1.71	.56	1.81	4.28	2.77	†21.44	1.43	†11.20	0.97
Hydrated sulphate of lime (gypsum)	40.94	48.88	92.21	93.84	94.56	73.92	96.01	87.81	96.46
Sulphate of lime (anhydrite or burned plaster)	56.37	50.05	5.44						
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Pure gypsum equivalent to total sulphate of lime	112.23	111.97	99.07						
Cost per ton	$11.50	----	*$15.00	$8.00	$5.50	$6.00	$10.00	$8.00	$9.00

* Reckoned from price per bag of 200 lbs.

† Chiefly carbonate of lime.

Scotia. But carbonate of lime is much commoner and ought to be much cheaper than sulphate; so that there is entire propriety in insisting on the superiority of a pure over an impure article in any *general* statement or comparison. If a farmer ordering ground plaster should have ground limestone supplied him at $8 to $10 per ton he would feel abused even though the result on his crops were as good as it would have been had he got what he ordered. Carbonate may help the crops and at the same time outrage the moral sense.

Limestone Rock.

Four samples of this material have been analyzed at the request of Professor B. F. Koons of the Storrs Agricultural School.

Professor Koons has kindly communicated the following particulars with regard to them, as well as the analysis of a fifth sample made by Professor J. H. Washburn of the Storrs School.

Analyses of Limestones.

	Near Bolton Notch.		Lebanon.	N. W. of Norwich.	No. Stonington. Analysis by Prof. J. H. Washburn.
	944	**945**	**946**	**947**	
Insoluble in acids	1.73	80.26	46.51	32.24	4.39
Oxide of iron and alumina,	1.50	5.71	4.78	7.56	2.57
Lime,	53.51	6.67	26.65	22.82	31.17
Magnesia,	.54	.98	.92	.60	17.80
Phosphoric acid,	.07	.09	.09	.15	
Carbonic acid and undetermined matter,	42.65	6.29	21.05	16.63	44.07
	100.00	100.00	100.00	100.00	100.00
Carbonate of lime,	95.56	11.91	47.59	40.75	55.66
Carbonate of magnesia	1.13	2.06	1.93	1.26	37.38

"Nos. **944** and **945** are from a large layer occurring on the east side of the ridge through which the N. Y. and N. E. railroad cuts at Bolton Notch, about twelve miles east of Hartford.

"No. **945** was taken from the walls of the cut where the layer is about fifty feet thick and resembles the adjoining massive and schistose rocks so much that it was only by the aid of acid that the presence of lime was detected. At the center of this layer the effervescence was very decided with dilute hydrochloric acid, but this character was less marked as the top or bottom of the layer was approached. I am not certain as to just where in the fifty feet layer No. 945 was taken, although I think from near the middle.

"No. **944** comes from a series of old abandoned hydromica slate quarries on the east side of the ridge extending for half a mile or more south from the railroad cut. The quarries have exposed the limestone in considerable quantities, yet at no place could I find the whole thickness of the layer as it is in the cut at the railroad.

"The stone varies considerably in character, some of it resembling that exposed in the cut, and again in places thin layers of highly crystalline, almost pure white, limestone occur. No. **944** comes from one of these layers about three inches thick. Just to the north of the railroad there is a larger bluff of this limestone and the outcrop can be traced a mile or more to the north.

"No. **946** was taken from a line of boulders in the town of Lebanon. These may have been carried there from the outcrop near Willimantic, possibly from Bolton, yet the direction of the line would indicate that they came from neither of these localities, but from some place not yet discovered, between these, and to the north of where the boulders are found.

"No. **947** is from a very extensive bed about three miles to the northwest of the city of Norwich. This doubtless is the most extensive exposure of limestone in Eastern Connecticut, as the outcrop extends two and a half or three miles along the brow of a hill, and at an old "Gold Mine" a layer fifty feet thick is exposed. The rock is deceptive in appearance, looking much like gneiss and has a great deal of feldspar, intermingled also in large veins.

"Professor Forrest Shepherd showed me where some lime, burned in an indifferent way from this outcrop, and spread in a careless manner upon a grass field near the city had caused a yield of from four to six times as much grass as grew where the lime had not been placed.

"This limestone has easy transportation down hill to the railroad.

"The purest limestone of eastern Connecticut that occurs in abundance is found in very extensive beds on the line between Preston and North Stonington. The accompanying analysis by Prof. J. H. Washburn, of the Storrs Agricultural School, exhibits the chemical composition of a sample. (See Table of Analyses.) This limestone has a bluish tint, is said to cut like Italian marble, and is admired for its strength and durability. It is densely crystalline so as to exclude moisture, hence frost has but little effect upon it.

"Lime was burned here a great many years ago, and from Prof. Forrest Shepherd, with whom I visited the locality, I learn that the cement (made from this lime) having suffered eighty years' exposure, still remains firm.

"The limestone near Willimantic is underrated as to its extent in the account given of it in the Station Report for 1881, pp. 58, 59. I have made several visits to the locality, and find the beds much thicker than there reported. At one place there is a horizontal surface of fifty feet exposed, and the layers have a dip of twenty-two degrees, which would give us a bed of over eighteen feet in thickness instead of *three* feet as stated.

"The Norwich and North Stonington limestone beds are destined to become of great value to the agricultural interests of eastern Connecticut as a source of fertilizing material. The North Stonington deposits would also appear to have considerable value for architectural purposes.

Mansfield, Conn., Nov. 28th, 1883."

Rock from a Ledge in New Canaan.

With regard to this material, Edwin Hoyt, of New Canaan, wrote as follows:

"The stone came from a ledge on the land of one of our farmers, which he has had ground in the past, and finds it to make very green and luxuriant grass. * * * He says it grinds as easily as plaster, and thinks it better as a fertilizer."

The analysis is as follows:

	1027
Water at 100°,	2.15
Combined water,	9.60
Sand and undecomposed silicates,	16.19
Silica from decomposable silicates,	26.44
Oxide of iron and alumina,	8.65
Lime,	7.63
Magnesia,	24.35
Potash,	.32
Soda,	trace
Carbonic acid,	5.30
Phosphoric acid,	.04
	100.67

To Mr. Hoyt was written in substance as follows:

The excess (.67) over 100 per cent. is due to slight and unavoidable errors of analysis. The rock consists essentially of 16 per cent. of quartz and silicates which are not attacked by strong acids, 12 per cent. of carbonate of lime, and 72 per cent. of hydrous silicates of iron, alumina, lime and magnesia, with a little potash. Applied to land it would supply a considerable quantity of magnesia, probably in a form readily available to plants. It is not likely, however, that soils in your part of the State are at all deficient in magnesia, and its favorable effect on land is rather to be attributed to its furnishing lime; perhaps, also, to its mechanical action as an "amendment" and to the presence of the hydrous silicates, which have important uses in the soil, both as a source of plant food and in absorbing and retaining plant food which might otherwise pass into the subsoil out of the reach of vegetation.

Quick Lime.

Two samples of quick lime were sent by R. E. Pinney, Suffield, with the inquiry, Which is the cheaper for agricultural use?

910. Barrel lime. Costs $13.00 in Suffield.

911. Paper mill lime. Costs $10.00 to $10.50 in Suffield.

Analyses.

	910	911
Insoluble in acid,	1.40	2.85
Carbonic acid,	.30	.25
Lime,	55.33	85.08
Combined water,	3.36	6.15
Magnesia,	36.37	5.67
Other matters by difference,	3.24	
	100.00	100.00

910 is probably made from Canaan limestone, which is a carbonate of lime and magnesia (dolomite). More than one-third of it is magnesia. **911** contains nearly 30 per cent. more lime than **910.** The former is therefore the better of the two at the same price.

Waste Lime from Paper Works.

854. From F. Whittlesey's paper mill, Windsor Locks. Sampled and sent by R. E. Pinney.

ANALYSIS.

Insoluble in acid,	1.99
Oxide of iron and alumina,	.87
Lime,	45.08
Carbonic acid,	5.95
Combined water,	12.06
Water at 100°,	33.19
Undetermined,	.86
	100.00

It contains in round numbers 50 per cent. of slaked lime, 13½ per cent. of carbonate of lime, 33 per cent. of water, and 3½ per cent. of other matters. This sample had dried out somewhat before reaching the Station; the fresh material is a paste. Two and a half tons of it would not yield more slaked lime than one ton of paper mill lime **911.**

INFUSORIAL EARTH.

870. Sent by Ellis Bagley, Branford, as a "marl."

872. Sent by Joseph Sellers, Portland. Taken from the bed of a pond which dried up in the Summer. It forms a layer four to five feet deep under a bed of muck eighteen inches deep.

ANALYSES.	870	872
Silica and sand,	94.70	92.07
Loss on ignition (organic matter and water),	2.57	4.44
Oxide of iron and alumina,	2.18	3.49
Undetermined,	.55	
	100.00	100.00

These samples have no fertilizing value. The silica in them consists in part of the siliceous "skeletons" of a low order of vegetable life, which is aquatic. Such material, when free from sand, is used for fine polishing.

ASHES OF COTTON SEED HULLS.

To prepare cotton seed for grinding and pressing, it is "decorticated" or hulled. The hulls make up about half the entire weight of the seed. They have no value as food, and at the mills are used for fuel in connection with wood or coal. As the analyses show, the ash of the hulls burned alone or with some wood is very valuable as a fertilizer, containing over 20 per cent. of potash and 9 to 13 per cent. of phosphoric acid.

When burned with coal the ashes would be of very inferior value or worthless. When the ashes of the hulls can be got clean from coal ash, they are well worth the price which has been asked for them.

Below are given the analyses of two samples made here during the year, the average of seven analyses of cotton hull ashes from the market and an analysis of the pure ash, free from any wood ashes, sand, coal and carbonic acid, made by Dr. C. W. Dabney, Jr. (Rep. N. C. Exp't Station, 1882, p. 99):

	852	909	Average composition.	Pure ash of Hull.
Potash,	25.83	26.79	21.89	57.95
Lime,				7.28
Magnesia,				15.53
Oxide of iron,				1.87
Alumina,				0.45
Phosphoric acid,	12.95	9.65	10.11	4.07
Sulphuric acid,				4.18
Soluble silica,				1.67
Chlorine,				2.39
Soda, undetermined and loss,				4.61
Water,	5.69	12.10	15.02	
Insoluble in acid,		11.63	12.45	
				100.00

The solubility of the phosphoric acid in 852 and 859 was as follows:

	852	909
Phosphoric acid, soluble in water,	.90	3.49
" " " in ammonium citrate,	7.96	5.39
" " insoluble in water and am. cit.,	4.09	.77
	12.95	9.65

Composition of House Ashes.

1026. Ashes from 46¾ lbs. of Gray Birch from Holderness, N. Hampshire. The wood was 2–6 inches diameter, 18 inches long and well seasoned. The ash as analyzed weighed 1 lb. 1⅛ oz.

1032. Ashes from 105¾ lbs. of well seasoned hickory wood. Sticks 2 feet long, 2–7 inches diameter. The ash weighed 2 lbs. 2 oz.

1040. Ashes from 105¼ lbs. of well seasoned oak wood. Sticks 2 feet long, 1½ to 6 inches diameter. The ash weighed 1 lb. 1½ oz.

1051. Ashes from 55½ lbs. of well seasoned chestnut wood. Sticks 1 foot long, 6–12 inches diameter. Cut on the Station land one year ago. The ashes weighed $4\frac{4}{10}$ oz.

1032 and **1040** were from wood bought of a dealer in New Haven and probably grown in this State.

All of these woods were burned on a clean brick hearth without the addition of any other kind of fuel. The bits of charcoal, left from the fire were sifted out and burned by themselves and the ash from them was added to the other. With these analyses are given analyses of ashes from the same kinds of wood which were prepared by G. H. Glover, Esq., of North Branford, in a stove, and noticed in the report of this Station for 1879, page 45. [Nos. **253, 254, 255.**] The amount of insoluble matter [sand, etc.] in them is much larger than in the others.

Next in the table is given the average of 13 analyses of wood from household fires as reported by Dr. F. H. Storer (Bull. Bussy Institution, part III, 1874, p. 193).

The last column of the table represents the average composition of unleached Canada ashes calculated from 13 analyses published in Bulletins II and IV of the Massachusetts Agricultural Experiment Station.

	Birch.	Hickory.		Oak.		Chestnut.		Average of 13 analyses by Storer.	Canada Ashes Unleached.
	1026	**1032**	**255**	**1040**	**254**	**1051**	**253**		
Potash	8.15	7.54	4.56	9.26	9.37	3.96	3.07	8.50	5.77
Soda	.43	1.57	.53	1.38	1.92	.92	.42		
Lime	35.31	42.60	36.29	43.20	29.65	39.72	29.15		38.99
Magnesia	4.36	6.51	5.71	4.28	3.65	5.82	9.63		
Oxide of Iron and Alumina,	.73	.56	2.79	.98	3.73	2.61	5.21		
Phosphoric acid	2.30	2.19	1.63	1.92	2.42	1.69	2.51	2.04	1.17
Sulphuric acid	.39	.90	.99	.96	1.88	1.08	2.46		
Chlorine		.16	.19	.63	1.49		.17		
Carbonic acid	26.72	31.65	23.22	27.45	16.57	24.00	12.80	25.53	
Sand and Silica	10.30	3.70	18.09	7.15	22.07	15.80	26.70	6.97	7.07
Charcoal	6.65	.88	1.51	.85	1.97	2.40	3.26		
Water	4.05	1.93	4.49	1.35	5.28	1.80	4.62		11.40
Undetermined	----	----		----	----	----	----	----	----
	99.39	100.19	100.00	99.41	100.00	99.80	100.00		
Per cent. of crude ash in the wood	2.27	2.01		1.04		.50			

The two samples of chestnut ashes differ remarkably from oak, birch and hickory ashes in having very much less potash. A large number of analyses would be necessary to decide whether this difference is more than an accidental one. Canada ashes apparently have rather less potash and phosphoric acid than clean burned birch, hickory and oak, and less than the average of ashes from house fires as found by Dr. Storer.

