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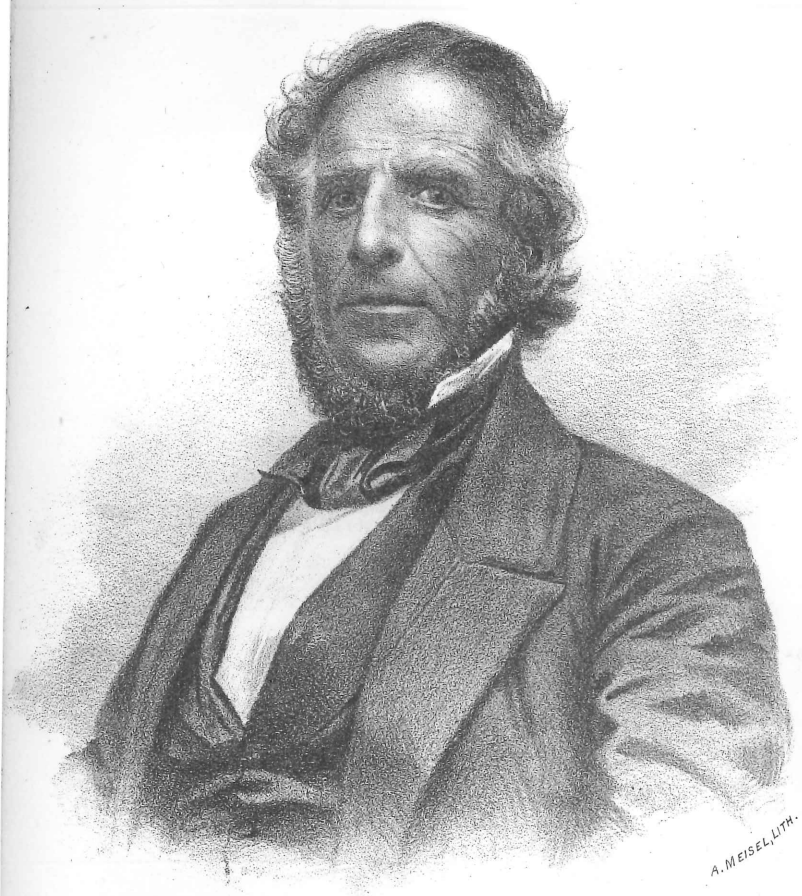

Yours truly
E. Holmes

TENTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

MAINE BOARD OF AGRICULTURE.

1865.

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1865.

BOARD OF AGRICULTURE.

JOHN F. ANDERSON, PRESIDENT.
CALVIN CHAMBERLAIN, VICE PRESIDENT.
STEPHEN L. GOODALE, SECRETARY.

NAME.	COUNTY.	P. O. ADDRESS.
(TERM EXPIRES JANUARY, 1866.)		
HARRISON JAQUITH,	Kennebec,	China.
SAMUEL JOHNSON,	Waldo,	Jackson.
SUMNER LEACH,	Lincoln,	Warren.
EBENEZER HAM,	Androscoggin,	Lewiston.
CALVIN CHAMBERLAIN,	Maine State Society,	Foxcroft.
(TERM EXPIRES JANUARY, 1867.)		
JOHN F. ANDERSON,	Cumberland,	South Windham.
GEORGE A. ROGERS,	Sagadahoc,	Topsham.
AMASA BIGELOW,	Somerset,	Bloomfield.
JOHN BACHELDER,	Oxford,	North Fryeburg.
STEPHEN L. GOODALE,	York,	Saco.
(TERM EXPIRES JANUARY, 1868.)		
ASA SMITH,	Penobscot,	Mattawamkeag.
SAMUEL WASSON,	Hancock,	Ellsworth.
EDWIN R. FRENCH,	Franklin,	Chesterville.
GEORGE H. FREEMAN,	Aroostook,	Presque Isle.
PHINEHAS M. JEFFERDS,	Piscataquis,	Foxcroft.
JOHN C. TALBOT,	Washington,	East Machias.

REPORT.

To the Senate and House of Representatives:

The members of the Board of Agriculture assembled at the Capitol, January 18th, in accordance with the provisions of law, and, a Committee on Credentials having reported a quorum present, permanent organization for the year ensuing was effected by the unanimous election of

JOHN F. ANDERSON, *President.*
CALVIN CHAMBERLAIN, *Vice President.*
S. L. GOODALE, *Secretary.*

Standing Committees were appointed as follows:

On Business Topics—Messrs. Rogers, French and Ham.

On Elections—Messrs. Chamberlain, Smith and Leach.

On Pay Roll—Messrs. Jaquith, Bigelow and Jefferds.

The rules and orders of last year were adopted for the present session.

The annual report of the Secretary for 1864 was presented and distributed.

Mr. Chamberlain presented a report from the Committee on Elections, by which it appeared that the seat from Waldo County was contested, and after discussing the points at issue, concluded with the following resolve:

Resolved, That Samuel Johnson be admitted to the Board as a member from the County of Waldo for the term of the present year.

Which resolve was adopted.

Pending the report of the Business Committee on Topics for the consideration of the Board at the present session, the following paper from Mr. Chamberlain was presented, read, and after some discussion, was placed at the disposal of the Secretary:

Questions.

Can a higher civilization be attained in Maine—her soil and climate considered—than is seen in her population to-day?

How can the physical and moral condition of our rural population be elevated?

And in what direction ought we to look for rapid and radical improvement?

CIVILIZATION is a word of widely varying signification. In this age it is well defined as being "a true perception of the laws of nature, and an intelligent adaptation of these laws to the purposes of human welfare." EDUCATION is New England's watchword. But how should our sons and daughters be educated? We would not send them among a coarse, sensual, semi-barbarous people, but rather seek to associate them with the intellectual, the refined and noble. We would surround them with the most favorable influences.

It is the aim of every good citizen, while he gets his "living," to develop himself fully. To this end no situation is more favorable than one that carries him constantly to the field—throws him in close communion with nature where every influence is pure and good. Material success is desirable, for its evidence speaks to all men in the higher general stamp of all our surroundings. To gain these is worth some effort, for they contribute to our comfort and pleasure and consequence, and they elevate us in the opinion of others. But the balance sheet of profit and loss in dollars, should not be the only test of rural improvements, or the sole inducement to agricultural labors. That economy which feeds the body well at the expense of starving the mind, is wretchedly short-sighted. A good ancient writing teaches that food and raiment are of secondary value in comparison with that which clothes and feeds the mind; that perishing worldly treasures are not to be counted with those everlasting possessions which make up our capital when we begin the life beyond the present. Another has well said, "Perhaps there are few things that mark the progress of civilization and the arts more than a correct taste in architecture and gardening. So long as men are indifferent to the appearance of the house they live in, and the grounds that surround it, they will rarely exhibit a true taste in anything else." By this standard of judgment, how stands our claim to civilization and refine-

ment? Through our wretched remissness in horticulture, how stand our morals?

In one of our country villages, with several religious societies claiming to be Christian, a citizen has made a standing offer to pay the expense of a student through a first class college, on condition that it can be proved to him there is one boy in either of their Sunday Schools who will not steal fruit. Aside from the difficulty of proving a negative, we think in that locality his money is not likely to be taken up in a hurry.

We disdain harboring opinions and feelings which lead us habitually to look on the dark side of the picture of human nature. But the honest investigator may sincerely ask, Has Christianity proved a failure? Is there a shadow of excuse for society here in New England presenting a phase of morals stamped with a coinage-mark that gives it currency inferior to that of some nations we hold as barbarians? We believe that no good reason exists that such things should be. We charge it all to the effect of loose screws in the frame-work of society. We look for a measurable remedy for these fearful evils in an improved condition of homes everywhere. Rural art and taste may, to a considerable extent, be joined to and exhibited with the practical and profitable.

During the autumn last past, we have seen many homes of men reputed wealthy, on good farms, where if any spot under the name of a kitchen garden was visible, it was but a corner of some tillage field embracing a few square rods, and noticeable only for a mass of weeds overtopping the planted crop. As an accompaniment to such an exhibition of thrift, is usually seen a slim attempt at fruit *culture* (*?*)—a few apple and cherry trees "stuck out," and no flowers. Village homes with ample lots, in many cases show but little improvement on this drear picture of farms.

Medical men teach that vegetables and fruits are conducive to health; and as most people, and especially children, are fond of garden fruits, is it not only *policy* for every land owner, but a *bounden duty* to provide a full supply for home consumption. Here we claim to have struck the root of the fearful increase of moral obliquity now coming to the surface in society. In the ho season our nature requires a liberal infusion of the vegetable in our diet. If fruits are not furnished in their season in the household, children are inclined to help themselves, even to the crossing a fence that bounds the garden of a provident neighbor. This desire

or propensity, instead of being, as sometimes charged, the promptings of a mischievous spirit, is but the healthy dictate of a physical necessity; and it is useless to attempt to restrain it by moral precepts taught from the "shorter" or the longer catechism, as it is to dam up Niagara. From the petty plunderings of fruit to supply a physical demand, the path is but an easy grade to crimes of any magnitude. Such juvenile exhibitions, instead of being chargeable to innate evil, dating back indefinitely through generations, is but the natural outgrowth of the conditions in which individuals find themselves; and the punishment—long extended—should be inflicted (in soul torture) on those who are the guilty instruments of imposing children on a community without taking the first step towards supplying the absolute, unerring, and uncontrollable demands of their nature. A nation might build its religion, theoretically, on the purest ethics, fresh from the fount of Divine wisdom —erect churches as numerous as New England school houses—educate and appoint every seventh man a priest—establish a code of laws and build prisons on a scale as terrible, and that nation would only succeed in producing generations of thieves and murderers so long as they neglected to provide for physical wants.