A cord of hickory wood, as we are informed by wood dealers in this city, weighs from 3400 to 4300 lbs. and on the average about 3500 lbs. A cord of oak wood weighs from 2300 to 2400 lbs. The weight of birch and chestnut wood per cord could not be ascertained.

From these figures and the analyses, the amounts of potash and phosphoric acid recoverable in the ashes of a cord of oak and of hickory are found to be as follows:

	Oak.	Hickory.
Potash,	2.3	4.3 lbs.
Phosphoric acid,	.5	1.3

Leached Wood Ashes.

1024. Made by J. F. Bartlett, Winsted. From stock of J. L. Bartlett, Simsbury. Sampled and sent by L. G. Goodrich, Simsbury.

1038. From stock of J. E. Wardwell, Southport.

1039. From stock of N. Alvord, Southport.

The last two samples were sent by E. C. Birge of Southport.

Analyses.

	1024	**1038**	**1039**
Potash,	1.33	1.54	1.41
Soda,	1.30	.78	.63
Lime,	24.69	26.92	26.85
Magnesia,	2.63	2.70	2.10
Oxide of iron and alumina,	4.16	2.27	2.17
Phosphoric acid,	1.86	1.24	1.15
Sulphuric acid,	0.19		
Carbonic acid,	16.39	17.25	16.94
Insoluble in acids and silica,	15.60	10.19	5.81
Charcoal,	2.61	2.67	1.81
Water,	28.58	33.03	39.65
Undetermined and loss,	.66	1.41	1.48
	100.00	100.00	100.00
Weight of one bushel,		63 lbs.	62 lbs.
Cost per bushel,	19c.	14c.	14c.

All the samples are of good quality.

Swamp Muck.

842. Peat, No. 1. Taken from the middle of a swamp. The layer was over 8 feet deep.

843. Peat, No. 2. Taken from the edge of a swamp. The layer 3 feet deep.

These two samples were sent by G. M. Denison, New London, Conn.

857. Muck sent by A. P. Hine, Torrington, Conn.

1017. Muck sent by Prof. B. F. Koons of the Storrs Agricultural School, Mansfield, Conn.

Analyses.

The fresh material contains—

	842	843	857	1017
Water,	85.46	74.47	75.03	79.49
Organic and volatile matters,	13.88	10.21	17.31	18.38
Ash,	.66	15.32	7.66	2.13
	100.00	100.00	100.00	100.00
With nitrogen,	.23	.32	.46	.47

The ash contains—

	842	843	857	1017
Silica and insoluble,	.30	14.38	7.25	1.12
Oxide of iron, alumina, and phosphoric acid,		.52	.15	.26
Lime,	.12	.17	.16	.43
Magnesia,				.11
Undetermined,	.24	.25	.11	.22
	.66	15.32	7.66	2.13

The dry muck contains—

	842	843	857	1017
Organic and volatile matters,	95·46	39.95	69.32	89.62
Nitrogen,	1.58	1.24	1.84	2.30
Silica and insoluble,	2.08	56.32	29.03	5.45
Oxide of iron, alumina, etc.,		2.04	.56	1.26
Lime,	.82	.68	.64	2.10

Review of the Fertilizer Market.

Organic nitrogen in dried blood and azotin was quoted in New York *at wholesale* in November, 1882, at $19.70 to $20.10 per 100 pounds. The same prices ruled through December and January. Since then its cost in dried blood has steadily declined, and in November, 1883, stood at from $13.70 to $15.20. From March till August the cost in azotin remained at $18.90, then dropped again, and in November, 1883, it was quoted at $15.20 per 100 pounds.

According to thirteen analyses of ammonite, dried blood and fish scrap, made at the New Jersey Station in the Spring of 1883,* the average retail cost of nitrogen in those articles was $20.08 per 100 pounds.† The highest price was $22.90; the lowest, $15.50. These were *manufacturers' cash retail prices* for ton lots, including bags, but not freightage nor the charges of middlemen.

The cost of nitrogen in dried fish scrap, containing from 5.3 to 8.3 per cent. of phosphoric acid and from 2.9 to 8.5 per cent. of nitrogen, from the stock of *retail agents* in this State, has ranged from $22.70 to $48.26 per 100 pounds.

Rejecting this highest figure the average retail cost in six articles has been $24.54.

Nitrogen in four samples of castor pomace from *retail agents* in this State has cost from $17.05 to $18.76 per 100 pounds, averaging $17.79; and the average cost in three samples of cotton seed meal has been the same, $17.81.

Nitrogen in ammonia salts cost *at wholesale* in New York, in November, 1882, $22.20 per 100 pounds. Since then it has quite steadily declined, and was quoted in November last at $16.40.

In the New York and Philadelphia markets it cost *at retail in ton lots*, including packages, from $19.75 to $21.50 per 100 pounds;‡ average cost, $20.78.

Two samples from the stock of *retailers* in this State furnished nitrogen at $22.90 and $23.35.

*Bulletin XXVII, N. J. Exp't Station.

† Allowing six cents per pound for the phosphoric acid present in the goods.

‡ Bulletin XXVII, N. J. Exp't Station.

Nitrogen in nitrates has this year, as last, cost less at wholesale than in any other form. In November, 1882, it was quoted at *wholesale* in New York at $17.60 per 100 pounds. In January it rose to $17.90, fell again in May to $16.30, declined still further in the Summer, and in November, 1883, stood at $15.20 per 100 pounds.

Last Spring in New York and Philadelphia it was bought of *importers at retail in ton lots* at from $18.40 to $20.60 per 100 pounds, $19.65 on the average.

The two samples analyzed here from stock of *retail dealers* in this State furnished nitrogen at $22.61 and $21.67 per 100 pounds.

Phosphatic materials have not shown striking fluctuations. The wholesale New York quotation for *bone black* in November, 1882, was $24.50 per ton. It remained at that figure till March, declined to $21.50 in June, and has since remained steady at $22.00.

Charleston rock, crude, in New York, was quoted at $9.00 per ton in January, 1882. It fell to $8.50 in March, and still remains at that figure.

Ground bone, quoted at $33.50 in November, 1882, rose in April to $35.00, and declined in June to $32.00, where it still remains.

Sulphuric acid, 66°, was quoted at $1\frac{1}{2}$ cents per pound from November, 1882, to July, 1883, and since then has been quoted at $1\frac{5}{8}$ cents.

In plain superphosphates, containing over ten per cent. of soluble phosphoric acid, the latter has cost* $9.80 per 100 pounds *at retail for cash*, bought of the manufacturers. No allowance is made for reverted and insoluble phosphoric acid. Such an allowance would make the soluble acid cost still less.

Only two analyses of plain high grade superphosphates from the open market have been made at this Station during the year. They furnished soluble phosphoric acid at $10.02 to $11.20 per 100 pounds.

Actual potash in high grade muriate cost in New York *at wholesale* in December, 1882, $3.58 per 100 pounds, which is the highest figure for the year. In November, 1883, it was quoted at $3.20. It has *retailed* in Connecticut during 1883 for $3.87 to $4.36 per 100 pounds.

* Average of nine analyses. Bulletin XXVII, N. J. Exp't Station.

Kainit has not fallen in price. In December, 1882, it cost *at wholesale* in New York $8.62 per ton; it has been as low as $7.47, but in November last was quoted at $8.75, the highest price of the year.

Since kainit contains on the average 12½ per cent. of actual potash, the wholesale cost of potash in kainit at $8.75 per ton is $3.50 per 100 pounds. Its *retail price* in ton lots in New York and Philadelphia* was, last Spring, $4.52 per 100 pounds, but in this State it has retailed as high as $7.38.

To recapitulate: Charleston rock has remained steady, bones and bone black have fallen slightly, and oil of vitriol is a shade lower perhaps, but in general we may say that phosphoric acid is not much cheaper this year than last.

Tankage, red and black blood, azotin, nitrate of soda and sulphate of ammonia have all fallen very considerably in price. It should be, and will be possible by using care in buying, to get them at a less cost than a year ago.

Potash as muriate is a little lower this year than last; as kainit it is at present a shade higher.

The market quotations given above are taken from the "Oil, Paint and Drug Reporter," published in New York. The weekly quotations for each month are averaged, and this average is taken as the quotation for the month. The following explanations will be helpful in the examination of the market quotations, and will also serve to show the basis on which they have been interpreted in this review:

Phosphate rock, *kainit*, *bone*, *fish scrap*, *tankage*, and some other articles are quoted and sold by the ton. The seller usually has an analysis of his stock, and purchasers often control this by an analysis at the time of purchase.

Sulphate of ammonia, nitrate of soda and muriate of potash are quoted and sold by the pound, and generally their wholesale and retail rates do not differ very widely.

Blood, azotin and ammonite are quoted at so much "per unit of ammonia." A "unit of ammonia" is one per cent., or 20 pounds per ton. To illustrate: if a lot of dried blood has 7.0 per cent. of nitrogen, equivalent to 8.5 per cent. of ammonia, it is said to contain 8½ units of ammonia, and if it is quoted at $3.75 per unit, a ton of it will cost $8\frac{1}{2} \times 3.75 = \$31.88$.

The term "ammonia" is *properly* used only in those cases where the nitrogen actually exists in the form of ammonia, but it

* Bulletin XXVII, N. J. Exp't Station.

is a usage of the trade to reckon all nitrogen, in whatever form it occurs, as ammonia.

To facilitate finding the actual cost of nitrogen per pound from the cost per unit of ammonia in the market reports, the following table is given:

Ammonia at	$4.00	per unit	is equivalent	to nitrogen at	24.3	cts.	per lb.
"	3.90	"	"	"	23.7	"	"
"	3.80	"	"	"	23.0	"	"
"	3.70	"	"	"	22.4	"	"
"	3.60	"	"	"	21.8	"	"
"	3.50	"	"	"	21.2	"	"
"	3.40	"	"	"	20.6	"	"
"	3.30	"	"	"	20.0	"	"
"	3.20	"	"	"	19.4	"	"
"	3.10	"	"	"	18.8	"	"
"	3.00	"	"	"	18.2	"	"
"	2.90	"	"	"	17.6	"	"
"	2.80	"	"	"	17.0	"	"
"	2.70	"	"	"	16.4	"	"
"	2.60	"	"	"	15.8	"	"
"	2.50	"	"	"	15.2	"	"
"	2.40	"	"	"	14.6	"	"
"	2.30	"	"	"	14.0	"	"
"	2.20	"	"	"	13.4	"	"
"	2.10	"	"	"	12.8	"	"
"	2.00	"	"	"	12.2	"	"

Commercial sulphate of ammonia contains on the average 20.5 per cent. of nitrogen, though it is found to vary considerably in quality. When it has that amount of nitrogen (equivalent to 24.3 per cent. of ammonia),

At 5	cents per lb.	Nitrogen	costs	24.4	cents per lb.
" 4⅞	"	"	"	23.7	"
" 4¾	"	"	"	23.1	"
" 4⅝	"	"	"	22.5	"
" 4½	"	"	"	21.9	"
" 4⅜	"	"	"	21.3	"
" 4¼	"	"	"	20.7	"
" 4⅛	"	"	"	20.1	"
" 4	"	"	"	19.5	"
" 3⅞	"	"	"	18.9	"
" 3¾	"	"	"	18.3	"
" 3⅝	"	"	"	17.6	"
" 3½	"	"	"	17.0	"
" 3⅜	"	"	"	16.4	"
" 3¼	"	"	"	15.8	"
" 3⅛	"	"	"	15.2	"
" 3	"	"	"	14.6	"

Commercial nitrate of soda averages 95 per cent. of the pure salt or 15.6 per cent. of nitrogen.

If quoted at	3⅝	cents per lb.	Nitrogen costs	23.2	cents per lb.
"	3½	"	" "	22.3	"
"	3⅜	"	" "	21.5	"
"	3¼	"	" "	20.8	"
"	3⅛	"	" "	19.9	"
"	3	"	" "	19.2	"
"	2⅞	"	" "	18.3	"
"	2¾	"	" "	17.6	"
"	2⅝	"	" "	16.9	"
"	2½	"	" "	16.0	"
"	2⅜	"	" "	15.2	"
"	2¼	"	" "	14.4	"
"	2⅛	"	" "	13.6	"
"	2	"	" "	12.8	"

Commercial muriate of potash usually has 80 per cent. of the pure salt, or 50½ per cent. of actual potash.

If quoted at	2.00	cts. per lb.	Actual potash costs	3.96	cts. per lb.
"	1.95	"	" "	3.86	"
"	1.90	"	" "	3.76	"
"	1.85	"	" "	3.66	"
"	1.80	"	" "	3.56	"
"	1.75	"	" "	3.46	"
"	1.70	"	" "	3.36	"
"	1.65	"	" "	3.26	"
"	1.60	"	" "	3.16	"
"	1.55	"	" "	3.06	"
"	1.50	"	" "	2.96	"

The following table shows the fluctuations in the wholesale prices of a number of fertilizing materials in the New York market, during the last 27 months. The price given for each month is the average of the four weekly quotations in that month. Sulphate of ammonia is assumed to contain 20.5 per cent. and nitrate of soda 15.6 per cent. nitrogen, and muriate of potash 50½ per cent. of actual potash or 80 per cent. of the pure salt. For three months azotin and ammonite were not quoted at all.

	Cost of Nitrogen at Wholesale in: Blood. cts. per lb.	Azotin or Ammonite. cts. per lb.	Nitrate of Soda. cts. per lb.	Sulphate of Ammonia. cts. per lb.	Cost of Potash at Wholesale in: Muriate of Potash. cts. per lb.
1881. May	21.3	21.8	21.9	24.7	3.78
June	21.5	21.8	21.1	24.8	3.86
July	22.0	21.8	20.8	25.6	3.92
August	22.4	22.1	20.8	25.2	4.06
September	23.8	----	20.9	24.7	3.78
October	23.0	24.3	20.8	24.9	3.64
November	23.3	24.3	20.4	25.6	3.62
December	23.1	----	20.3	25.7	3.60
1882. January	23.0	----	19.9	25.6	3.71
February	22.3	22.2	19.8	25.6	3.60
March	19.6	20.1	18.3	25.0	3.36
April	19.7	19.7	18.4	23.8	3.24
May	19.1	19.7	18.3	22.7	3.26
June	18.9	19.7	16.9	22.4	3.28
July	19.8	19.5	16.8	22.4	3.40
August	19.5	19.5	16.8	22.4	3.52
September	19.7	20.3	17.7	22.4	3.60
October	19.7	20.1	17.8	22.3	3.56
November	19.7	20.0	17.6	22.2	3.56
December	19.7	20.1	17.6	21.8	3.58
1883. January	19.7	20.1	17.9	20.7	3.51
February	19.4	19.7	17.9	21.9	3.42
March	18.0	18.9	17.8	20.7	3.42
April	18.2	18.9	17.9	20.1	3.40
May	18.2	18.9	16.3	20.1	3.34
June	17.8	18.9	16.3	20.0	3.36
July	17.2	18.9	15.6	19.0	3.23
August	16.0	18.9	15.3	18.6	3.18
September	15.3	17.0	14.8	17.6	3.21
October	15.0	15.2	14.8	17.3	3.12
November	14.5	15.2	15.2	16.4	3.20

On the Composition of Leaves at Different Periods of Growth.

Dead leaves collected in the fall are valued for litter and as an absorbent in stables, but it is generally understood have no great fertilizing value in themselves. The experiments of Zöller and Rissmüller have shown that while in early summer the leaves contain very considerable amounts of nitrogen, phosphoric acid and potash, these substances are withdrawn into the wood of the tree with the advancing season, so that before the leaves fade they have lost the larger part of what was most valuable in them, which the tree retains for its further use. Rissmüller's investigations on the leaves of the beech tree* show that in their dry substance the highest *percentage amount* of nitrogen, phosphoric acid and potash, is found when they open in May, and this percentage quite regularly decreases till they ripen and fall, but the *absolute* amount of nitrogen, phosphoric acid and potash is greatest in July and from that time on decreases.

From an oak tree standing on a lawn at the Station, leaves were carefully picked at three different periods, as follows:

Oct. 16. The leaves were bright green and showed no signs of fading or changing color.

Nov. 13. The leaves were brown, having almost entirely lost their reddish tinge. Leaves were falling from the tree, but not rapidly. It retains part of its leaves till the buds start in the spring.

March 17. The upper branches were quite bare, but the lower ones had still many leaves.

Two samples of leaves from a chestnut tree (*Castanea vesca*) which stands on the Station land were also gathered on the following dates:

Oct. 16. The leaves were green and unfaded.

Nov. 13. The leaves were ripe and ready to fall.

The tree was nearly bare and the next day was entirely so.

ANALYSES OF THE FRESH LEAVES.

	Oak.			Chestnut.	
	Oct. 16.	Nov. 13.	Mar. 17.	Oct. 16.	Nov. 13.
Water	56.630	29.743	10.496	60.215	31.675
Albuminoids	5.287	3.403	3.898	4.314	4.215
Fiber	9.185	20.379	24.322	6.705	13.395
Non-nitrogenous Extract	24.938	39.335	52.858	23.473	42.333
Ether Extract	1.630	3.340	3.898	3.480	5.407
Ash	2.330	3.800	4.528	1.813	2.975
	100.000	100.000	100.000	100.000	100.000

* Landwirthschaft. Versuchs-Stationen XVII, 30.

The ash contains:

	Oak. Oct. 16.	Oak. Nov. 13.	Oak. Mar. 17.	Chestnut. Oct. 16.	Chestnut. Nov. 13
Potash	.326	.173	.072	.353	.384
Soda	.015	.029	.005	.016	.021
Lime	.688	1.426	1.817	.404	.864
Magnesia.	.162	.288	.284	.928	.443
Oxide of Iron	.081	.077	.119	.181	.164
Phosphoric Acid	.263	.260	.084	.186	.230
Sulphuric Acid	.060	.090	.154	.086	.149
Carbonic Acid	.418	.815	1.229	.259	.512
Silica and insoluble in acid	.317	.642	.764	.100	.208
	2.330	3.800	4.528	1.813	2.975

To facilitate comparison, these analyses are reduced to a water-free basis.

Albuminoids	12.19	4.84	4.36	10.84	6.17
Fiber	21.18	29.00	27.17	16.86	19.60
Non-nitrogenous Extract	57.50	55.98	59.06	58.99	61.93
Ether Extract	3.76	4.76	4.36	8.75	7.93
Ash	5.37	5.42	5.05	4.56	4.37
	100.00	100.00	100.00	100.00	100.00

The ash contains:

Potash	.75	.25	.08	.89	.56
Soda	.04	.04	.01	.04	.03
Lime	1.58	2.03	2.03	1.02	1.28
Magnesia	.37	.41	.32	.57	.61
Oxide of Iron	.19	.11	.13	.46	.24
Phosphoric Acid	.61	.37	.09	.47	.34
Sulphuric Acid	.14	.13	.17	.21	.22
Carbonic Acid	.96	1.16	1.37	.65	.75
Silica and insoluble	.73	.92	.85	.25	.31
	5.37	5.42	5.05	4.56	4.37

The leaves gathered on Oct. 16th had very nearly finished their assimilating function, those gathered Nov. 13th we may assume had nearly or quite ceased to lose through resorption into the wood, and those gathered March 17th represented dead leaves which had been exposed to leaching and the action of frost for nearly four months.

The green oak leaves lost between one-third and one-half of the percentage of nitrogen in their dry substance, between the time that they began to change color and the time when they became brown ("dead"). The corresponding gain is found chiefly in the fiber and also in the ether extract. The relative amount of potash in the second period is only one-third of what it is in the first, the relative amount of phosphoric acid is much less, while lime, silica and phosphoric acid are relatively more abundant.

The same changes to a less extent are noticed in the chestnut leaves, except that there is a loss instead of a gain in ether extract.

These analyses show the composition of the leaves at different periods, they do not *prove* an absolute loss of nitrogen, potash, etc., during the fading of the leaves, though such a loss no doubt occurs. The *percentage* amounts of these elements can be lessened either by the withdrawal of them from the leaves or by the further deposit of fiber, fat, etc., in the leaves.

Between Nov. 13th and March 17th, the dry matter of the oak leaves has become, pound for pound, somewhat poorer in nitrogen, fiber and ash, and the ash has lost in large part its potash and phosphoric acid. In this case the loss must be absolute as well as relative, for there can scarcely be any other than a physical connection between the leaf and the wood of the tree. The loss has been occasioned by the weathering and leaching of the leaves in the winter storms.

From the analyses of the oak and chestnut leaves gathered on Nov. 13th, it is seen that the newly fallen leaves, with about 30 per cent. of water, contained in 100 lbs:

	Oak.	Chestnut.
Nitrogen	.54 lbs.	.67 lbs.
Potash	.17	.38
Phosphoric acid	.26	.23

Stable manure with 70 per cent. of water, contains about .5 lbs. nitrogen, .4 lbs. potash and .5 lbs. phosphoric acid. While the nitrogen in stable manure is readily available, it is likely that that of fallen leaves is comparatively inert.

The amount of leaves which fall yearly, according to Ebermayer,* varies considerably, being larger in wet seasons than in dry, larger on a rich soil than on a poor one. It also varies with the thickness of the woods. Other things being equal, trees produce more foliage when standing apart than when standing in dense woods.

* Versuchs-Stationen: XVIII, 63.

Nor is the composition of the fallen leaves, at least of the ash constituents, at all constant. J. Nessler* found in the dry substance of newly fallen oak leaves, phosphoric acid and potash as follows:

	Phosphoric Acid.	Potash.
1867	.224 per cent.	.347 per cent.
1868	.073 "	.232 "

and in dry beech leaves:

1867	.360	.503
1868	.104	.282

Similar observations were made by Zöller and Rissmüller.

Composting Dead Leaves.

Under date of March 31, 1883, Mr. George A. Ross, of Jewett City, writes as follows:

I wish to make a compost heap of the following:

Dead leaves that have drifted behind a wall for the last 25 years and more, also the soil under these leaves, which is a dark brown loam filled with small roots; and unslaked lime.

1st. Now how shall I compost it?

2d. In what proportion shall I use the lime and loam?

3d. Shall I use the lime unslaked or slaked, at first?

4th. Shall I let it stand a year?

I should be very happy to hear you make any suggestion that you think will benefit me.

To Mr. Ross was replied in substance:

1st. Use fresh slaked lime.

2d. One bushel of unslaked lime to 15 or 20 of the loam would probably be an ample quantity. (1 bush. of lime to 10 of pure swamp-muck is enough.)

3d. Mix or interstratify well. Put down 20 bushels, two or three inches deep, then sprinkle on the one bushel of lime still warm from the slaking. Add another layer of loam and another of lime, and so on until the heap is several feet high.

4th. The heap may remain through a summer and may then be mixed by cutting down and shoveling over.

5th. If a bushel of salt (to six bushels of lime) be dissolved in water and the brine be used to slake the lime, the action will be

* Jahresbericht Ag. Chem., XI, 360.

much more rapid and a few weeks will suffice to set up a decomposition, when the heap may be overhauled, and the compost will be ready in a few weeks more.

6th. Instead of salt, muriate of potash may be advantageously used. It will probably act as well in the compost and will also supply indispensable potash to the crops.

The favorable effect of "salt and lime mixture" is explained in my Report on "Peat and Its Uses as Fertilizer and Fuel," page 73, as follows:

"When quick-lime is slaked with a brine of common salt (chloride of sodium), there are formed by double decomposition, small portions of caustic soda and chloride of calcium, which dissolve in the liquid. If the solution stand awhile, carbonic acid is absorbed from the air, forming carbonate of soda; but carbonate of soda and chloride of calcium instantly exchange their ingredients, forming insoluble carbonate of lime and reproducing common salt. When the fresh mixture of quick-lime and salt is incorporated with any porous body, as soil or peat, then, as Graham has shown, unequal diffusion of the caustic soda and chloride of calcium occurs from the point where they are formed, through the moist porous mass, and the result is, that the small portion of caustic soda which diffuses most rapidly, or the carbonate of soda, formed by its speedy union with carbonic acid, is removed from contact with the chloride of calcium.

Soda and carbonate of soda are more soluble in water and more strongly alkaline than lime. They, therefore, act on peat more energetically than the latter. It is on account of the formation of soda and carbonate of soda from the lime and salt mixture, that this mixture exerts a more powerful decomposing action than lime alone. Where salt is cheap and wood ashes scarce, the mixture may be applied accordingly to advantage. Of its usefulness we have the testimony of practical men."

Case of Poisoning with Paris Green.

"East Hartford, Sept. 25, 1883.

Prof. S. W. Johnson:

Dear Sir:—Here inclosed I send you a portion of the bowel of a horse for analysis, which I have very strong suspicion was poisoned. Dr. Cressy made the post-mortem examination, and is of that opinion also. An early reply will greatly oblige

Yours very truly,

Jno. E. Lathrop."

The material came to hand on the 29th of September, and was immediately examined. It contained both copper and arsenic, which, with acetic acid, are the constituents of Paris green (aceto-arsenite of copper). Paris green was, therefore, undoubtedly the cause of death.

FEEDING STUFFS.

Twenty samples of feeding stuffs have been under examination during the year, as follows:

Meal from entire corn	1	sample.
Hominy meal	6	"
Gluten meal	2	"
Wheat middlings	3	"
Shorts	1	"
Bran	1	"
Cotton seed meal	3	"
New process linseed meal	1	"
Dried grains from ale brewery	1	"
Steam-dried brewers' grains	1	"
	20	

Maize Meal and Hominy Feed.