Had we the power to set this subject in words that would burn to the inmost souls of our countrymen, it should be the last duty discharged to our native State, to show the absolute necessity for reform here—immediate, thorough—and based, as it is, on a foundation ethical, physical, moral and sanitary. I find words beautifully in point to my purpose, written by Mr. Colman, while on his tour abroad:

"I have said and written a great deal to my countrymen about the cultivation of flowers, ornamental gardening, and rural embellishments; and I would read them a homily on the subject every day of every remaining year of my life if I thought it would induce them to make this a matter of attention and care. When a man asks me what is the use of shrubs and plants, my first impulse is to look under his hat and see the length of his ears. I am heartily sick of measuring everything by a standard of utility and profit, and heartily do I pity the man who can see no good in life but in pecuniary gain, or the mere animal indulgences of eating and drinking." "Few countries in temperate latitudes are richer in the floral kingdom of nature, and the luxuriance of vegetable growth, and the splendors of vegetable beauty, than the United States.

Why should they not be cultivated? Was the human eye, that wonder of wonders, that matchless organ of our physical constitution, that inexhaustible instrument of the most exalted and varied pleasures, made in vain? Are the forms of beauty in the natural world, so infinitely multiplied as they are around us, made for any other purpose than to be enjoyed? And what better means can we take to strengthen the domestic affections, of all others the most favorable to virtue, than to render our homes as beautiful and as attractive as possible? Who does not see constantly the influence of external circumstances upon character as well as comfort, and perceive how greatly order, exactness, and personal neatness contribute to form and strengthen the sense of moral exactness and propriety?"

We feel that any apology for the length of the above quotation would be out of place here, coming as it does from a venerable teacher of Christianity, who, in the closing years of a useful life, comprehended the entire subject of progressive civilization, and with a ready pen devoted his ripest hours to teaching that moral improvement should be sought through an improved physical condition.

In this high latitude all the elements of nature combine in demanding the highest intelligence in the culturist, the most profound education, the highest possible culture. The desired condition of mentality can only be attained through a long and persistent course of training. To improve the schools for such discipline and attainment is the work of the present.

"Every man should do his best to own a home. The first money he can spare ought to be invested in a dwelling where his family can live permanently. There is something agreeable to our better natures in having a home that we can call our own. It is a form of property that is more than property; it speaks to the heart, enlists the sentiments and ennobles the possessor. The associations that spring up around it as the birth place of children, as the scene of life's holiest emotions, as a sanctuary where the spirit cherishes its purest thoughts, tend to improve and exalt the moral sensibilities. Our happiness of to-day is increased by a view of the place where we were happy yesterday. The scenes and circumstances by which we are surrounded have much to do, not only with our character, but with our happiness. On this account we should do all in our power to make our homes attrac-

tive; to adorn them with those charms which good sense and refinement so easily impart to them."

In respect to the comforts and embellishments of homes, we see a constant improvement in our State; but when the true uses of such improvements are better understood, we hope to see their growth in an accelerated ratio. One of their first uses is the formation of a taste for the beautiful in the young. This taste, so far as it is a subject of culture at present, is very much a thing of the imagination, built upon the current literature of the day, and having a very slim foundation on the real and more tangible of home realities. This condition of things should not long be suffered. Instead of home comforts and enjoyments tending to restrain our young people and hold them to the State, they are lured abroad in search of the ideal. Increasing intelligence and taste are converting many things that once were luxuries into the comforts and the necessaries of life.

Every man who cultivates even a small garden, may add ornament to his culture—may make it contribute to his own taste for beauty—can mingle with those plants that contribute to the nourishment of the body, such as are pleasant to the sight, and as shed an agreeable fragrance around him. Wealth may be employed to create rapidly a world of beauty, but every farmer should be his own artist. Nature rarely produces a man so deficient in love for the beautiful, that by a mental effort he may not enter on its culture, and soon make it to him a source of pleasure and enjoyment. "By doing a little at a time, by adding one improvement after another, every farmer may in a few years create around him scenes whose beauty alone would amply reward him for all his labors. A garden thus formed by degrees is much more satisfactory than one produced at once by a large outlay of labor and money. The pleasure of creating it is prolonged, and the expense being a little at a time is not felt. In this way, new flowers, vegetables, and fruits are added from time to time, each giving fresh pleasure and new beauty. A garden is one of the most fruitful sources of instruction to the family. Horticulture is one of the *fine arts* which the farmer can cultivate; and while he is gratifying the love of the beautiful which nature has given him, he is also improving his intellect and his heart. The farmer needs recreation, and where will he find it better than in his garden? Time spent there will make him fonder of his home, and keep him from

temptation. Many young farmers might have been saved from ruin if they had early commenced the cultivation of a garden. Every man of taste and intelligence should seek to interest his neighbor in the subject, especially the younger portion of them. In this way communities may be influenced, and beauty, which shall increase our attachment, be added to our beloved land." *

Garden culture will surround our homes with associations of beauty, and with memories of pleasure and joy that will go with us in all our wanderings. The effect of culture on taste and character is already seen in active business men, who with their intelligent families intend some day to be farmers. It is the garden that interests them in rural employments. It is this taste for country life that is beautifying the homes of towns and cities; and this taste for the beautiful there wrought out in life pictures, to some extent finds its way into the country in feeble reflections. "It is a law of our nature that we become attached to those objects upon which we have bestowed labor, and on which we have expended care. We love the trees our hands have planted, the vines we have cultivated and trained over our doorways, and over the trellis our own hands have constructed." How emphatic this is rendered in the case of our best fruits, that are propagated only by working a portion of one tree or shrub on that of another by the process of budding or grafting. We often expend much care in obtaining desired fruits in this manner; sometimes receiving them in scions from across an ocean or continent. These, when successfully worked upon the trees, shrubs or vines of our gardens, become the pets of the household, and give enduring pleasure. Who shall be the ingenious philanthropist to devise a simple plan through which all children shall be instructed in the art of budding and grafting? It is as easily acquired as the boy's first lesson in kiteology, or the indispensable handicraft of girls. To-day there is scarcely one person in a thousand of our population who are ready operators in this simple art; whereas it should be a familiar exercise to most persons. The school-teacher,—master or miss,—at the proper season, on botanical excursions, should be competent to instruct in regard to the laws by which fruits and flowers may thus be multiplied successfully, and also to perform these operations.

* See an exhaustive essay in Report Department of Agriculture 1863, by Hon. Simon Brown.

Should our reader interpose the ever ready objection to the adoption of our ideas—the pecuniary one—if we have not already provided for the objection, we suggest that gardening is nearly allied to—is even a part of that system of culture which must sooner or later prevail in New England, now known as "high farming." Farms here must be comparatively small, and we shall be compelled to adopt the most thorough system of culture. The increasing density of population demands an increase of the fruits of the earth. Density of population and an improved husbandry are conditions favorable to self-culture. Thus the two are inseparably blended—man and his works improved, elevated and ennobled, each by the progress made in the other. We inaugurate a reform movement destined to improve humanity through the attendant physical conditions, and we solicit the aid of an engine potent to give utterance to the public will, if not to supply that will on questions of general moment—the pulpit of New England. Will that aid be withheld? When we again urge this subject on the attention of people who are prominent religionists in the dominant sects, shall we again be met, as in years past, with the exclamation—"It is of no use to raise good fruit, the boys will steal it all!" Will men continue to be ruled by a dogmatism cruel as it is unjust—striking deep to the root of their usefulness, and freezing up their innate love of kind? With a quotation from an excellent new essay, we will leave our theme with the reader.

"Cultivated flowers are evidences of high civilization; they are a sort of floral thermometer, indicating, in some degree, the intelligence and refinement of the people; and their indications are as significant as are the evidences afforded by architecture, painting, poetry, or any of the sciences. The lessons of these gentle teachers are having an influence on the habits and manners of our people. . . . . Where there are flowers I thought I could see more order about the buildings; an air of tidiness, thrift and comfort, and better farming generally; and when I entered the dwellings I found the families intelligent, comparatively refined, and not unfrequently imaginative and poetical. Strange as the assertion may sound to some, it is nevertheless true, that if these last two qualities were more generally prevalent and cultivated on the farm, they would tend to keep thousands of farmers' sons and daughters from deserting the old homestead."

What shall be our policy in regard to the future population?