[See Table of Analyses on page 78.]

CLVIII. Meal from entire corn. From stock of W. H. Childs, of North Manchester. Sent by H. A. Slater, of North Manchester. Price in February, 1883, $30.00 per ton. This meal is rather below the average as regards its content of fat.

The next six analyses are of "hominy feed;" also called "Baltimore meal" or "white meal." This material is a by-product in the manufacture of hominy. It consists of the hull of the corn and of the soft portions around the chit.

CLIV and CLVII were sent by Oliver Rice, of Meriden. Cost $1.30 per 100 pounds at retail, $23.00 per ton in car lots in Meriden in February, 1883.

CLX. Sent by H. A. Slater, from stock of W. H. Childs, North Manchester. Price, $25.00 per ton in February, 1883.

CLXIII. Sent by Andrew Kingsbury, Coventry. Price, $1.25 per 100 pounds (yellow corn meal retailing at $1.40).

CLXIV. Sent by N. P. Perkins, Willimantic, from stock of J. C. Bugby & Co. Price, $1.25 per 100 pounds in June, 1883 (yellow corn retailing at $1.40 per 100 pounds).

Analyses.

	Maize Meal.	Hominy Chops, Hominy Feed, Baltimore Meal or White Meal.					
	CLVIII.	CLIV.	CLVII.	CLX.	CLXIII	CLXIV.	CLXXIII.
Water	18.81	8.65	11.14	13.46	12.91	10.64	11.46
Ash	1.30	----	2.32	2.54	----	3.39	2.30
Albuminoids	8.81	8.69	9.50	9.75	9.00	8.69	7.88
Fiber	1.35	----	2.54	2.79	----	----	3.30
Nitrogen-free Extract (Starch, Sugar, etc.)	67.37	----	67.66	64.27	----	----	67.68
Fat	2.36	7.16	6.54	7.19	7.17	5.95	7.38
	100.00		100.00	100.00			100.00
Cost per ton	$30.00	$23.00*	$23.00*	$25.00			$23.00
" " 100 lbs.		$1.30	$1.30		$1.25	$1.25	$1.20

Water Free.

	CLVIII.	CLIV.	CLVII.	CLX.	CLXIII	CLXIV.	CLXXIII.
Ash	1.60	----	2.62	2.93	----	3.79	2.60
Albuminoids	10.85	9.53	10.73	11.27	10.33	9.71	8.89
Fiber	1.66	----	2.86	3.22	----	----	3.73
Nitrogen-free Extract (Starch, Sugar, etc.)	82.98	----	76.46	74.26	----	----	76.54
Fat	2·91	7.85	7.33	8.32	8.23	6.65	8.24
	100.00		100.00	100.00			100.00

* In car lots.

CLXXIII. Sent by O. L. Buell, West Simsbury, from stock of J. & H. Woodford, Avon. Cost $1.20 per 100 pounds, or $23.00 per ton in December, 1883.

On the average hominy meal contains 9.3 per cent. of albuminoids and 7.5 per cent. of fat; maize meal, 9.0 of albuminoids and 3.8 of fat: and flint corn, 10.9 of albuminoids and 4.9 of fat.

Presumably the albuminoids and fat in hominy meal are severally as digestible as they are in ordinary maize meal. They are cheaper, and the relative quantity of them, especially of the fat, is larger. For these reasons it appears that, as far as can be judged *from chemical analysis*, it is more economical at the prices given to use hominy meal in a ration than corn meal. Experience in its use must decide whether it is as healthful as maize meal, and whether in the case of milk cows it has a favorable or unfavorable effect on the milk yield, or imparts any peculiar flavor to the milk. In substituting it for corn meal, it should be considered that hominy meal contains twice as much fat as corn meal, and the ration should be modified accordingly. This large proportion of fat evidently makes it needful to use some caution as to the quantity fed.

Mr. N. P. Perkins, of Willimantic, writes that he and others of the same place, are feeding hominy meal instead of yellow corn meal to milch cows, with good results. The cows keep in excellent condition and give more milk than on yellow corn meal. The daily ration per cow is 4 quarts hominy meal, 2 quarts wheat bran and 2 quarts of "fine feed," well mixed and fed wet; one-half in the morning and the other half at night.

Mr. Perkins also feeds it to horses and hogs in the same way that maize meal is fed. But in fatting cattle it cannot be quite so freely used as the maize meal. A fatting cow which ate a peck of the latter daily became cloyed when a peck of hominy meal was substituted, and refused it altogether.

Mr. A. Kingsbury, of Coventry, also reports favorably with regard to using hominy meal for cows.

Gluten Meal.

CLV. Sent by Burdett Loomis, Hartford, February, 1883.

CLXXII. Sampled and sent by Newton & Fuller, Springfield, Mass., from their stock. Price in November, 1883, $1.40 per 100 pounds.

ANALYSES.

	CLV.	CLXXII.	Water free. CLV.	Water free. CLXXII.
Water	10.73	10.54		
Ash	.72	.67	.80	.75
Albuminoids	31.75	30.00	35.54	33.53
Fiber	1.26	.60	1.40	.67
Nitrogen-free extract	50.57	54.93	56.69	61.42
Fat	4.97	3.26	5.57	3.63
	100.00	100.00	100.00	100.00

Gluten meal is a by-product in the manufacture of glucose, which has lately come into the market. It is not easy to compare this with the ordinary kinds of feed. It ranks among concentrated feeding stuffs, because of its large content of albuminoids (or protein). Beans with 24 per cent., linseed cake with 29 per cent., and malt sprouts with 26 per cent. of albuminoids come nearest to it in respect to this, the most costly element of food. The gluten meal is, however, richer in fat than beans or malt sprouts, and much less rich than linseed and cotton seed meal. It most resembles the "new process" linseed meal, which contains on the average 35½ per cent. of albuminoids and 4½ per cent. of fat, and it is likely that its feeding value will approach that of "new process" linseed. Actual use in feeding can alone decide positively its value, which, from its source and its composition, is presumably high. Its proper use is in connection with coarse and unconcentrated foods, to supply their deficiency of albuminoids.

Dried Brewers' Grains.

CLVI. Dried grains from ale brewery. Sent by Burdett Loomis, Hartford, February, 1883.

CLXVII. "Dried Brewers' Grains for Horse and Cattle Feed." Prepared by the Concentrated Feed Company, 422 East 62d St., New York City. Sample drawn from a bag of 100 pounds presented to the Station by the company.

ANALYSES.

	CLVI.	CLXVII.	Water free. CLVI.	Water free. CLXVII.
Water	6.23	11.91		
Ash	3.31	3.63	3.53	4.11
Albuminoids	19.25	20.25	20.53	22.98
Fiber	10.24	11.60	10.92	13.17
Nitrogen-free extract	56.80	46.10	60.58	52.37
Fat	4.17	6.51	4.44	7.37
	100.00	100.00	100.00	100.00

The prejudice against brewers' grains, which has been quite general, has arisen largely from the improper feeding of them and from the fact that, being very wet, they spoil quickly and have to be brought from the brewery fresh every day or two, or else are liable to be fed sour unless pitted or ensilaged. When properly fed they give excellent results.

The Concentrated Feed Company now prepare them by drying, so that they can be kept indefinitely. In composition they differ from gluten meal by containing some 12 per cent. less of albuminoids and 10 per cent. more of fiber, with 2 per cent. more of ash.

Wheat Bran, Middlings and Shorts.

CLXVIII. Wheat bran. Sent by M. C. Dean, from stock of E. W. Spurr, Falls Village. Cost $20 per ton on cars in August, 1883.

CLXI. "White middlings." Sent by H. A. Slater, North Manchester, from stock of W. H. Childs. Cost $28 per ton in February, 1883.

CLXV and CLXVI. Wheat middlings. Sent by H. Page, Durham Center.

CLIX. Shorts. Sent by H. A. Slater, North Manchester, from stock of W. H. Childs.

Analyses.

	Bran.	Wheat Middlings.			Shorts.
	CLXVIII.	CLXI.	CLXV.	CLXVI.	CLIX.
Water	14.18	13.85	11.62	11.35	13.59
Ash	5.97	2.45	----	----	5.23
Albuminoids	12.69	15.00	14.25	14.31	13.87
Fiber	7.69	1 27	----	----	8.99
Nitrogen-free Extract	56.21	63.70	----	----	55.62
Fat	3.26	3.73	3.50	3.98	2.70
	100.00	100.00			100.00

Water Free.

	Bran. CLXVIII.	CLXI.	CLXV.	CLXVI.	Shorts. CLIX.
Ash	6.95	2.84	----	----	6.05
Albuminoids	14.79	17.41	16.11	16.15	16.05
Fiber	8.97	1.48	----	----	10.40
Nitrogen-free Extract	65.50	73.94	----	----	64.37
Fat	3.79	4.33	3.96	4.49	3.13
	100.00	100.00			100.00

CLXV and CLXVI represent two different lots of wheat middlings offered to the sender, who wished to know which was the better article. CLXVI has about one-half a per cent. more of fat in it, which, other things being equal, would make it more valuable. To Mr. Dean's inquiry with regard to the sample of wheat bran sent by him answer was made as follows:

"Your questions, as to the value for feeding and for manure of this sample, are not easy to answer. The value of bran as of any other similar kind of feed depends upon the place in the ration, bran alone being a very poor feed, while bran in suitable mixture with other fodders is very valuable. In the Reports of this Station and in "Armsby's Manual of Cattle Feeding," also in a recent book by Stewart on the same subject this matter is more or less fully discussed. You will find in the Station Report of 1881, a paper by Dr. Armsby, pp. 90 to 105, which will give you the principal points. As to the value of the manure, I can only say that the richer the food, other things being equal, the richer will be the manure. Bran contains an abundance of nitrogen and phosphates. In the mature animal these ingredients pass entirely into the manure when the animal is not increasing in weight or giving milk or nourishing young. The manure from bran fed animals will therefore be richer in these elements than that furnished by hay-fed cattle. As to feeding, one word further: but a limited, rather small amount of bran can be fed to an animal without injury to its health. The proper use of bran in a cattle ration is as an addition to common hay or other coarse feed and the coarsest feed like straw and chaff may be advantageously fed to animals when a suitable quantity of bran or similar concentrated feed is used at the same time."

Cotton Seed Meal and New Process Linseed Meal.

CLXII. Cotton Seed Meal. Sent by Wm. Smith, of Plainville, from stock of G. Richards & Co., Unionville. Cost, $31.00 per ton. Its analysis as a fertilizer will be found on page 57, No. **876.**

CLXX. Cotton Seed Meal. Sent by H. S. Frye, Poquonock.

CLXXI. Cotton Seed Meal. Sent by A. E. Holcomb, Poquonock.

These two samples were from stock of F. Ellsworth, Hartford. Cost $30.00 per ton in November, 1883.

CLXIX. New Process Linseed Meal. Made by Cincinnati Linseed Oil Co. Sample drawn Nov. 1, 1883, from five 100-lb. bags, presented by the company to this Station.

ANALYSES.

	Cotton Seed Meal.			New Process Linseed Meal.
	CLXII.	CLXX.	CLXXI.	CLXIX.
Water	----	7.61	7 29	13.35
Ash	----	6.53	6.85	6.08
Albuminoids	43.44	46.12	45.31	34.25
Fiber	----	4.90	5.32	8.00
Carbhydrates	----	21.67	21.93	37.02
Fat	----	13.17	13.30	1.30
		100.00	100.00	100.00

Water Free.

Ash	7.06	7.38	7.00
Albuminoids	49.91	48.87	39.51
Fiber	5.30	5.74	9.22
Carbhydrates	23.48	23.67	42.78
Fat	14.25	14.34	1.49
	100.00	100.00	100.00

The samples of Cotton Seed Meal are of average quality. This material has been used to some extent as a fertilizer in this State and when it has been damaged by water, smoke, etc., or has become musty, this is the only use to be made of it; but the clean fresh meal can most economically be used first as cattle food and then as a fertilizer. When the nitrogen of any such material can with small outlay of money or time be converted into milk or beef it is certainly wasteful to turn it back into the ground and after nine months or a year recover it again in vegetables or grain. That part of the cotton seed, not assimilated by the cattle is saved in their manure and may then be applied to the land.

The "new process" of preparing linseed meal effects a more complete exhaustion of the oil or fat contained in the cake after it has been pressed. Linseed "cake" as will be seen from the table following, has about 29.7 per cent. of albuminoids and 11¼ per cent. of fat. Nearly all of this fat is removed by the new process and the meal after the extraction contains, pound for pound, more albuminoids than the cake.

CLXIX contains less oil than any sample previously examined here, though the albuminoids are not proportionally high.

It is of no special advantage to the farmer that the oil should be so perfectly extracted (for a certain amount of fat is desirable in the ration), unless by this means the feed can be bought cheaper or rather unless the albuminoids, pound for pound, cost him less. The necessary fat in the ration can be then supplied in cheaper form from cotton seed.

Table of the Composition of American Feeding Stuffs.

By Dr. E. H. Jenkins.

On the following pages is given the average composition of the fodders commonly used in the country, compiled exclusively from American analyses. The compiler has aimed to bring together all analyses which have been published and could be obtained up to September 1st, 1883. Probably a few have been overlooked.

In the first column of the tables is given the total number of analyses from which the average was obtained. The probable accuracy of the average increases with the number of analyses on which it is based.

It is very desirable to know within what limits the composition of each fodder is likely to vary, and for that reason the maximum and minimum amounts of each ingredient have also been inserted in the table.

Composition of Feeding Stuffs.

Compiled from all available analyses made in this country—Posted to September 1, 1883.

Name.	Analyses.	Total Dry Matter.			Protein.*			Fat.			Nitrogen-free Extr.			Fiber.			Ash.
		Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	
Green Fodder.																	
Maize fodder	18	7.20	28.90	**17.66**	0.56	1.80	**1.29**	0.10	0.60	**.28**	3.20	17.70	**9.83**	1.90	9.80	**5.04**	1.22
Maize fodder—ensilaged	28	12.32	27.88	**19.63**	0.90	2.77	**1.47**	0.30	1.80	**.72**	5.62	14.23	**10.12**	4.04	10.02	**5.96**	1.36
Pea vine—ensilaged	1	----	----	**18.36**	----	----	**2.40**	----	----	**.80**	----	----	**7.60**	----	----	**5.57**	1.99
Rye	5	---	----	**25.3†**	2.30	3.00	**2.60**	0.60	0.70	**.65**	4.90	6.70	**5.90**	13.40	14.90	**14.30**	1.90
Sorghum leaves	3	23.30	32.70	**27.00**	2.40	3.70	**3.10**	----	-- -	----	----	----	**15.1‡**	4.30	6.80	**5.20**	3.50
Cow pea vines, green and succulent, with the pods	2	13.97	17.90	**15.94**	3.00	3.25	**3.12**	0.58	0.62	**.60**	5.34	8.46	**6.91**	2.87	4.09	**3.48**	1.83
Cow pea vines, probably after the pods were removed	1	----	----	**27.19**	----	---	**1.85**	----	----	**.21**	----	----	**7.86**	----	----	**15.27**	2.00
Soja bean vines	2	30.15	30.65	**30.40**	3.88	3.94	**3.91**	1.05	1.55	**1.30**	14.24	14.39	**14.32**	8.26	8.91	**8.58**	2.29
Carrot leaves	1	----	----	**16.70**	----	---	**4.26**	-- -	----	**.86**	----	----	**5.99**	----	----	**2.25**	3.34
Beet leaves	1	----	----	**11.16**	----	----	**2.71**	----	---	**.60**	----	----	**2.49**	----	----	**2.50**	2.83
Hay and Dry Coarse Fodder.																	
Low meadow hay	10	85.50	93.60	**89.50**	4.60	10.40	**7.70**	0.70	3.60	**2.20**	39.80	55.20	**43.60**	21.40	40.00	**30.20**	5.80
Maize fodder, field cured	9	61.00	85.20	**72.63**	3.40	5.80	**4.56**	.66	1.60	**1.29**	30.50	49.20	**38.62**	18.65	30.94	**23.76**	4.39
Meadow hay	7	----	----	**85.7†**	10.10	21.50	**12.10**	1.60	5.10	**3.10**	32.70	45.20	**39.60**	14.90	31.70	**23.00**	7.60
Low meadow hay	10	85.50	93.60	**89.50**	4.60	10.40	**7.70**	0.70	3.60	**2.20**	39.80	55.20	**43.60**	21.40	40.00	**30.20**	5.80
Salt marsh hay	11	81.40	92.80	**89.53**	4.30	7.80	**5.90**	1.63	3.10	**2.32**	34.10	53.67	**42.42**	27.00	37.90	**31.47**	7.42
Timothy hay	16	----	----	**85.7†**	4.80	9.60	**6.29**	1.10	3.30	**2.01**	39.98	48.60	**44.31**	25.10	33.35	**28.92**	4.17
Timothy and Red top	4	----	----	**85.7†**	6.00	9.00	**7.60**	1.50	2.50	**2.00**	39.20	46.90	**44.10**	24.70	28.50	**26.50**	5.50
Clover hay	8	78.18	91.53	**85.51**	8.87	13.54	**11.42**	1.47	3.10	**2.18**	35.03	45.47	**40.40**	23.79	28.64	**25.83**	5.63
Hungarian grass hay. Reckoned to average water content	6	----	----	**83.30**	5.72	10.67	**7.02**	1.30	2.47	**1.72**	34.85	42.40	**41.79**	27.30	28.94	**27.34**	5.43
Black grass hay (*Juncus gerardi*)	2	88.98	91.06	**90.02**	6.56	7.06	**6.81**	2.28	2.38	**2.33**	43.14	49.31	**46.26**	24.63	29.42	**27.01**	7.60

* Or albuminoids. † Calculated to average water content. ‡ Includes fat.

Composition of Feeding Stuffs—*Continued.*

Name.	Analyses.	Total Dry Matter.			Protein.*			Fat.			Nitrogen-free Extr.			Fiber.			Ash.
		Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	
Hay and Dry Coarse Fodder—*cont.*																	
Black grass hay, with seed	1	----	----	90.84	----	----	7.50	----	----	2.96	----	----	51.44	----	----	22.10	6.84
Buckwheat straw	2	89.50	89.60	89.60	3.30	4.40	3.80	1.40	1.70	1.60	32.10	34.50	32.20	44.90	46.80	15.90	5.10
Wheat straw	2	88.63	92.22	90.13	2.19	2.56	2.37	1.24	2.53	1.89	41.51	47.01	41.27	37.32	40.05	38.68	3.22
Oat straw	3	87.50	93.47	89.89	2.30	5.08	3.35	1.00	3.15	2.07	26.42	44.26	36.97	35.21	55.96	42.78	4.72
Rye straw	1	----	----	87.54†	----	----	6.89	----	----	2.68	----	----	35.70	----	----	34.20	8.03
Cow pea vines	1	----	----	89.78	----	----	19.81	----	----	1.13	----	----	34.98	----	----	23.66	10.20
Roots, Bulbs and Tubers.																	
Mangolds	3	7.18	8.56	7.96	1.57	1.89	1.70	.03	.51	.20	3.56	4.91	4.19	.76	.91	.82	1.05
Ruta bagas	1	----	----	12.92	----	----	1.15	----	----	.09	----	----	9.11	----	----	1.16	1.41
Turnips	1	----	----	11.11	----	----	1.34	----	----	.09	----	----	8.11	----	----	.86	.71
Carrots	2	11.18	12.15	11.67	.97	1.35	1.16	.65	.71	.68	6.86	7.39	7.13	.86	2.32	1.59	1.11
Beets	1	----	----	12.32	----	----	1.73	----	----	.21	----	----	7.61	----	----	1.69	1.05
Onions	1	----	----	14.74	----	----	2.28	----	----	.22	----	----	10.80	----	----	.76	.68
Sweet potato	1	----	----	26.61	----	----	1.28	----	----	.28	----	----	23.00	----	----	.98	1.07
Yam	1	----	----	28.77	----	----	2.06	----	----	.25	----	----	25.24	----	----	.75	.67
Fruits, Grains and other Seeds.																	
Cucumbers	1	----	----	4.30	----	----	.83	----	----	.21	----	----	1.95	----	----	.85	.46
Tomato	1	----	----	8.74	----	----	1.00	----	----	.47	----	----	5.84	----	----	.70	.73
Squash	2	4.82	5.42	5.12	.64	.68	.66	.24	.32	.28	2.95	3.54	3.24	.53	.54	.54	.40
Peas	1	----	----	21.94	----	----	1.37	----	----	.55	----	----	14.18	----	----	1.66	.88
Apples	1	----	----	15.89	----	----	.21	----	----	.28	----	----	14.26	----	----	.91	.23
Barley	9	87.40	92.80	88.90	8.60	15.70	12.40	1.50	3.20	1.80	66.70	73.00	69.30	1.30	4.20	2.90	2.50
Buckwheat	8	85.10	89.10	87.40	8.60	11.00	10.00	2.20	2.40	2.25	62.60	65.40	64.50	7.80	9.40	8.70	2.00
Cotton seed, hulls and kernel	1	----	----	92.28	----	----	15.72	----	----	18.56	----	----	29.09	----	----	25.75	3.16

* Or albuminoids.

† Calculated to average water content.

COMPOSITION OF FEEDING STUFFS—*Continued.*

Name.	Analyses.	Total Dry Matter.			Protein.*			Fat.			Nitrogen-free Extr.			Fiber.			Ash.
		Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	
FRUITS, GRAINS AND OTHER SEEDS—*cont.*																	
Cow pea	5	79.20	89.99	**85.21**	19.30	23.00	**20.77**	1.30	1.60	**1.13**	48.10	61.99	**55.75**	3.37	5.00	**4.06**	3.20
Soja bean	3	89.87	93.95	**91.41**	34.63	38.62	**36.22**	16.80	19.00	**17.92**	26.20	30.50	**28.66**	3.69	5.00	**4.24**	4.37
Doura, brown (Durha)	3	87.30	92.40	**89.00**	9.00	11.50	**10.30**	----	----	**4.20**	----	----	**69.90**	----	----	**1.50**	1.60
Maize kernel (flint)	50	81.80	95.90	**88.99**	7.90	13.70	**10.87**	3.40	7.10	**4.91**	65.00	77.30	**70.12**	0.80	2.70	**1.61**	1.45
Maize kernel (dent)	26	84.80	93.80	**88.80**	8.10	11.80	**10.50**	3.80	6.30	**4.70**	66.30	75.30	**70.20**	1.30	3.00	**1.80**	1.50
Maize kernel (sweet)	14	89.10	94.00	**91.20**	10.20	14.40	**12.20**	5.30	9.30	**8.00**	62.70	72.40	**66.90**	1.50	4.90	**2.30**	1.90
Maize kernel ("Western corn")	3	79.30	83.60	**80.90**	7.80	8.60	**8.30**	3.60	3.90	**3.70**	64.90	68.20	**66.00**	1.70	1.80	**1.75**	1.20
Maize kernel, aver. of all varieties:	100	79.30	95.90	**88.89**	7.80	15.30	**10.81**	3.40	9.30	**5.31**	61.80	77.30	**69.47**	0.90	4.90	**1.80**	1.50
Oats	21	86.50	91.10	**89.30**	8.00	14.40	**11.30**	4.10	5.80	**5.00**	57.10	66.90	**61.00**	1.50	12.90	**9.00**	3.00
Rice	10	86.00	88.60	**87.60**	5.90	8.60	**7.40**	0.30	0.60	**.40**	77.50	80.60	**79.20**	0.10	0.40	**.20**	0.40
Rye	6	86.80	91.30	**88.40**	9.50	12.10	**10.60**	1.40	2.10	**1.70**	70.70	73.90	**72.60**	1.40	2.10	**1.60**	1.90
Sorghum seed	13	83.20	90.70	**87.21**	7.70	12.66	**9.12**	2.10	4.60	**3.71**	66.80	73.60	**70.57**	1.50	3.20	**2.03**	1.81
Sorghum seed (decorticated), (see also sorghum meal below)	2	89.43	90.07	**89.75**	9.54	9.98	**9.76**	3.95	4.60	**4.27**	71.56	73.59	**72.58**	1.48	1.52	**1.50**	1.64
Wheat (winter)	58	86.20	92.50	**88.80**	8.40	14.50	**11.70**	1.30	2.70	**1.90**	68.10	81.70	**71.80**	1.20	1.90	**1.70**	1.70
Wheat (spring)	10	86.70	92.10	**89.50**	8.10	15.40	**13.00**	1.80	2.60	**2.20**	66.10	78.70	**70.60**	1.40	2.30	**1.90**	1.80
Wheat (average of all varieties)	99	86.20	92.50	**88.96**	8.10	15.94	**12.21**	1.20	2.99	**2.15**	66.10	77.70	**71.08**	1.10	2.30	**1.66**	1.86
Peanuts (without hulls)	2	93.20	93.80	**93.50**	----	----	**28.30**	41.20	51.50	**46.40**	----	----	**1.80**	----	----	**13.90**	3.30
Sword bean seed (*Canavalia gladiata*)	1	----	----	**89.63**	----	----	**26.60**	----	----	**3.12**	----	----	**53.10**	----	----	**4.13**	2.68
Chinese corn kernel	1	----	----	**92.13**	----	----	**9.63**	----	----	**3.75**	----	----	**75.50**	----	----	**1.79**	1.46
FLOUR AND MEAL.																	
Barley meal	3	83.80	86.00	**84.90**	8.80	13.90	**11.80**	0.70	2.20	**1.70**	----	----	**70.90**	----	----	**.10**	0.50
Buckwheat flour	3	85.10	87.20	**86.50**	4.20	8.00	**6.50**	0.70	1.70	**1.30**	75.80	79.40	**77.30**	0.20	0.40	**.30**	1.10

* Or albuminoids.