Shall we see to it that our natural increase shall take that position, mentally and morally, which may be secured through the faithful discharge of our whole duty in the premises? Or shall our course hitherto be deemed good enough? Or shall we, perchance, see a scene re-enacted of which we retain some vague recollection in the musty past—when some eyes were turned to Northern Europe, or "the Lord knows where," begging for any poor specimen of humanity to come in, occupy and enjoy our goodly land. For that scene, a word of modern coinage presents itself, and persistently claims to stand as expressive of the shady side of the proposition. We turn aside for the moment, to avoid the watchful eye of courtesy, and write the word—*fogyism*. Our rural population, as the heirs of hardy pioneers, hardly yet needs another voice to be raised in preaching *labor*. We have a record of one who appeared in another clime eighteen hundred years ago, whose deep thoughts flowed gracefully and spontaneously—pure and full of wisdom, as he preached the gospel of labor. And the poor heard him "gladly," for he promised them both peace and justice. In his contrast of those in different physical conditions, we read that health bloomed on the cheeks of labor—while for the over-worked and the under-worked there was neither health nor happiness. The over-worked meditated theft, falsehood and suicide; the under-worked thought of sensuality, gaming and nightly amusements. Neither knew the serene rest of honest labor.

In taking a retrospect of man, dim shadows of error, injustice, and misery flit across his pathway, while high and holy, above the world, stands its Saviour in the *spirit* and the *power* of honest labor. In his right hand are millions of happy homes. Waste places blossom beneath his hand. Villages and cities bloom out of his footsteps. Savage men awaken to spontaneous homage. Under his sceptre the world will be changed into a paradise. First the material, then the spiritual.

CALVIN CHAMBERLAIN.

Mr. French said: There has long been a want of mental culture among farmers. They have been men of hard work, and a day spent in the culture of flowers, has been regarded as lost. Under these influences, we have been brought up. We are apt to forget that children are children, and that we ourselves were once young. What are our homes in the country? Cold, cheerless, the place

of hard labor and few pleasures. As they go out in the world, they catch glimpses of something better. Is it strange, then, that they should become dissatisfied with the farm and the home, and seek one amid more favorable influences, and one giving more pleasure. We are apt to let a greed of gain keep down and stifle our finer and purer feelings and aspirations. Thrift is commendable, but it is not rational for a man to devote all his powers to the pursuit of wealth—if so, he becomes sordid and selfish, and the moral sensibilities become hardened and blunted. Farmers are too apt to pile up money in the banks, or invest it in stocks or notes—rather than expend it in those natural beauties which give a charm and enjoyment to our children and ourselves. This is all wrong, money laid out in embellishing our homes is a good investment; it makes us happier, enriches our own minds, creates a good influence upon all around; and although it cannot all be accomplished in one year or ten—yet the work will be one of interest, and home will be the dearest place to the children who are coming upon the stage of action—and they will have less desire to go out to seek their fortunes away from the old homestead. Those who are brought up under these influences, will invariably be good citizens—each careful of the other's rights, and a sense of justice will pervade each heart. Society will become better. To the children this is a subject of much importance. By nourishing a taste for flower culture in their young minds, we are stimulating a taste, which, in after years, will result in developing him morally, physically and intellectually as a MAN.

Mr. Goodale remarked that with some of the views expressed he could most heartily concur. The free use of fruits and vegetables is conducive to health, beyond all doubt. It is as natural to desire fruits in their season as to go to the fire when cold. He believed ripe fruit in its season was requisite to health, had never known any injury resulting from its constant use; and believed it to be a bounden duty for parents to provide and keep a supply of it. Children should be induced to engage in the culture of fruit. It gives them a sense of property not otherwise acquired. If he found a boy in his garden taking fruit, he would, as he had often done—give him a currant bush, grape vine, or some other plant, and tell him how to set it out and take care of it. If this is done, the boy is cured from stealing fruit. It is really a species of moral culture, and is a most sure way of accomplishing

good. With regard to some other statements in the paper, many might be less inclined to concur, but in this case as in all similar ones under our rules, they go out as the views of the individual presenting them, and not as the utterance of the Board. The subject is a most important one, and should receive greater attention than has hitherto been given to it.

Mr. Johnson alluded to the influences of our surroundings, and the great power they exert upon the mind and character of the man. The culture of flowers appeals to a sense of order and beauty, and stimulates us to greater exertion in this direction. Even from the vegetable garden there comes a healthy moral influence, aside from contributing to the health and comfort of the farmer and his family. The grapes growing in his own garden, had been as much a source of pleasure to his wife as flowers, and the neighbors who looked at, always admired them and went home determined to have some themselves. Thus the influence of fruit and flower culture becomes contagious and productive of good.

Mr. Chamberlain presented the following resolutions:

"*Whereas,* The Secretary of the Board, in the closing pages of his last report, has appended to the papers there presented in relation to the proposed Agricultural College, several remarks and suggestions pertaining to the practical details of such an institution, it is

Resolved, That the Board heartily concur in these suggestions, and particularly endorse the 10th suggestion, relating to the advantages to be derived through courses of public lectures to be given at points distant from the location of the College.

Resolved, That it is highly desirable to organize in connection with the College, a systematic plan for the prosecution of experiments calculated to solve the doubtful points in Agricultural practice, similar to those which have been for some time in successful operation in Germany, and known as experimental stations."

Mr. Johnson remarked that the annual expense attending these experimental stations was about ten thousand dollars, as near as he could obtain correct information concerning them. This shows what the Germans are willing to do in order to sustain them, and the inference is that they must receive a benefit therefrom, corresponding with the amount expended to carry them on.

Mr. Goodale said that these "stations" had their origin, in large measure, in the necessities of the Germans, growing out of

the heavy taxes and public burdens which bore with severity upon them, and made it needful to get as much as possible from the land in order to meet these demands upon them. If we, ourselves, have not already reached a point of taxation as high as that of the Germans, we are fast drifting into it, and it becomes us to look about and find what agencies can be used to aid us in securing a greater product from our land to meet our increasing expenses. What is required to carry out this suggestion is well stated in a note lately received from Prof. S. W. Johnson of the Sheffield Scientific School, New Haven, and from which he read the following:

"What we want in my opinion is as follows:

1st. A locality with farm and laboratory and appurtenances, or the money to procure them with.

2d. A fund yielding at least $2000 to $3000 annually.

3d. A competent man of science to carry on and plan the chemical and other scientific work. This individual in order to do anything advantageously must have a three to five years training in Chemical laboratories—must be familiar with the German and French languages, and ought to have seen and worked in some of the German experimental stations so as to know their methods.

I know of one man and only one whom I could recommend for such a situation—a native of your state. Give him the facilities he should have, including one or two assistants, and he would shortly produce something good.

From such a station too much must not be expected, for great labor and much time are generally requisite to make even a little advance.

It would be worth five years' labor for the conductor of the scientific part of such an establishment to have spent six months in Germany, visiting and working in their experimental stations, which having been long established have overcome a multitude of little difficulties that would at first embarrass a beginner here, while the study on the ground of what has been done and is doing, would enlighten one as to the points that promise most immediately to reward investigation.

I sincerely hope that you will succeed in establishing such an aid to Agriculture in your State. The work I hoped to have been able to do was to spend my days in such agricultural investigation, but I shall do otherwise, and can only be comforted by seeing the work go on under other hands."

Mr. French spoke of the advantages of the system of lectures which it was proposed to establish in connection with the Industrial School, and thought much could be accomplished in this way. He believed that nothing would do so much to stir up an interest among the farmers as these lectures, and said that many would be greatly benefited by them who could not attend the course of study at the College.

Mr. Rogers, from the Business Committee, presented the following list of topics for consideration, the chairmen of which were appointed by the President:

1. The Agricultural College of Maine. Samuel Johnson.

2. Will the Board concur in the recommendation of the Commissioners appointed by the Governor, in relation to the proposed Industrial College, viz: that it be connected with Bowdoin College. E R. French.

3. To what extent should classical and literary studies enter into the course of the Industrial College, and how far should practice be combined with scientific instruction. S. L. Goodale.

4. What valid objection exists to the use of cows as animals for draft? G. H. Freeman.

5. Is the yoke as generally used for oxen, a rational or an absurd implement of draft? C. Chamberlain.

6. Should the breeding of mules be encouraged? P. M. Jefferds.

7. Manures and their application. A. Bigelow.

8. What is needed in Maine to elevate the standard and enhance the profits of her agriculturists? G. A. Rogers.

9. What is the best method of keeping pasture land in good condition? J. F. Anderson.

10. What recommendation will the Board make in regard to the collection of agricultural statistics? Ebenezer Ham.

11. What methods of tillage are best adapted to the system of mixed farming usually pursued in this State?

12. Introduction of agricultural study into common schools. H. Jaquith.

Mr. Johnson submitted the following report on the first topic:

Your Committee, to whom was assigned Topic No. 1, to wit: "The Agricultural College of Maine," in submitting their report,

would say that in the investigation of this subject, we have had in our minds constantly two leading thoughts:

1st. The wants of the industrial classes as felt by ourselves, and as we believe them to be felt by others; and

2d. The means at our disposal.

Four possible departments or schools rise up before us and claim our attention in considering this subject:

1. A preparatory school, where those students who cannot pass the required examination to enter the college department, may have an opportunity to complete their course of preparation.

2. The Agricultural College.

3. A department where the ancient and modern languages, the higher branches of mathematics, and other kindred branches of learning shall be taught.

4. A Scientific School of the highest order, rather theoretical than practical, similar to the Scientific School attached to Harvard College.

Had we the means and the hopefulness of Indiana, and contemplated appropriating $200,000, to erect suitable buildings and provide suitable cabinets and attachments, and $19,000 a year for the salaries of professors and assistants, we might indulge the imagination in an almost Aladdin's palace of scientific beauty and excellence. But our resources, estimated at $10,000 a year, demand a far different plan. And perhaps it may be better in our infancy and immaturity, to begin with more moderation. With an expensive suite of buildings, and large corps of teachers, if the expectations of the people were not met, and the plan of the projectors failed to be carried out successfully, we should all be chilled with disappointment. We would, then, dispense with the Primary Department. And when we consider the advanced state of our common schools and the great number of our high schools and academies, we think this may be done safely. Considering, too, the large number of schools we have for linguistic culture, we would leave out, for the present, the third department under contemplation. Our enterprise being in its infancy, and our means limited, we would also at present dispense with the purely scientific department.

A suggestion has been made to us indirectly by an eminent man and successful teacher, that we should open the Agricultural College to females as well as males; teaching them the best meth-

ods of making butter and cheese, the cultivation of flowers, the training and pruning of grape vines, and horticulture generally, also allowing them to listen to a large part of the lectures. But we believe that such a vision of beauty and splendor belongs rather to the future than the present. At our first start, we must avoid running, not only a too expensive machine, but also one too complicated.

We come then to the Agricultural College proper as the only subject to which we can direct our attention. The first question arising in connection with it is: For whose benefit is it to be erected? Whose wants and interests shall we consult? Whose patronage shall we seek? We answer, the gift of Congress is expressly for the *industrial* classes. If we divert the stream of this noble charity, directly or indirectly, to any other object or purpose, however worthy and useful, we prove ourselves false to the intention of the donors, and false to those who should be its recipients.

The great, leading question now arises, What do the industrial classes *want?* We answer, they want a school that is eminently *practical.* The morning gown and cane are to be laid aside, the ungloved hand by its roughness and hardness must show that it has been applied to healthful labor. We want our sons, while studying mechanics, including, of course, rural architecture, and, on account of the partially military character of the institution, civil engineering, if possible, to learn to use tools with accuracy and effect, blow following blow. We want them to be able to fit and fasten a shoe to a horse's foot in a workmanlike manner, understanding the structure of the foot and the reason why they pare the hoof and apply the shoe as they do. We want them to become practical gardeners, understanding the cultivation of flowers, the uses of the hot-bed and hot-house, the best varieties of each kind of garden vegetables, and the best manner of propagating them; we want them to learn grape culture, also to become experts in setting out, pruning, grafting, and budding the apple, pear, plum, and cherry, and, in fact, in every part and process of orchard culture. We want them to understand how to set milk, and make butter and cheese; how to take calves at a few days old from the cow and so feed them that their health and growth shall be a certainty and not an accident. We want them to become skilful butchers and understand how to cut up meat,

salt it, and cure bacon. We want them to apply *double entry* to the feeding, breeding, and raising of neat stock, horses, sheep and swine, of different breeds, so that when they come to look over the balance sheet for a series of years, they may know with some degree of certainty, what breed is best. We want them to have a good knowledge of veterinary science, so as to understand all the more common diseases of domestic animals, and the best method of treating them. We want them to understand not only the general principles of chemistry, but also practical and analytical chemistry; we want them to understand very nearly the component parts of any given portion of soil, and be able to apply fertilizers to it intelligently, and then expect pretty exact results. But we must stop, though we are far from exhausting the subject, for we have not spoken of draining, of the best use to be made of animal, vegetable, mineral and marine manures, of the training of oxen and horses, of bee culture, of sheep rearing, and many other important and practical matters which every farmer should understand. But we have said enough to show something of the nature and extent of our *wants*.

The course of thought pursued develops a marked contrast between the contemplated Agricultural College and our old colleges, both in imparting and acquiring knowledge. The process in the old college is mainly subjective—from within, outward. First the thought, the idea, then the object, if it is connected with any outward object. The process in the Agricultural College must be mainly objective, dealing with natural objects and processes, and the deductions derived from experiment. In the old colleges the student spends the most of his time sitting at his table studying text-books. While we would by no means discard text-books from the Agricultural College, yet the student must spend much of his time in practice. In the old colleges the professors do the most of their teaching sitting, with the text-book in their hands. In the Agricultural College oral instruction must preponderate, the teacher often showing the pupil how he would have him do any particular thing by doing it skilfully himself.

Let us next inquire what standard of attainments shall be required for admission to the Agricultural College? As we do not contemplate the study of the languages and of many of the higher branches of learning in our new institution, it seems proper and safe under the circumstances, to elevate the standard of required

attainments for admission. We would require of the applicant a good knowledge of reading, writing, geography, arithmetic, elementary algebra, ancient and modern history, five books in Euclid's Geometry, English composition, a sufficient knowledge of book-keeping to keep common business accounts with neatness and accuracy, and we recommend as highly desirable, a course of about one year in the study of the Latin language. That is, he should pass a satisfactory examination in the Latin Grammar, Latin Reader or its equivalent, and Sallust or its equivalent. We are disposed to urge the requirement of some knowledge of Latin, partly on account of its value in the way of mental discipline, but also because it is the readiest way to a correct understanding of the English language, for it has given to it a third part of its words in common use, and names to much of the nomenclature of the sciences.

We would fix the required age for admission at eighteen years, and the time for completing the course at from two to four years. Perhaps it would be best to commence with a three years' course, and the whole number of students limited to sixty; twenty being admitted at the commencement of the first year and the same number at the commencement of each following year. Whether this number shall be appointed among the Representative Districts or selected from the whole number presenting themselves, giving preference to those who bear the best examination, we leave for future determination.

The precise course of study to be pursued we would have, at present, to be in a great measure determined upon by the College Faculty themselves, only saying that, of the foreign Agricultural Schools, the one at Hohenheim, Germany, established by Schwartz, comes the nearest to our wishes and wants. Of American schools, the Agricultural College of Michigan is, perhaps, the best model. There appears, however, even there, too much theoretical teaching and too little practice. We would require of each student, from four to six hours of daily labor in the summer season, the labor being more for his own instruction and benefit than for profit.

We would recommend that the number of permanent teachers be at first three; a Superintendent or President and two Professors, leaving it to them to employ such lecturers, assistants and laborers as they need, and the funds placed at their disposal admit.

Almost everything depends upon the character and qualifications of these men. Could we place at the head of the institution a Schwartz, an Agassiz, or our own much loved and honored Cleveland, with his philosophical and practical turn of mind, its success would be almost sure. Such a man would create and command his own surroundings, as well as the necessary means. To secure professors of the right kind, we must pay generous salaries. Grumble as we will about it, in all our business transactions the great law of supply and demand must govern us. When we would make a purchase, we must conform to the market price. From what we have observed of the salaries paid in other colleges of a similar kind, we do not believe that men of the first class for the Presidency and two Professorships can be obtained for less than from $1500 to $2000 a year, and any other than first class men we do not want.

The extent to which military tactics should be studied and practiced, we leave for others, who are better qualified, to determine. You will observe, Mr. President, that we have made practice a *sine qua non*. We have determined that the head should not much outrun the hands. This necessarily circumscribes our field of operations. We have given preference to agricultural pursuits over mechanical, because we believe that to be the design of the donors.

In conclusion, let us express the hope that this Institution may have the general character of a *home*. That the students may not be compelled to find boarding places somewhat distant from each other, but that they and the teachers may form a community by themselves, *near* each other always, and *with* each other as much as possible.

SAMUEL JOHNSON,
For Committee.

In the course of the discussions which followed this report, Mr. Anderson spoke as follows:

Mr. President:—Is it not a significant fact that all those who are most directly interested in this agricultural and mechanical college are so unanimous in the belief that it should be a completely independent institution? Is it not a significant fact that the State Agricultural Society, at three annual meetings, have, by a formal vote, expressed the same sentiment? Is it not a very

significant fact that, after careful, earnest and thoughtful deliberation, and more than two years counsel with a large number of the farmers, mechanics and artizans of the State, upon the subject, the Board of Agriculture should have passed the same determinate resolve at two different sessions; and, already upon the third, we perceive a clear indication of the same unanimity of feeling in regard to this point. Three able reports from as many committees upon different topics relating to the general subject curiously agree upon this part of it.

Upon this second reading of the report upon the broad topic of the college itself, drawn up in a convincing and logical style, by one of old Bowdoin's own sons, I avail myself of the opportunity to offer some thoughts which occurred to me when I first heard from one of the Commissioners the proposition which had been offered before them. In common with you all, I have since enjoyed the opportunity of reading the printed copy of the propositions as formally presented, and the Commissioners' report thereon. Believing still that the thoughts are not altogether inappropriate, I offer them for what you may consider them worth. And first, I submit to you whether every position now taken here, ought not to be unequivocal and explicit. And if, as you listen, an apology be deemed necessary for any of my remarks, I beg you will find it in the fact that I sincerely believe the issue to be now met, is one of life or death to the agricultural and mechanical college of Maine.

What will ultimately redound to the greatest good of agriculture is the course for us to aim at, with clearness of vision and singleness of purpose. Questions of expediency belong not here. It is not for us to admit a willingness to sacrifice the greater good for the less. It is not for this body to pronounce what shall be, nor how it shall be. If the Legislature determines to trade away the future brightness of a constantly perfect day, for the uncertain, fitful glimmer of *ignus fatui;* or the ready, reckless promises of any jack-with-a-lantern who may seek to mislead in the haze of that day's young dawning, we cannot help it, but it becomes us not to assent beforehand to what, we believe, would be, to all concerned in such criminal weakness, a crying shame.