Composition of Feeding Stuffs—*Continued.*

Name.	Analyses.	Total Dry Matter.			Protein.*			Fat.			Nitrogen-free Extr.			Fiber.			Ash.
		Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	
Flour and Meal—*continued.*																	
Graham flour	3	86.30	87.90	**86.90**	11.30	12.40	**11.70**	1.50	1.90	**1.70**	69.80	70.00	**69.80**	1.80	2.00	**1.90**	1.80
Hominy	2	86.40	86.60	**86.50**	8.10	8.10	**8.30**	0.40	0.50	**.50**	77.10	77.20	**77.15**	0.30	0.30	**.30**	0.40
Maize meal	13	78.30	90.14	**85.49**	7.40	13.94	**9.07**	2.50	4.63	**3.82**	60.72	72.70	**69.16**	0.90	2.99	**1.87**	1.57
Oat meal	6	91.10	93.70	**92.10**	12.90	16.30	**14.70**	6.10	8.80	**7.00**	66.60	69.00	**67.50**	0.60	1.20	**.90**	2.00
Rye flour	4	86.40	87.70	**86.90**	6.00	7.10	**6.70**	0.80	0.90	**.85**	77.60	79.10	**78.30**	0.40	0.50	**.45**	0.70
Wheat flour	49	86.50	91.70	**88.40**	8.60	13.50	**11.10**	0.60	2.00	**1.10**	68.30	78.50	**75.40**	0.10	1.20	**.20**	0.60
By-Products and Refuse.																	
Apple pomace	3	22.80	27.40	**25.90**	1.00	1.70	**1.40**	1.70	2.00	**1.90**	15.70	17.00	**16.70**	3.90	5.90	**5.20**	0.70
Brewers' grains, from brewery	8	21.50	31.40	**25.35**	4.70	7.80	**5.92**	0.80	2.90	**1.91**	10.10	15.94	**12.47**	3.10	5.60	**3.97**	1.06
Brewers' grains, from Silo	1	----	----	**33.20**	----	----	**6.90**	----	----	**2.60**	----	----	**16.90**	----	----	**5.40**	1.40
Brewers' grains, kiln dried	1	----	----	**97.40**	----	----	**20.10**	----	----	**6.40**	----	----	**54.90**	----	----	**11.80**	4.00
Brewers' swill	1	----	----	**5.70**	----	----	**1.90**	----	----	**.80**	----	---	**2.00**	----	----	**.70**	0.30
Cotton seed meal,	14	90.90	94.32	**91.96**	38.69	50.81	**43.97**	11.29	18.00	**13.72**	12.70	25.19	**21.44**	3.10	11.80	**5.68**	7.15
"Hominy chops," "hominy feed," "Baltimore meal," "white meal"	5	86.50	93.20	**88.34**	9.50	10.20	**9.73**	4.45	10.20	**8.26**	61.00	71.10	**64.18**	3.20	4.80	**3.82**	2.35
Sorghum meal (from seed mostly decorticated)	1	----	----	**86.81**	----	----	**8.25**	----	----	**3.85**	----	----	**71.27**	----	----	**1.88**	1.59
Linseed cake	12	89.20	93.80	**90.96**	26.00	35.60	**29.70**	2.80	16.20	**11.25**	29.10	41.90	**35.03**	4.50	15.70	**8.54**	6.44
Linseed meal	3	87.57	92.87	**90.45**	30.88	33.95	**32.84**	4.94	6.83	**5.64**	36.54	41.11	**38.51**	7.12	8.87	**7.80**	5.66
Linseed meal ("new process")	3	87.10	90.10	**88.70**	32.00	37.60	**35.50**	2.70	5.90	**4.50**	----	----	**34.18**	----	----	**8.80**	5.80
Palm nut meal	2	89.16	93.86	**91.51**	13.63	16.01	**14.82**	6.41	18.73	**12.57**	33.80	41.66	**37.74**	21.57	23.98	**22.77**	3.61
Maize cob	9	85.60	92.80	**90.80**	1.20	2.70	**2.20**	0.10	0.90	**0.40**	45.30	59.60	**54.90**	29.80	38.30	**32.00**	1.30
Gluten meal	2	91.57	92.60	**92.13**	28.03	35.00	**31.51**	8.01	8.73	**8.37**	44.72	54.46	**49.60**	.73	3.25	**1.99**	.66
Malt sprouts	2	88.40	92.69	**90.55**	22.94	25.90	**23.92**	1.10	2.98	**2.04**	45.60	50.30	**47.86**	9.30	10.88	**10.09**	6.64

* Or albuminoids.

Composition of Feeding Stuffs—*Continued.*

Name.	Analyses.	Total Dry Matter.			Protein.*			Fat.			Nitrogen-free Extr.			Fiber.			Ash.
		Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	Min.	Max.	Aver.	
By-Products and Refuse—*continued.*																	
Rye bran	3	86.30	89.70	**87.70**	12 60	16.80	**15.26**	1.79	2.60	**2.19**	59.75	67.00	**63.12**	2.50	4.10	**3.51**	3.62
Sorghum bagasse	3	11.30	16.60	**14.50**	0.62	0.68	**0.65**	----	----	----	----	----	**10.20**	2.80	3.30	**3.10**	0.60
"Starch feed," refuse from starch manufacture	2	27.80	37.70	**32.90**	3.60	5.70	**4.60**	1.30	2.00	**1.60**	18.80	28.90	**23.80**	1.60	3.40	**2.50**	0.20
"Sugar feed," refuse from glucose manufacture (dry)	2	89.60	93.40	**91.50**	13.10	13.50	**13.30**	5.90	11.20	**8.60**	54.90	61.40	**58.10**	8.40	10.70	**9.50**	2.00
Glucose waste (wet)	1	----	---	**24.00**	----	---	**3.72**	----	----	**1.63**	----	----	**17.39**	----	----	**.75**	0.51
Vegetable ivory sawdust	1	----	----	**81.20**	----	----	**3.40**	---	---	**.70**	----	----	**68.60**	----	----	**7.50**	1.10
Wheat middlings	6	86.70	89.40	**88.20**	10.10	14.20	**12.20**	2.10	3.70	**3.00**	60 20	70.90	**65.60**	3.50	7.50	**4.80**	2.60
Wheat bran	15	86.10	91.35	**88.24**	7.80	16.88	**14.88**	2.60	5.84	**3.90**	50 41	58.90	**55.07**	5.90	16.60	**8.70**	5.69
Wheat shorts	5	87.80	89.00	**88.50**	11.10	15.10	**13.00**	2.50	4.90	**4.00**	56.30	62.30	**59.70**	6.30	10.50	**7.70**	4.10
Rice flour	1	----	----	**89.68**	----	----	**14.00**	----	----	**13.49**	----	----	**51.22**	----	----	**6.12**	4.85
Rice meal	1	----	----	**84.90**	----	----	**9.30**	----	----	**1.60**	----	----	**59.90**	----	----	**8.10**	6.00
Rice "Polish"	1	----	----	**88.79**	----	----	**12.93**	----	---	**7.69**	----	---	**62.96**	----	----	**2.41**	2.80
Rice feed	1	----	----	**89.67**	----	----	**11.43**	----	----	**11.49**	----	----	**47.20**	----	----	**9.93**	9.62
Rice bran	1	----	----	**90.70**	----	----	**12.78**	----	----	**5.23**	----	----	**62.34**	----	----	**2.00**	8.35
Rice bran "Douse"	1	----	----	**91.22**	----	----	**10.93**	----	----	**8.20**	----	----	**41.93**	----	----	**17.76**	12.40
Rice Hulls	2	91.50	92.30	**91.90**	3.12	4.68	**3.90**	0.55	0.65	**.60**	38.74	41.60	**40.17**	30.27	38.57	**34.42**	12.81
Rice straw	1	----	----	**96.34**	----	----	**4.68**	----	----	**1.74**	----	----	**50.90**	----	----	**28.31**	10.71

* Or albuminoids.

SEED TESTS.

During the year 122 samples of seeds have been tested with regard to their vitality, and many of these tests have been repeated a number of times in experimenting with new forms of apparatus and in studying the effect of temperature on germination. In this study attention has been chiefly directed to onion seed because its production is a long established business in this State, and the station is more often called upon to test this than any other kind of seed.

Onion Seed.

Within the last few years the Station has tested a considerable number of samples which were sent in by growers or wholesale dealers with information as to the variety of the seed, its age, and the locality where it was grown. These samples represented seed ready for market after winnowing and separating the small, light seed.

On the following pages are tabulated the results of those tests which were made on seed reputed to be less than one year old.

Numbers 130, 131, 138, 230, 253, 254, 255 and 258 are believed to have been more than one year old at the time of testing This is indicated by their low vitality and the fact that so large a percentage of seed remained hard at the end of the sprouting test. See Report of this Station for 1882, page 95.

Excluding these eight samples, the *vitality* of 72 samples is found to be on the average 81.8 per cent., ranging from 58.8 to 99.5 per cent., and the average weight of 79 samples, per 1000 seeds is 3.773 grams.

On only four varieties have a considerable number of tests been made. Their average vitality and weight are as follows:

Variety.	No. of tests.	Average vitality.	Average weight per 1000 seed (grams).
White Portugal	11	73.5	3.440
Wethersfield Large Red	16	80.9	3.758
Danvers Yellow	18	84.1	3.849
White Globe	10	84.0	3.836

The results of these tests show that the vitality of seed of the same variety and raised in the same geographical region

Onion Seed Tests.

Variety.	Station No.	Where raised.	When raised.	Seed sprouted.	Seed remained hard (per ct.)	1-2 sprouted seed germinated in days.	1,000 seeds weigh (grams).
Wethersfield Large Red	**224**	R. I.	1882	86.8	4.5	5	3.793
" "	**48**	Conn.	1879	92.5	7.0	4	3.910
" "	**53**	"	1879	82.3	9.0	4	3.950
" "	**131**	"	1880	75.3	18.5	4	4.284
" "	**138**	"	1880	44.3	34.5	3	4.241
" "	**225**	"	1882	75.8	4.5	5	3.754
" "	**246**	"	1882	77.3	8.0	4	3.920
" "	**247**	"	1882	73.0	17.5	4	4.217
" "	**85**	Mich.	1880	74.0	13.0	4	3.966
" "	**86**	"	1880	80.0	4.0	4	4.150
" "	**132**	"	1880	85.3	5.5	4	4.373
" "	**255**	"	1882	37.5	38.0		2.977
" "	**117**	Cal.	1880	89.5	1.0	3–7	2.890
" "	**181**	"	1882	79.5	2.0	5	2.869
" "	**226**	"	1882	70.0	7.0	8–11	3.104
" "	**46**	"	1878	92.5	4.5	5	3.737
Large Red Globe	**112**	Conn.	1879	90.5	5.0	4	3.797
" "	**228**	"	1882	86.5	9.5	5	4.493
" "	**249**	"	1882	85.5	7.0	4	4.189
" "	**182**	Cal.	1882	89.0	3.7	6	3.285
Early Large Red Globe	**227**	"	1882	75.8	7.5	6	3.506
Early Red Globe	**84**	Conn.	1880	85.8	7.2	5	4.352
" "	**229**	"	1882	72.6	13.0	6	4.004
" "	**259**	Mich.	1882	58.7	14.5	6	3.039
Second Early Red	**235**	R. I.	1882	66.2	14.5	5	3.825
Extra Early Red	**244**	Conn.	1882	75.0	12.5	4	3.990
" "	**245**	"	1882	69.0	15.0	4	4.010
" "	**240**	Cal.	1882	89.3	1.5	4	3.362
Extra Early Flat Red	**80**	Conn.	1880	82.5	12.0	5	4.485
" "	**223**	"	1882	74.0	9.0	5	4.220
" "	**183**	Cal.	1882	96.3	2.0	4	3.612
" "	**222**	"	1882	77.8	5.0	5	3.895
Extra Early	**170**	Conn.	1882	99.5	2.7	5	4.341
Danvers Yellow	**230**	R. I.	1882	35.3	30.0	5	3.347
" "	**101**	Conn.	1880	92.2	5.5	5	4.179
" "	**102**	"	1880	80.3	7.2	5	4.107
" "	**109**	"	1880	85.2	7.7	5	4.172
" "	**110**	"	1880	97.8	1.5	4	4.009

ONION SEED TESTS.