This Board, created to "investigate all subjects relating to agriculture, horticulture, and the arts connected therewith in this State, that its members may think proper, and to submit to the

Legislature such recommendations and suggestions as the interests of agriculture may be deemed to require," has constantly manifested a disposition to perform its duties without fear and without favor. It is not here that any underhand manœuvring has been discovered about the settlement of an agricultural college. This Board—composed of farmers and horticulturists; of men making no pretensions to great intellectual attainments, nor aspiring to high social positions, although they perhaps feel a more vital interest in this problem than any other organized body of men in this State—does not stoop to the employment of "lobby influences" upon the Legislature; nor condescend to reply to any irregular attack upon itself.

But let me call your attention now, to a bolder and more high-handed effort to obtain control of the lands—or proceeds thereof—donated to this State for the purpose of founding (according to the language of the grant) "at least one college, where the *leading object* shall be * * * to teach such branches of learning as are related to agriculture and the mechanic arts, * * * in order to promote the liberal and *practical* education of the industrial classes in the several pursuits and professions of life." I refer to propositions which have been made by our prominent colleges to the Commissioners appointed by the State Executive to consider this matter. You are aware that Waterville, Brunswick, and Lewiston appear, or have, in previous years, appeared—each striving to secure the agricultural college of Maine as an adjunct. Failing in this rivalry, they unite and propose that whatever may accrue from the Congressional grant of land, shall be divided among them, for which each will agree to teach some one or more branches of learning relating to agriculture and the mechanic arts. If the existing colleges of Maine feel sure that they each require an additional appropriation to run smoothly in their properly worn tracks, let them make a distinct appeal to the Legislature for it. We hope they may get it. *No new precedent will thus be established. We* throw no obstacles in *their* way. If they are aware that they ought to teach additional branches of learning of a more practical character, let them do that. We hope they will. But if they propose to assume only sufficient additional labor, or such a show of it, as will enable them to seize upon this appropriation from the General Government, for a new and entirely distinct institution, let them forbear, we cannot consent to it. We believe it would be an outrageous wrong.

Can anything be more evident to common sense, than that this donation was not intended for already established schools of either high or low degree; which are fostered and endowed by the State for the recognized purpose of founding a general education, suitable alike for all pursuits, and which are designed to secure such method and habits of application as will fit the student to enter upon those special studies afterwards necessary to enable him to fill his place creditably in the business world?

We see an anomalous proceeding by the General Government. The Congress of the United States has moved out of its accustomed way, and passed an act universally felt to be a decided innovation upon its old order of legislation. And what does it mean? Merely to augment the rights and privileges of already prosperous, State endowed institutions? Do you believe it? Can any one believe it? Contrary to its past spirit, our Government seeks to guide in a particular course of instruction; it furnishes the means, and points out the way. Giving heed, *at last*, to the advice of President Washington, it indicates a willingness, to a certain limited extent, to provide for the education, in their own special and peculiar pursuits, of those industrial classes of society which underlie all others, which sustain all others, and upon which all others depend for the essential requisites of life. Then is it decorous to attempt, by sophistry, an evasion of the vital principle of this design? Is it right to so transpose the terms upon which we receive this conditional gift, as to cause that to follow haltingly, which should vigorously lead? Is it honorable to fail, or *hesitate*, to meet and respond heartily to the liberal statesmanship which devised this plan to benefit the nation?

Instead of this combined effort at mis-appropriation, we might have reasonably expected the reverend presidents and learned professors of well endowed and firmly established colleges, disinterestedly, to give their aid to the farmers and mechanics of Maine, to start, in such a moderate way, an institution promising to be so peculiarly their own; to lend the advantage of their support, the benefit of their learning and of their experience, in devising the mode by which our small share of the bounty, munificently granted by the general Congress for this express purpose, shall best, and most surely for final good results, be applied; to offer words of encouragement even to this Board of Agriculture, composed, as I have said, of practical workers of the land, devoted

to the cause the projectors of this new seat of learning designed it to foster.

It would seem not unreasonable to expect that high dignitaries of the land, secure in their own well merited positions, would compassionate the struggling efforts of those whom they might account so much below themselves; and, instead of engaging in a discreditable struggle to defraud them of their small portion, show their inferiors how best to advance to the goal they desire to reach, without attempting to compel them to follow in the grooves which seem right to their own unpractical, contemplative, theoretical, conventional minds.

It would be but natural for us to look for countenance and support among educated and enlightened Christian teachers, even if the design was to obtain a share of their own field of labor; then how much more confidently had we the right to trust to their favor and good will in an attempt to enter upon a new field; to undertake the breaking up of new ground with a new class of laborers! But mere closet men, wedded to old customs, and shrinking nervously from contact with the soil in which we and our sons must delve, cannot lead us in the new and rugged paths we seek to tread! They can never point out to us the substance of what we need! Perhaps we may not yet ourselves clearly perceive the exact course to pursue to obtain the proficiency we long for. We have learned to creep, but we have an ambition to stand; to stand upright, and to walk alone, unled and untrammelled. Can a boy continue in leading strings and become a real man? Is self-reliance attainable by blindly and willingly acting under the direction of other men, and those theorists merely? Who have revolutionized the world by their inventions and active suggestions? were they book worms? mere men of erudition? Does our observation teach that a profound knowledge of the past history of mankind solely qualifies to lead in new paths of practical life? Says the author of the "Theory of Teaching": "Life is a better teacher than books." And again, "The cares, and trials, and necessities, the refreshments and delights of common life, are the great teachers of common sense; nor can there be any effective school of sober reason, where these are excluded." And in this new enterprise, if it is to have virtue and command success, *practice*, intelligent *practice*, must lead the way. The sturdy brain, which has directed the brawny arm day after day, during

years of physical exertion, and has forced from inert matter the elements of power and life to man, must be the pioneer in this unknown wilderness. Practice must lead; but science, following close, should smooth the path, and make it clear and open to all who may here seek a living and a home.

We, farmers, mechanics, and artizans of Maine, want just the college which, we believe, it was designed this grant of land should initiate;—an institution independent and clear of all others—something that shall have an individuality of its own, that we can talk about and for; the plan and course of which we can plainly see and understand. And if it has to start, as does the pioneer in the wilderness, with only the well selected farm, and one able, intellectual, and *practical* head to direct, it will then have an illustrious precedent in Hohenheim school in Wurtemburg, standing now, as is generally admitted, at the very head of all the institutions for agricultural education in Europe, which commenced in 1818 with but one head—Schwartz—assisted by a single farm inspector, and with eight pupils, on a farm of 255 acres, and for two years had no additional force. It now has a domain of 825 acres, a director who has a secretary and a farm assistant, a treasurer, a book-keeper, a librarian, an overseer in the institute, a house master, a post master, nine established professors, and several other directors, managers and inspectors, and this great establishment is practically self-supporting.

Let me say here that it was found at this college, and generally in the European schools, that the lower departments, where practice was more prominently in the lead, turned out the men who were most constantly sought for. That while it continued to be a matter of some difficulty for those in the more theoretically scientific departments to find situations, although they too had a certain knowledge of practice, the thoroughly practical *fellows* had only to elect where they would go. What valid objections are there to such an humble beginning in this country, in this State? I cannot see them. In fact, I believe there are peculiar advantages in such a course of procedure to balance any disadvantages which may be adduced. Its director growing gradually by a similar gradation with his school, will better appreciate its capabilities and requirements. He will be able to criticise deliberately each suggested innovation in every department, and will more easily continue the thorough master of his station. Its apparent low estate, isolated,

and thus courting attention, will be a constant appeal to the care and interest of those for whose good it is projected. It will ever seem nearer to them and far more accessible to their children, and will surely become a cherished object to their concern and protection. Now they have no special and peculiar interest for either of the existing colleges. As ably conducted and grand places of learning, they may be proud of them, and occasionally, when a boy discovers marked propensity for study, no pains are spared to fit him out for college and give him there a "liberal education"; but always with the feeling that one is going out from the others never to return, whose interests are to be no longer identical with theirs, of whom they may, perhaps, be proud as the successful scholar, but from whom they do not expect to derive any benefit to their own more lowly pursuit. And I appeal to you, brother farmers, what proportion of those whom you have thus seen leave the farm, have returned to labor upon it, and of the few who did return, how many were good for anything there? How many were not from college taught silly self-conceit, altogether above their work?