Variety.	Station No.	Where raised.	When raised.	Seed sprouted.	Seed remained hard (per ct.)	1-2 sprouted seed germinated in days.	1,000 seeds weigh (grams).
Danvers Yellow	**136**	Conn.	1880	88.5	6.5	4	4.333
" "	**133**	Mich.	1880	91.3	4.0	4	4.137
" "	**258**	"	1882	39.8	30.5	5	3.141
" "	**58**	N. Y.	1879	94.3	2.3	5	4.050
" "	**97**	"	1880	98.0	3.0	6	4.305
" "	**98**	"	1880	90.8	5.0	5	4.099
" "	**134**	"	1880	92 2	3.8	6	4.350
" "	**135**	"	1880	87.3	8.8	5	4.241
" "	**49**	"	1879	85.8	10.5	4	3.490
" "	**55**	"	1879	64.8	11.0	7	3.585
" "	**118**	Cal.	1880	88.5	0.8	4	2.662
" "	**241**	"	1882	74.8	4.0	5	3.052
" "	**242**	"	1882	78.0	9.5	4	3.990
Flat Danvers Yellow	**231**	N. Y.	1882	69.8	6.0	6	4.057
" "	**180**	Cal.	1880	94.5	0.8	5	2.981
" "	**233**	"	1882	82.3	1.0	6	3.169
Globe Danvers Yellow	**179**	"	1882	77.0	2.0	6	2.890
" "	**232**	"	1882	68.0	3.5	6	3.279
Yellow Dutch	**111**	Conn.	1880	80.0	4.8	5	3.350
"	**253**	Mich.	1882	57.3	23.0	6	3.014
White Portugal	**50**	Conn.	1879	75.8	14.0	3	3.720
"	**114**	"	1880	91.8	2.5	6	4.040
"	**115**	"	1880	88.0	7.0	5	4.190
"	**116**	"	1880	89.0	5.5	5	3.767
"	**220**	"	1882	60.0	3.5	5	3.788
"	**131**	N. Y.	1879	64.5	27.5	7	3.952
"	**256**	Mich.	1882	48.0	1.5	5	2.681
"	**257**	"	1882	69.5	14.0	6	3.254
"	**178**	Cal.	1882	73.8	2.8	5	2.605
"	**221**	"	1882	69.5	3.0	5	2.851
"	**243**	"	1882	70.0	2.5	6	3.000
White Globe	**57**	Conn.	1879	96.0	0.0	4	3.830
"	**113**	"	1880	93.8	2.0	4	4.444
"	**218**	"	1882	75.0	6.0	6	3.747
"	**219**	"	1882	70.8	7.0	6	3.946
"	**250**	"	1882	73.2	16.0	6	3.920
"	**251**	"	1882	88.7	8.0	5	4.260
"	**129**	N. Y.	1880	89.7	7.0	6	4.123
"	**254**	Mich.	1882	20.0	65.0	6	4.418
"	**177**	Cal.	1882	89.5	0.8	6	2.890
"	**217**	"	1882	77.0	0.5	6	3.258

varies considerably from year to year with the character of the season. For instance, the season of 1882 is said to have been an extremely bad one for raising seed in Michigan, and it is seen that the Michigan grown seed of that year is very light and sprouts poorly.

It is held by some growers that onion seed more than a year old raised in a favorable season gives a better crop than seed raised a year later in a poor season.

The average weight of 1000 onion seed, as found in 79 samples representing 14 "varieties" grown in different sections of the country, was 3.773 grams. The maximum weight was 4.493 grams; the minimum, 2.605 grams. From these figures we may compute the number of seeds per pound which is, in round numbers—

Average number of onion seed in the pound	12,000
Maximum number of onion seed in the pound	17,400
Minimum number of onion seed in the pound	10,000

The California grown onion seed seems to be smaller than eastern grown, and it has been found considerably lighter in all cases where it has been tested. To illustrate, the average weight of 1000 seeds of Wethersfield large red onion, Connecticut grown, in 16 trials was 3.95 grams; Michigan grown, 3 trials, 4.16 grams; California grown, 3 trials, 2.95 grams. White Portugal onion, Connecticut grown, 4 trials, 3.901 grams; California grown, 3 trials, 2.818 grams. Danvers yellow onion, Connecticut grown, 11 trials, 3.786 grams; New York grown, 5 trials, 4.236 grams; California grown, 3 trials, 3.234 grams, etc., etc.

The temperature most suitable for the germination of onion seed in laboratory tests has been made the subject of experiment. Haberlandt* has observed the germinating power of 56 species of seeds and the rapidity of their germination at 62°, 77°, 89°, 100°, 111°, 122° F., but onion seed was not among the number. In each trial made at this station three lots of two hundred seeds each were placed in three sprouting beds of the kind described below, and left to germinate at 51°, 60° and 85° F., respectively. These temperatures were not entirely constant, but the fluctuations were inconsiderable. A maximum and minimum thermometer stood with each apparatus, and the figures given are the average temperature. From time to time the seeds already sprouted were counted and removed.

* Landwirthsch. Versuchs-Stationen, xvii, 104.

Following are the results:

Station No.	Variety.	Per cent. of seed sprouted at 51° F.	60°	85°
237	Italian	63.0	57.5	42.5
238	Italian	35.5	45.0	29.0
239	Italian	47.5	55.0	32.0
240	Extra Early Red	82.0	88.5	51.5
245	Extra Early Red	58.0	62.9	40.5
241	Yellow Danvers	78.5	83.0	45.0
242	Yellow Danvers	71.0	69.0	51.0
248	Yellow Danvers	64.5	82.5	29.0
243	White Portugal	65.0	69.0	39.0
246	Large Red Wethersfield	70.5	76.0	39.5
249	Large Red Globe	78.5	84.5	49.0
250	White Globe	77.0	77.0	50.5
251	White Globe	82.0	83.5	62.5
254	White Globe	20.5	15.5	10.0
253	Yellow Dutch	48.5	43.5	23.0
252	White Silver Skin (French)	67.0	73.0	47.0
	Average	**63.0**	**66.5**	**40.0**

It appears from these results that in every case fewer seeds germinated at 85° than at either of the lower temperatures. This difference is very decided in every instance except, perhaps, in No. 254, and amounts, on the average, to 25 per cent.

More seed germinated at 60° than at 51° in all the trials but one, No. 237. The differences, however, with the exception of No. 248, are seen to be comparatively small when it is considered that duplicate tests made at the same temperature not infrequently vary by 5 per cent.

One-half of the germinating seed sprouted within 10 days, on the average, from the beginning of the test at 51°; within 7 days at 60°, and 6 days at 85°.

The results demonstrate that a temperature not far from 60° F. is the most suitable for the germination of onion seed in the laboratory. Probably a difference of 5 degrees in either direction would make no essential difference in the results.

Lettuce Seed.

The *vitality* of 28 samples of lettuce seed, representing 23 alleged "varieties," received from wholesale dealers, and stated by them to be fresh seed, winnowed and ready for market, was, on the average, 98.3 per cent. The maximum vitality was 100 per cent.; the minimum 93 per cent. Since there was so little difference in the vitality of the samples, the results of the tests are not here given in detail. The varieties were the following: Boston Curled, Extra Boston Curled, Early Boston Curled, Boston Market, Curled Simpson, black seed; Curled Simpson, white seed; Extra Curled Simpson, Early Simpson, Butter Salad, black seed; Butter Salad, white seed; Butter Salad, yellow seed; Tennis Ball, white seed; Early Tennis Ball, Hanson's, Large India, All the Year Round, Drum Head, Cabbage, or Malta Drum Head; White Paris, Frankfort Head, Early Curled Silesia, Ferry's Prize Head, Green Fringed, Philadelphia Butter.

The weight of 1000 seeds of the samples above referred to was on the average 1.28 grams. The maximum weight, 1.56 grams; the minimum, 1.00. Most of the samples were California grown.

Four samples of Early Boston Curled and two of White Paris are not included in the averages for this reason. The White Paris seed averaged .717 grams per 1000, and the four samples of Boston Curled .808 grams per 1000. These weights it will be seen are very much lower than the minimum of all the other 28 samples.

Seeds from the U. S. Department of Agriculture.

Twenty-five varieties of vegetable seeds distributed by the Department of Agriculture last winter have been tested with the following results:

Variety.	Station No.	Seed sprouted. Per cent.	Seed remained sound. Per cent.	1-2 sprouted seed germinated in days.
Lettuce—				
Yellow Seeded Butter	184	99.0	2.0	3
Salamauder	185	98.8	1.0	3
California Gardeners'	186	95.2	0.0	6
Cabbage—				
Jersey Wakefield	187	98.8	0.0	5
Early Summer	188	96.2	3.5	5
Henderson's Early Summer	189	78.5	0.0	6
Turnip—				
Purple Top Rutabaga	190	94.8	2.0	5
Sweet German Rutabaga	191	90.3	0.0	5
Carrot—				
Long Orange	192	53.0	30.5	6
Improved Long Orange	193	52.5	24.7	7
Radish—				
Long Scarlet	194	71.7	0.0	4
White Tipped Scarlet Turnip	195	61.7	0.0	4
Peas—				
Daniel O'Rourke	163	96.0	0.0	9
Challenge	164	94.0	0.0	9
Yorkshire Hero	165	95.0	0.0	9
Improved Daniel O'Rourke	166	94.0	0.0	8
Sweet Corn—				
Early Minnesota	168	60.5	0.0	13
Early Marblehead	169	83.5	0.0	14
Onion—				
Extra Early Onion	170	95.5	3.0	5
Extra Early Red	171	53.8	33.0	6
White Portugal	172	74.5	15.5	6
Red Globe	173	31.0	39.0	6
Tomato—				
Trophy	175	45.5	?	5
Large Smooth	174	76.8	0.0	6
Acme	176	78.3	0.0	5

Most of them were of good quality as far as vitality is concerned. One sample of onion seed, 173, was evidently old and comparatively worthless. 31.0 per cent. sprouted, while 39 per cent. remained hard at the close of the test. One other sample, 171, is undoubtedly old seed.

It will be noticed that a laboratory test can only take into account three of the factors which determine the quality of a sample of seed, viz: its purity, that is, its freedom from seeds of other species of plants, its germinating power, and its weight.

At present it is not possible in most cases from such a test to decide whether the seed will produce vigorous or feeble plants, or whether it is true to name, in so far as to be free from all other varieties of the same species.

Apparatus for Testing the Vitality of Seeds.

During the year the apparatus here described has been tested and found to give perfectly satisfactory results with onion and lettuce seed. Other species of seeds have not as yet been tried in it.

The apparatus consists of a pan of copper or galvanized iron two and a half feet long, ten and a half inches wide and one and three-quarters inches deep. At one end is a small horizontal tube let into the side near the bottom, which may be closed with a cork. The pan has a slightly arched cover, two feet and four inches long, ten inches wide, with a rim three inches deep. It is provided with a handle and has two three-quarter inch orifices on top through which a thermometer can be introduced if desired, which also secures sufficient ventilation for small seed. The tiles which hold the seed to be tested are made of a very light* and coarsely-porous earthen ware which absorbs water almost as rapidly and abundantly as a sponge. This material is manufactured by S. L. Pewtress & Co., of New Haven, as a filtering medium, and is quite unlike any other earthenware that has come under our notice. Each tile is nine inches, by eight and one-half, by one and one-half. The upper surface is grooved, by help of a broad file, so as to form seven channels or beds, about one-quarter of an inch apart, running the length of the tile, each seven-eighths of an inch wide and three-sixteenths of an inch deep.

* One of them weighs, when dry, 2 pounds 11 ounces.

Each channel receives two hundred seeds, previously soaked for six to twelve hours, and a slip of paper with the proper label or number.

The water and seeds may be emptied together into the dry channel from the capsule in which they have been soaked and distributed evenly with the help of a wash bottle.

Each pan will carry three tiles or twenty-seven samples of seeds. The bottom of the pan is covered with water a quarter of an inch deep, the cover is put on and the apparatus placed where the temperature is tolerably constant and suitable for the germination of the seeds under trial.

The air in this apparatus is constantly saturated with moisture, the seed bed is also saturated but can never have water standing on it; the holes in the cover secure necessary ventilation, but the evaporation from the porous tiles is not so rapid as to reduce their temperature. These considerations and the fact that little care is necessary to keep the water supply constant, have led us to adopt this form of apparatus, after finding that the results of its use closely agreed with those obtained with moist filter paper as a sprouting medium. In sixty-six trials by the two methods a difference of ten per cent. or more occurred in four cases; the average difference was 0.7 per cent.

This sprouting apparatus thus appears to give unexceptionable results, and in convenience of use much surpasses any arrangement we have hitherto met with. For use with large seeds additional ventilation may be needful.

The Station's instructions for sampling seeds are as follows:

THE CONNECTICUT

AGRICULTURAL EXPERIMENT STATION,

NEW HAVEN, CONN.

Instructions for Sampling Seeds.

The *Purity* and *Germinating Power* of Seeds intended for Farm and Garden use are learned by examining a small average sample. From a weighed amount of seed the pure seeds are culled out and weighed, foreign matters and especially noxious seeds are identified, the vitality of the pure seed is tested by careful sprouting trials, and a report is drawn up of the results.

As the test of germinating power requires some time for its completion, a report on samples sent in cannot be ordinarily expected in less than two weeks.

The examination of *grass-mixtures* can only be undertaken in special cases. It requires a large outlay of time and labor which is not often justified by the results.

In selecting a sample for examination the greatest care should be used to have it represent accurately the whole amount from which it was taken. This result will be secured by proceeding as follows:

1. Mix well together with the hand and arm the contents of the package (bag or barrel) or packages of seed.

2. Take out five or six small handfuls or cupfuls* from various parts of the package, mix these together and take a part of this mixture for the sample.

3. Send of the smaller seeds—red top, white clover, timothy, etc., two (2) ounces; of beets, turnips, red clover, etc., four (4) ounces; of wheat and cereals, and of peas and other legumes, eight (8) ounces.

4. Samples may be sent by mail, or otherwise, prepaid, and should be *plainly labelled* and addressed to

CONN. AGRICULTURAL EXPERIMENT STATION,
New Haven, Conn.

* A small cup may be closed with the palm of the hand, forced down to the desired place, then filled and withdrawn.

Seeds sent in for gratuitous examination must be accompanied by the following form:

THE CONNECTICUT

AGRICULTURAL EXPERIMENT STATION,

NEW HAVEN, CONN.

Form for Description of Sample.

Station, No. Received at Station, 188 .

Each sample of seed sent for gratuitous examination must be accompanied by one of these Forms, with the blanks *below* filled out as fully as practicable.

This Form, filled out and sent with the sample, will serve as a label; but it should be returned *in good order* for filing in the Station Records.

Send with each sample a specimen of any printed circular, or statement that accompanies the seed or is used in its sale.

Name or label of seed,

Name and address of Producer or Importer,

Name and address of Dealer from whose stock this sample is taken,

Date of taking this Sample,

Selling price per pound or bushel,

Known or reputed age of seed,

Number of packages from which sample is taken,

Signature and P. O. address of person taking and sending the sample.

The results of the examination are reported to the party sending, on a Form, of which the following is an example:

REPORT OF SEED TEST.

CONNECTICUT

AGRICULTURAL EXPERIMENT STATION.

NEW HAVEN, CONN., 188 .

Examination of

Received 188 Station No.
From

Pure seed,		per cent. by weight.
Impurities,		per cent. by weight.
Pure seed sprouted during	days.	per cent. by number.
Pure seed decayed during	days.	per cent. by number.
Pure seed sound (unsprouted) after	days.	per cent. by number.
Of sprouted seed, ½ germinated in		days.
1000 seeds weighed		grams.
Per cent. value,		

The "per cent. value" of a sample of seed is obtained by multiplying its per cent. (by weight) of pure seed into the per cent. (by number) found, or able, to germinate, and dividing by 100. It refers the number of seeds found, or able, to germinate, from "pure seed" back upon the sample itself, in terms of per cent. In case of *perennials only* it takes account of ⅓ of the unsprouted sound seeds, the proportion which, on an average of many observations, has been found to germinate under favorable conditions.

Director

MILK.

Analyses of Milk of Ayrshire Cows.

In March last, S. M. Wells, Esq., of Wethersfield, gave the station opportunity to make analyses of a number of samples of the milk of single Ayrshire cows from his well-known herd. The results are tabulated below. Two of the analyses are incomplete as respects some ingredients.

Name of Cow.	Mysie.	Mysie Athol.	Mysie McCrae.	Flora McArthur.	Flora 34
Water,	88.40	87.45	87.66	85.83	87.24
Casein and albumin,	3.03	3.07	3.26	----	3.05
Fat,	3.17	3.78	3.82	4.96	3.74
Sugar,	4.82	4.94	4.32	4.71	----
Ash,	.58	.76	.94	----	----
	100.00	100.00	100.00		
Total solids,	11.60	12.55	12.34	14.17	12.76
Date of dropping last calf,	Oct. 26, '82.	Feb. 27, '83.	Dec. 26, '81.	Mar. 21. '83.	Mar. 6, '83.

The milk was received Mar. 28, 1883. As will be seen, three of the cows were fresh in milk, one had been four months in milk and one fifteen months.

With perhaps the exception of the milk of Flora McArthur who calved only a week before the sample was taken, the analyses show as close agreement as could be expected between analyses of the milk of a single cow on different days, or at different stages of lactation. The average total solids amount to 12.76 per cent., which shows excellent quality.

Case of Watered Milk.

In March, 1883, a sample of milk was brought to this station by the purchaser, who suspected adulteration. This suspicion was confirmed by the analysis I, see below.

It was reported to the sender that the milk might possibly be a genuine milk of extraordinary and abnormal composition, taken from a single cow; but in all probability it was rich milk (probably Jersey or Guernsey), which had been mixed with about one-third its weight of water. That to test the matter beyond all doubt a sample taken by a third party at the time of milking and known to be unwatered, might be sent for analysis; and if this trial should be refused the fact of watering would be rendered pretty certain.

A sample taken as suggested was soon afterwards analyzed with the following results, II:

	I.	II.
Specific gravity	1.024	1.030
Solids, per cent.	10.04	14.14
Fat, "	3.31	5.48

The fact of watering thus proved was not denied, and the seller made the restitution demanded.

A sample of milk from the same party taken three weeks later contained 14.28 per cent. of solids and 4.40 per cent. of fat.

Examination of Market Milk.

Incidental to the proving of a method of determining fat in milk, partial analyses have been made of fifteen samples of milk bought at groceries or meat markets in New Haven in December, 1883. The price paid in all cases was four cents a pint. The results are as follow:

No.	Solids.	Fat.
48	9.25	2.81
49	13.03	4.19
50	10.32	2.95
51	11.32	3.46
52	13.03	3.79
53	9.77	2.99
54	11.41	3.71
55	13.55	4.49
56	11.06	3.00
57	12.52	3.99
58	12.04	3.94
59	13.88	5.38
60	12.61	4.33
61	14.26	5.66
62	12.77	4.15

Three of these samples, Nos. 48, 50 and 53 have probably been skimmed or watered, one other, No. 56, is of poor quality, the rest are, no doubt, pure milk. Nos. 59 and 61 are unusually rich.

These samples were not bought primarily with the object of finding out the quality of the milk kept on hand at the places visited, and they do not accurately show it. They show only what quality of milk a purchaser is likely to get. No pains are usually taken to stir the milk thoroughly in the can before dipping out, and it may easily happen that one customer will receive rich milk and another very poor milk from the same can.

Effect of Worry on the Quality of Milk.

On May 14, Mr. Wm. F. Morgan of Woodbridge, brought to the station a sample of milk from a cow recently purchased by him and turned in with his herd. The animal was represented to be a good milker, but the quality of her milk was inferior and no cream could be got from it. A partial analysis of the milk was made with the following results:

Specific gravity,	1.031
Solids, per cent.	11.28
Fat, "	2.16

The cow had been a pet and had not previously run in a herd. It was suggested by Mr. Morgan that she might be somewhat harrassed by the other cows. It is well known that excitement or "nervousness" often has an effect on the milk secretion and that the quality was thus strikingly influenced in this case is rendered highly probable by the following analyses of two samples of milk from the same cow, taken at later dates—which show excellent quality.

	Aug. 1, '83.	Jan. 15, '84.
Water, per cent.	87.50	84.92
Solids, per cent.	12.50	15.08
Casein and albumin, per cent.	2.81	3.34
Fat, per cent.	3.94	5.54

The present State law with regard to the sale of milk is as follows:

An Act to Prevent the Adulteration of Milk.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. Whoever shall knowingly sell, supply, or bring to be manufactured to any butter or cheese manufactory in this State any milk diluted with water, or adulterated by the addition of any foreign substance, or from which any cream or milk commonly known as strippings has been taken; or whoever shall knowingly bring or supply milk to any butter or cheese manufactory that is tainted or partly sour, shall, for each offense, forfeit and pay a sum not less than twenty-five dollars nor more than one hundred dollars with cost of suit, to be sued for in a court of competent jurisdiction, for the benefit of the person or persons, firm or association, or corporation, or their assigns, upon whom such fraud shall be committed.

Sec. 2. The usual test for quality and the certificate of analysis of the director of the Connecticut Agricultural Experiment Station shall be deemed *prima facie* proof of adulteration.

Sec. 3. No person shall sell, or expose for sale any milk from which the cream or any part thereof has been removed, without distinctly and durably affixing a label, tag, or mark of metal in a conspicuous place upon the outside, and not more than six inches from the top of every can, vessel, or package containing such milk, and such metal label, tag, or mark shall have the words "Skimmed Milk" stamped, printed, or indented thereon in letters not less than one inch in height, and such milk shall only be sold or retailed out of a can, vessel or package so marked.

Sec. 4. No person shall sell or offer for sale, or shall have in possession with intent to sell or offer for sale, any impure or adulterated milk.

Sec. 5. Every person who shall violate the provisions of sections three and four of this act shall be deemed guilty of a misdemeanor, and on conviction thereof shall be fined not more than seven dollars, or be imprisoned not more than thirty days or both.

Sec. 6. A printed notice of this law shall be conspicuously posted in all public places, creameries, or factories where milk is received or sold.

Approved, April 25, 1882.

On the Determination of Nitrogen by Combustion with Calcium Hydroxide.

In a paper by the Director, published in the American Chemist for 1873 (vol. III, p. 161), it was shown that the mixture of sodium hydroxide and calcium hydroxide or oxide, proposed by Will and Varrentrapp as a reagent for converting organic nitrogen into ammonia for the purposes of analysis may be advantageously replaced by a more easily prepared mixture of sodium carbonate and calcium hydroxide. When preparing that paper some combustions were made with simple calcium hydroxide and in case of uric acid for instance, the amount of nitrogen obtained fell short of the theoretical quantity by less than one per cent. As no entirely satisfactory results were then reached by burning with simple slaked lime, it was concluded that the presence of an alkali hydroxide, which it was thought might be formed in small quantity in the process of combustion, was necessary to the complete conversion of the nitrogen into ammonia. Further trials were then contemplated but not until recently has the opportunity offered to carry them out. A series of analyses whose results are here given, demonstrate that this further simplification of the Will and Varrentrapp method applies to all those classes of substances, which are ordinarily encountered in technical work.

The calcium hydroxide was prepared from a good quality of quick lime by slaking with water in but slight excess, drying off any surplus of water at a moderate heat, rubbing gently in a mortar, passing through a sieve of $\frac{1}{25}$ inch holes and bottling in well-closed "fruit jars."

The tubes were filled and the combustions were made in the way indicated in the Report of this Station for 1878, page 116. The points to be observed are chiefly these. For the burning of 0.5 gram of substances containing 8 per cent. of nitrogen or less, a tube of 14 inches is long enough. For dried blood or albuminoids containing from 12 to 17 per cent. of nitrogen a tube 2–4 inches longer is desirable.

The mixture of substance and slaked lime must not quite half fill the tube in length-wise direction. The long anterior layer of slaked lime must be brought to a *full red heat* before heating the mixture, and must be so kept throughout the combustion.

No fumes or tarry matters, indicative of incomplete combustion, should appear in the bulb containing standard acid.

When the combustion proper is begun it may be carried on quite rapidly until completed.

The tube is cooled below a red heat before aspirating.

The ammonia from the combustion is received in standard hydrochloric acid and titrated with a standard ammonia solution, using tincture of cochineal as an indicator.

The advantages of using cochineal tincture instead of litums solution are very considerable. It can be kept unaltered indefinitely, as litmus cannot, it is not seriously affected by the presence of carbonic acid in solutions, and as an indicator it is more sensitive.

In our use of the mixture of slaked lime and sodium carbonate, the acid in the bulb-tube is frequently colored more or less deeply red. This in nowise interferes with the alkalimetry, for the red color fades as the point of neutralization is reached. In burning with simple slaked lime, the standard acid has almost invariably remained colorless, a fact which shows that the combustion with the latter is more perfect. Evidently it is highly heated water vapor which at once oxidizes the carbon and hydrogenizes the nitrogen, and the slaked lime alone, operates more effectually because it supplies more water in a given bulk of charge.

As was to be anticipated, the lime, at the full red heat to which it must be exposed, does not retain all the carbon dioxide that is formed; the gases which pass the standard acid give a copious precipitate in baryta-water. The standard acid, however, takes up from the heated gases too little carbon dioxide to sensibly affect the point of neutralization, and the entire accuracy of the determination is in no degree impaired.

The contents of the tube, after the combustion is finished, are mostly quicklime with some carbonate, since they slake strongly and effervesce slightly in dilute acid.

The following are some of the results obtained by the two methods. Soda lime here signifies the mixture of about equal bulks of sodium carbonate and slaked lime. The combustions have been executed by Mr. E. H. Farrington.

	Theory.	Soda-lime.	Slaked lime.
Crystallized potassium ferrocyanide,	19.93	19.82	19.86
Anhydrous " "	22.80	22.78	22.83
Potassium ferricyanide,	25.49	25.42	25.40
		25.46	25.42
Strychnine,	8.38		8.30
			8.32
Hippuric acid,	7.81	7.79	7.83
Dried oak leaves,	----	1.81	1.76
Dried chestnut leaves,	----	1.54	1.63
Wheat middlings,	----	2.28	2.30
Dried peat,	----	2.03	1.94
Castor pomace,	----	4.54	4.53
		2.48	2.39
"Fish and Potash,"	----	3.75	3.75
Superphosphate,	----	3.46	3.37
Bone,	----	3.93	4.02
"	----	6.70	6.61
Fish scrap,	----	7.16	7.12
" "	----	7.61	7.70
Dried blood,	----	11.79	11.88
		11.79	11.79
" "	----	11.18	11.26
		11.23	11.33

In the case of bone, fish and superphosphates, a still closer agreement would probably have been obtained by the two reagents if the materials analyzed had admitted of finer pulverization and more accurate sampling.

A considerably larger number of comparisons have been made, but in no case, except that of strychnine, was the difference greater than is indicated by the determinations above given.

The combustion of strychnine is more difficult than that of the other substances named above, and for good results it is needful to use it in small quantities, as seen from the subjoined statement.

			Soda-lime.	Slaked lime.
Strychnine,	0.5 grm.:	tube 12–14 in.	7.82	7.89
			7.85	7.98
"	0.3 "	" 14 "	7.44	
		" 20–22 "	8.14	8.14
			8.05	8.20
"	0.2 "	" 20 "	8.14*	8.25
"	0.1 "	" 20 "		8.30
				8.32

* Will & Varrentrapp's Soda-lime, made by Merck.

INDEX

COMPOUND INDEX

TO THE REPORT OF THE BOARD OF AGRICULTURE AND OF THE AGRICULTURAL EXPERIMENT STATION.

Folios starred refer to the Report of Experiment Station.