But the settlement of an industrial college, the character of which is so distinctively marked, that its name or design can never be displaced by, or merged in, any other; where knowledge of, or proficiency in, their own profession and their own art, is the *leading object;* where every other pursuit is subordinate to such an aim that they cannot lose sight of the intention, or fail to identify its success with their own advancement and general progress; where the qualifications for admission are only such as every farmer's boy and every mechanic's of ordinary intelligence possesses, they will all watch with the utmost solicitude; upon it will concentrate their best thoughts, and who can doubt that they will furnish the means, not only for its support, but to enable it to advance by degrees until it shall become a model school, a model farm, and a model workshop, to the lasting benefit of every farmer and every mechanic in Maine; and, while it may attain to an equally eminent rank among the schools of the world, will prove to possess as complete adaptation to the wants of America as the Hohenheim has to Germany. What other argument, worthy of a moment's consideration, has been adduced against an independent Agricultural College, but this obvious deficiency of means to enable it *forthwith* to assume the elevated position all admit it

should aspire to? I have heard none. And this, I have endeavored to show, we need have no concern about. Let it commence within its means; if it proves worthy, it will surely grow in just proportion to the wants and demands of our people; if it turns out to be a failure, it is but of one preparative experiment without loss of property to the State. But it is asserted that with the funds already provided for the Agricultural College of Maine, it might at once spring into the full tide of successful operation by attaching it to either that of Waterville, Lewiston or Brunswick. This may appear so, and it might be that, for a very limited period, fewer embarrassments and more apparent advantages of a literary character, would seem to arise from such a connection. But, admitting that we had the right to thus pervert the terms upon which the grant of land is made, I am most firmly persuaded that ten years would not elapse before the Agricultural College of Maine, overshadowed, insignificant, and vain, would have utterly passed away, unhonored and unlamented.

The stipulations of the other proposition which meditates the education of yeomen and artizans, on the travelling system of here a little, there a little, and yon a little more, is almost too absurd to joke about. But being a final and combined offer, emanating from the very fountains of scholarship and refinement in our State, it becomes us not to pass it by without exposing its practical bearing upon the proposed education of poor men's sons. The united localities of these three colleges, connected by the travelled roads, form nearly a true isosceles triangle, having two sides of about forty-five miles each, the other of eighteen miles in length. At each angle it is proposed to teach some essential part of the agricultural and mechanical education provided for by the Congressional grant of land. Entertaining this proposition, it becomes a matter, not only of curious speculation, but really, with our class of pupils, one of serious import, to estimate how many miles of travel it may require to complete this course of education. And having fixed the standard measure, to carry well out the novel system, an adequate sum should be levied to provide pedometers adapted to the different modes of travel, so that each student's progress and grade might be quite appropriately noted in miles, furlongs and rods, or, the contained area being determined and multiplied by the number of times he travels around the triangle, the sum of his attainments may be given in acres, roods and

perches. Rather than have our youth, who seek education in the industrial pursuits of their fathers, forced into a mere accessory of an avowed sectarian institution, or poised upon such a three legged stool of learning as meditated by our learned doctors, we had far *better* join the proceeds of our grant to that of Vermont and New Hampshire, and thus obtain unquestionable ability to establish and maintain an independent Agricultural College of instant high degree.

But, unless coerced into it, there is no necessity for our entertaining this thought. Two valuable estates are proffered, by their public-spirited owners, as free gifts for the purpose we have in view. One of them, possessing most of the modern improvements, is now a well appointed establishment, ready for occupancy. By merely accepting offers already made, this State may at once, without expense, enter upon this experiment with a larger and better equipped farm, a more generous endowment, and altogether superior auspices of certain success, than the Germans had in undertaking their Wurtemburg school. Instead of becoming an incongruous branch of a great corporation, soon to be treated with careless indifference as an unimportant part of the aggregate, why should we not form for ourselves a nucleus about which shall agglomerate, in a gradual and healthy growth, congenial properties, to be guarded and nurtured by able men of practical common sense, whose sole aim shall be to build up and increase a knowledge of the science and practice of Agriculture and the Mechanic Arts? Instead of vainly forming a single obscure member in a group of fixed stars, why not create the central light of a new constellation? Instead of condemning this nebulous star to a meteoric existence, to be "soon into ruin hurled," from too slight attraction for the old and impotent method, why may we not bring into being a new luminary, the central body of a new system, which, steadily emitting new rays of vivifying light, shall aggregate, condense and solicit into true and natural satellites of its own the nebulous mists which now pervade and envelop our agricultural world?

I hope that nothing which I have said or may say in consideration of this subject will be construed into an attack upon officers of colleges or other institutions of learning, as such. I do not wish to appeal to any prejudices which may exist against learned and valued teachers of our youth, legitimately pursuing their high and honorable, and, too often, wearisome calling. But I do mean

to invite you to scrutinize the motives which actuate those who are now persistently dictating the course of instruction to which they desire the Legislature to consign the sons of our farmers and mechanics. And their fitness for the new position they would arrogantly assume in a system so foreign to their training and acquirements! What is it that, at this late day, has waked these men up to the special interests of the so-called "industrial classes?" Have they become more enlightened, and regard our necessities as never before? Have they a thought of standing out prominently as philanthropists by showing a willingness to extend their field of useful labor? In such high toned and exalted men we are very loth to think it can be unworthy of their just pretensions. Is it for our exclusive benefit? We cannot see it. Is it for their own? They may say for that of both? This we deny; we say it cannot be, and we claim that in this case the recipient must be the best judge of the value of the proffered bestowal. We will admit that they may be the best judges of the value the new endowment might be to them, while we maintain that we know best whether they can serve our turn. We can but recognize in their strenuous effort to reach this additional endowment an inordinate desire to build up in any way and to any extent their own institutions, utterly regardless of the rights or feelings of others they may trample upon, without, in fact, according the least consideration to any but their own view of an unscrupulous transaction for more money and for more influence. I believe they have no more regard for these "industrial classes" than they ever had, and I do honestly and conscientiously think that the propositions which they have formally presented ought not to be entertained for an hour by any true friend of the farmers and mechanics of Maine, or by any man capable of appreciating the binding force of an honorable contract. For, in accepting this gift with the conditions attached thereto, this State becomes a party to a contract with the General Government, and bound in honor to establish, according to the letter and the spirit of the articles, "at least one college where the *leading* object shall be * * * to teach such branches of learning as are related to Agriculture and the Mechanic Arts." We cannot get away from this. By voluntarily accepting that which is conditionally bestowed we pledge our sacred honor to carry out these conditions.

The Government, relying upon our honor to carry into effect

the object it had in view, entrusted us in advance with what it had devoted to this purpose. To fail in this now, is very meanly to commit a breach of trust. And I believe it is as clear as daylight to every disinterested and unprejudiced mind in the State which has been turned upon this donation, that it would not be complying with either the spirit or the letter of the grant, to connect the agricultural and mechanical college with any other institution, neither with the letter of the grant nor any approach to its spirit.

Our school, our farm, and our workshops, must be managed with the strictest economy, and at the same time, with such a generous expenditure as, with a practical knowledge of business, and shrewd foresight, will anticipate the wear and tear and depreciation of all constructions, implements, stock and tools, and domestic animals. As in all the farm operations in this State, we must make a little money go far. Have the officers of our literary colleges been accustomed to this sort of management? Have their habits and course of life been such as would render them apt to learn this sort of management? Have they accomplished all that could reasonably be expected of them with the means they have had at their disposal? I would like to ask if either of those two older establishments would care to exhibit, in one round sum, the money it has received from all sources from its beginning, and give us the amount per capita upon the students who have graduated there? We must have practical knowledge of the wants and necessities of those people whose sons are to be instructed in a special course to insure progress in the same pursuits, and we must have the ability to apply the highest scientific attainments to daily and hourly training in the varied operations of the school, farm, and shop. Merely parading in ostentatious array a brilliant course of study will not do. Overlooking and directing such a course of study, alone, will not do. Lectures alone will not do, mere abstractions will not do, generalisms will not do, merely telling how, will not do. But with all these, must be a showing how to think and to act in the best and most scientific way, of the earnest, practical, every day business life.

Remarks were submitted by other members, and after free discussion the report was adopted unanimously.

Mr. French, from the Committee on Second Topic, presented the following report:

"Will the Board concur with the recommendation of the State Commissioners relative to connecting the proposed Industrial College with Bowdoin?"

Whenever a great enterprise is to be undertaken, it is well to consider all the circumstances that are to affect its successful accomplishment. In the establishment of an Industrial College, such an enterprise is about to be engaged in by the people of this State, and the question very naturally arises, how, and by what means, is the desired object to be best attained?

Plans and schemes have been rife in all the States receiving the benefit of the appropriation of Congress, and after more than two years' agitation and discussion in this State, the problem has failed of a satisfactory solution among us. The report of the Commissioners appointed by the Governor to receive propositions and examine locations with a view to the establishmont of the College, and, more particularly, their recommendation contained therein, brings the matter definitely, and perhaps finally, before the Legislature and the people; and the question before us is,—what action shall this Board take in the premises? Is the proposition tendered and recommended, such an one as will ultimately secure the results hoped for and intended by the legislation of Congress? Shall it become the adjunct of some already existing institution, or be established on an independent basis of its own? To answer these questions candidly, we must consider what are the requirements of an institution such as is contemplated by the act of Congress, and if we find these requirements met in the recommendation of the Commissioners, then we are bound to concur therein.

A successful industrial institution must be located in the midst of its studies, where its students, in their every day life, can have a practical demonstration of the theories of professors, and the application of scientific facts to material objects. The judgment is to be disciplined as well as the mind; the hands trained as well as the intellect. The teachers must be something more than guide-posts by the way-side, pointing always in the same direction; they are to be the actual guides who accompany the traveller, ready to seize upon the ever varying incidents of the journey, and impart instruction therefrom. They must be men whose every day

life is a school, whose education does not retain enough of the *thick* moss of centuries to constitute the cardinal points for the future, fixed as the north pole. We fill our museums with the old fossils, we build our capitals with the living rock.

Our industrial schools are to be different from anything a previous age has ever undertaken; they are to become an element in the march of human progress, and are consequently to mark out a course for themselves. We must be ready to meet their requirements, and not make them conform to our circumstances entirely, if we hope to realize the greatest benefit. The musty tomes of the dead past have but a secondary place in the living present, and the stereotyped thoughts of ancient lore, serve only as a polish for mere artificial minds. The busy, thinking world does not stop to consider what has been, but is grappling with the present and preparing for the future. The masses are coming to the surface, and the people ask to be educated in the various walks of life, they presume that they may be fitted to fill some honorable place in a "higher civilization." That demand must be met, and an opportunity is now presented to the people of this State and of these United States to make a beginning.

Having premised briefly thus much with regard to the requirements of an Industrial College, we come now to consider the offer of President Woods which has so favorably impressed our Commissioners. It is truly a munificent one, and worthy of the corporation making it. They propose to receive the funds accruing from the grant, and in connection with the Josiah Little fund establish an agricultural and scientific department in connection with the College; provide professors and an experimental farm, and erect a hall equal in accommodation to their Medical College. Having done this, they will receive a certain number of students, put through a course of *one year's* instruction, and, when they have mastered so much, will confer on them the degree of *Bachelor of Science!*—bachelors truly, for we do not believe that in one short year they would enter into any serious matrimonial alliance with science—the parties, doubtless, would soon divorce themselves.

This proposition virtually amounts to the establishment of a theoretical and scientific school not unlike the Institute at the University of Jena, and as such would fail to meet the requirements of the legislation creating it, or the community establishing

it. They might indeed have an *experimental* farm, but a *model* farm would be out of the question, considering the nature of the soil in that vicinity. This the Commissioners admit when they say "it is not suitable for a stock farm." The farm is to be one of the essential features of such an institution, and should be a representative of the agriculture of the State. The students should be required to make a practical application of the principles taught them, by performing a certain amount of labor each day on the farm or in the shop. This would create a distinction or caste at the College, and, on the other hand, an undue familiarity with adepts in college life might lead to dissolute and injurious habits.

The location in a large village like Brunswick, would be unfavorable to successful prosecution of study, and would be productive of many evils a more rural retreat would be exempt from; and besides, the charges for board and room-rent would be such that only the wealthier portion of the community could bear the expense, and the middle class of people would be debarred its privileges. These should be had on or near the farm, and at such a price as shall barely cover cost and contingencies, that all may be on as nearly an equal footing as possible. That there would be advantages derived by many in the use of the libraries, cabinets, &c., collected there, all will admit, but these should not be overrated; being of that general character suited to the students of large leisure rather than one who is pursuing a specialty. The disadvantages greatly overbalance the advantages to be derived from what the college already possesses that could in any way be made available, sufficient to settle the point in the minds of practical men who have given the subject consideration.

Another objection which obtains with very many is the strictly sectarian character the institution now assumes, and which will more or less guide its future operations. The people desire that their school shall be founded on the broadest principles of an enlightened Christianity. There is one other point which it may be considered presumption in us to raise, but nevertheless we give it as our firm conviction that there are but very few professors to be found in this or any of our colleges, who are really competent to become teachers in an industrial and scientific school, and that as a consequence the connection of the proposed Industrial College with Bowdoin would make it a mere adjunct of that institution. We do not deem a favor a blessing, that will cramp the future life,

and uselessly expend energies that can only be fully developed by a constant growth. The full life-power of our being must be in exercise if we ever expect to reach a healthful maturity, and our schools for the million must have the free air of a free thought.

We have thus briefly stated some objections that may be urged against the proposition from Bowdoin College which has the recommendation of the Commissioners, and it may be asked, what do we propose instead of it? Happily we are not without a basis on which to act. The report of the Commissioners embodies two munificent offers of sites for the proposed Industrial College in different sections of the State, one of which, is thought by men whose judgment can be relied on and who have examined the premises, to be well adapted to the purpose designed. Let the Legislature now in session, accept the gift thus generously tendered to the State by B. F. Nourse, Esq., of his farm in Orrington, and appoint a Board of Trustees of the Industrial College of Maine. As soon as this Board shall have been organized, let the farmers and public-spirited men of the State be appealed to for funds to erect the necessary buildings and otherwise provide for the organization of the College, independent of any action of the State. The appeal will not go unheeded, the funds *can* and *will* be raised, and that, too, without a dollar of appropriation from the State for the present, and perhaps for years to come. Not only can funds be raised, but the farm can be stocked from the choicest herds the State affords by contribution of the liberal-minded raisers of thoroughbreds; the most approved implements of husbandry will be donated, and in fact nearly every want will be supplied by the generous rivalry of the citizens of Maine. We do not believe this to be an overdrawn picture; we are disposed to consider fully the wants of such an institution when established, and meet them with that enlightened spirit which fully comprehends the future. We believe the good common sense of the people of Maine, when once interested in the matter, will be found equal to the emergency, and, if legislation is not misdirected and the enterprise is fully inaugurated, we can, ere long, point to an institution that is an honor to the State and the pride of its citizens.

E. R. FRENCH,
For Committee.

The discussions which followed the presentation of this report were lengthy and earnest. To a considerable extent, the consideration of the general subject as presented in the report last given was mingled with this, as both were for some time under discussion during some days of the earlier portion of the session.

Mr. Johnson remarked, that his prejudices were in favor of accepting the offer of Bowdoin College, as it was his fostering mother, but he always had an opinion that it should be a separate and independent institution, and not situated in the immediate neighborhood of such an institution as a literary college, or in the vicinity of a large town. He referred to the offer of Bowdoin College, and reviewed at some length the advantages offered by that institution, and regarded them wholly as quite inconsistent and ill adapted to our wants. We want an institution mainly practical, not theoretical. The fact that Bowdoin College is a religious institution, under the guidance of one religious sect, is a great objection to connecting the Industrial School with it. This would not, perhaps, be an objection to him, but it would to a large class of our citizens. We must create such a school as will command the support and sympathy of the entire industrial population of our state—if we do not do this, we fail in our object.

He wished to correct an opinion which might prevail in the minds of some in regard to the offer of Bowdoin College. (He then read the following extract from the communication of President Woods, making the offer of that institution, as embodied in the report of the Commissioners.)

"To provide a building, to be erected by the College within such time as may be agreed upon, and without drawing in any manner, or under any pretext, upon either the capital or the income of the original fund; to be equal in style and similar in plan to the Maine Medical College; to be appropriated to the objects and uses of the Scientific Institution, and known by such name as may be given to this institution; to contain lecture-rooms for all the courses of study not otherwise provided for, and also rooms for the library, cabinets and museum; and until such building can be erected, to set apart, for the use of the Institution, such College buildings, or portions of them, as shall furnish it with ample accommodations."

It will be seen from this, said Mr. Johnson, that Bowdoin College does not make any offer of rooms for students, or residences

for professors and teachers. If the Industrial School should be connected with this College, the students and teachers must find rooms and accommodations as best they can, and at Brunswick prices.

He next directed the attention of the Board to the offer of B. F. Nourse, Esq., which, in his opinion, was one of real and substantial value, and in this respect, and in respect to our wants, is one to which the offer of Bowdoin College is not to be compared. He then alluded to the reasons why this farm had not been accepted by the Commissioners, and proceeded to show that they were, in reality, no objections at all. The location was just the one that was needed, near enough to lines of communication, and at the right distance from town. He alluded to the want of buildings. It is true it has not buildings sufficient to all the wants of the Institution, but in this respect it is far superior to the offer of Bowdoin. Upon this farm are barns, sheep-houses, hog-pens, and other out buildings, far better adapted to the wants of the proposed school than the building offered by Bowdoin. The offer is a rich one, and one which should be fully appreciated and heartily responded to.

Mr. Anderson said that one objection not before mentioned, is this: we have never known of an instance where one institution is willing to kill itself for the benefit of another—a new one. We do not want an Industrial College limited by being drawn into the sphere of another; it must be an institution of the highest rank. A year or two ago—when this subject was agitated—Bowdoin College was represented by an able and fair man, who, referring to the offer of Waterville College for the grant, said to the Legislature of this State, "If you are determined to bury it (the Industrial College) we can give it a more decent burial than Waterville can." What a contrast to this is their present offer? Then they looked upon it from a liberal, honorable, and correct standpoint—now they view it from a selfish motive. How shall this Board look upon such transactions, but with distrust.

There is another thing to be taken into account in this connection. The United States has gone out of its usual course of legislation, to foster a special interest. When the State accepts the gift of the General Government, it becomes a party to a contract, and is in honor bound to carry out the conditions of the other party—the Government—in the letter and spirit of the act. He

alluded to the act of Congress, and believed there was a complete contract between the State and the United States, in the matter. If connected with any other institution, he believed neither the spirit nor letter of the act would be carried out. Indeed, if connected, it would be worse than nothing, because it might stand in the way of another industrial school, which we some time certainly shall have.

Mr. Goodale said he was as much in favor of connecting it with Bowdoin as with any other. No doubt some advantages might be thus secured, but they were insignificant compared with the disadvantages which must be incurred. Their aims were, to considerable extent, unlike—the one being towards general development and the other towards special practical training and instruction connected with such development. Their methods were unlike, and it was not in human nature for things to go on smoothly, and without friction and embarrassment, when one part were required to labor, and with another play, labor and study were optional. He believed, too, that it would be better to have this agricultural school started in a small way. We should not take up more than one-half or two-thirds—at most three-fourths—of the income of the lands for teachers or professors. The instructors might profitably occupy a part of each year in delivering lectures in different parts of the State, something like our teachers' institutes. The teachers or professors could employ other lecturers in various departments to assist them. Their lectures should be held in one part of the State one year, and at another the next, and in this way over the State. There should be a small admission fee to these lectures, and at the close of each lecture, let such as choose be examined upon the subject, and have small prizes awarded to those who pass the most commendable examination. In this way, a thousand could be reached and benefited, where one could be reached if instruction was wholly confined to the school. The teachers would also be benefited by mingling with the people at large.

At the annual meeting of the State Agricultural Society, held during the session of the Board, the same subject was discussed, and I have thought it well to introduce here an outline of the views presented.

The late lamented Dr. Holmes alluded to the early history of industrial schools in the State. As early as 1828, the Gardiner

Lyceum was established, one of the main features of the situation being a manual labor department. Soon after, the Seminary at Kent's Hill, and the College at Waterville, both started mechanical or manual labor departments—the latter at one time having a considerable number of workshops connected with it. Now, in each of these instances, the idea was correct; the hands as well as the brain should be educated. But they each failed because there was not sufficient capital to act as a sort of balancing power. When the demand for the article manufactured failed, they were obliged to stop making them. The practical as well as the theoretical was needed to fully educate a man; and other things being equal, those succeeded best at the former who had been thoroughly educated at the latter. He had known a gentleman, who, after going through a regular course of study at Brown University, bound himself out to a ship carpenter for the purpose of acquiring the trade. He worked patiently and skilfully—because his hands were guided by acquired knowledge, and he knew how to apply the principles of science and mechanical philosophy to the work of his hands—and he succeeded admirably, becoming an eminent ship builder and owner, and acquiring a large property. At the fair of the New England Agricultural Society at Springfield, last summer, he made the acquaintance of the best teamster of oxen upon the grounds. Upon inquiry, he learned that he had been educated at Yale College, and had afterwards taken to the business of farming. He also learned that he was a farmer in Connecticut, and found out from his neighbors that there was not a better farmer in the State. These are only two of the numerous instances of success in manual pursuits where the parties had the benefit of thorough scientific training to guide them. After speaking at some length upon this part of the subject—all going to show the importance of uniting practice with science in educating a man for the industrial pursuits of life—he alluded to the national grant to States, for the benefit of Industrial Schools, and spoke of its importance to Maine. To us, the proportion is 210,000 acres of public lands, worth about two hundred thousand dollars. Reviewing the act of Congress donating this land to the States, he remarked that it was evidently the intention of Congress that this fund should go to the establishment of a separate and independent institution. As to the education to be given, the act itself expressly states, that the object of this institution shall be "to

promote the *liberal and practical* education of the industrial classes in the several pursuits and professions of life"; and further, the act says that the *leading object* of this institution shall be, "without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to Agriculture and the Mechanic Arts." This, then, is positive: the education shall be practical, and the main or leading object to teach what relates to agriculture and the other industrial arts. Following out this part of the argument in an able and convincing manner, he next alluded to the Report of the State Commissioners and the offer of Bowdoin College. He disapproved in the strongest terms of the connection of the Industrial School with any College now established in the State. There would be no surer method of destroying it. As to buildings—which the national grant made no provision for, and the cost of which was made the great objection to its being established as a distinct institution—he saw no difficulty about this part of the matter. We do not need elegant or expensive buildings. The interests of the school would not demand it, especially at first. All that is needed, is plain, durable, convenient, wooden buildings for the pupils, teachers, &c., &c., with suitable barns and out buildings for stock. The demonstrations are mainly to be made in the field—not in the lecture room—the teachers are expected to be practical as well as scientific men, men who are used to the plow and spade, and any farm house is good enough for these, certainly at first. As to apparatus—that can be cheap at first and answer every purpose. Some of the most splendid and useful discoveries in chemistry ever made—were made with very cheap and very simple apparatus.

Rev. Mr. Dillingham, Speaker of the House of Representatives, said he had previously entertained and expressed the opinion that the proposed agricultural school could consistently be connected with some one of the existing colleges in the State, and thereby make a great saving to the State. He had also thought that the people would not be willing to sanction its establishment as a separate institution. But he had been led to change his convictions. He concurred most heartily in the views of Dr. Holmes, believed we did not need any expensive buildings to begin with, and thought it would accomplish more for practical agriculture, if the fixtures at first were plain, simple, and comparatively inexpensive. The teachers and professors connected with it should be

eminently and enthusiastically agricultural men. Unless they are such, the school will be a failure. He would say nothing against our Colleges—they are all honorable institutions, and are a credit to the State; but the professors and teachers connected with them are men of books, literary men; they are not practical, they are not agricultural men. The speaker alluded to what was said last winter before the Legislative Committee on Agriculture, by Prof. Smythe of Bowdoin College, when referring to the offer of Waterville, viz: "That it was impracticable to connect it with any existing College, but if the State was determined to bury it, Bowdoin could give it a more decent burial than Waterville could," and said he believed none of the institutions desire the grant to nurse it and train up young men for practical life, not at all. He also believed that if so connected, there would be constant friction among the students; moreover, if the institution was one of great pretensions, he thought its results would not be so satisfactory as if it were more moderate and humble. Farmers were plain, practical men; it was the tendency of the profession to be such, and it was this class of men whom we wish to bring into the College. He was in favor of making it a separate institution, with buildings ample, moderate and respectable, and believed the effect of such an institution on Maine, would be good, and only good, to all future generations. The farmers of Maine need to be educated, and brought up higher—have wider views of things, be divested of numerous prejudices. We have many such men, but we want them multiplied, and we want a college for this purpose. When that is in operation, and has been in operation for ten years, then we shall hear nothing about abolishing this Board of Agriculture, but it will then be looked upon as one of the permanent institutions of the State, and go forth with increased powers for usefulness.

We scarcely begin as yet to appreciate the advantages to be reaped when this institution has been in operation for a series of years. It will work fourfold, yes, twenty-fold, more results than its most sanguine friends now expect; indeed, we cannot begin to compute the good that will come from it. Farmers should assert their right to be educated in their profession. Look at the number to be educated in our State. And look, also, at the difference in those who are educated, and those who are not. It is a difference of 100 to 1, in power, influence, and value to the community,

of the two classes. Where are the men of inventive brain in our State to get encouragement or instruction? Not at Bowdoin. It should be the special province of one of the professors of the Agricultural College to aid, help, and encourage the inventive genius of our people. By a single invention all the expenses of the college could be paid. As an illustration in evidence of this, look at the Beater Press Company of this State, with an invested capital of $400,000. It is the idea which is valuable, not the iron and wood of which the machine is composed. The field of invention is not exhausted, and our State has as many inventive intellects as any State in the Union. This institution should not be started in an extravagant way. We may wish to change it in some particulars as we learn them by its workings. We cannot tell exactly what we do want, and, for this reason, should commence in such a moderate, inexpensive way, that changes may be made at little cost. To erect the necessary buildings, we want, say $20,000. Can this sum be raised—raised by the farmers of the State? Look at the money farmers have invested in bank stock, United States bonds, railroad stock, &c., and is there the shadow of a doubt that the liberal, progressive farmers of Maine will generously respond to this call? We will not ask this sum of the State, but of those energetic, liberal farmers, who will willingly contribute to it. Let our established colleges do their own work in their own sphere, and we will give them "God speed"; but let us, as farmers and mechanics, have this institution of our own in such a situation and manner that it will confer its benefits upon us. It will be necessary to have farm stock at the college. How many of our farmers will give the very best pick of their cattle and sheep; such breeders as Anderson, Lang, Percival, and a host of others? Let us take the first step and move on!

Mr. Goodale, for the Committee on the Third Topic, reported as follows:

The Committee on Topic No. 3, viz: "*To what extent should classical and literary studies enter into the course of instruction of the Industrial College? and how far should practice be combined with scientific instruction?*"

Report that they have given the subject such consideration as the very limited time at their command, with its frequent interruptions,

have enabled them to do, and will remark that in deciding upon the first point, we should take into consideration the attendant circumstances of our condition, so far as they bear upon the subject—and first, that the endowment is confessedly too small to admit the establishment of an institution of so great breadth and scope as might be desired. Second, that we are already well supplied with academies, high schools and colleges specially designed for and well adapted to impart classical and literary instruction, while we have not a single one specially designed, as this is intended to be, for the liberal and practical education of the industrial classes.

Another consideration deemed worthy of some weight in this connection is, that it does not seem advisable to adopt a course which shall make this new institution a competitor to those already established. We are aware that many of the Agricultural Colleges of Europe, and some in this country, do embrace such studies, and were there need in our case, and pecuniary ability to include them, there could be no objection. The language of the act of Congress leaves no doubt in our mind of an intention to make it optional with each State to include classical studies or not, according as their needs, desires and ability might dictate. Situated as we are, it appears decidedly preferable that the educational institutions already existing, numerous enough, and able as they are, should be exclusively relied on to impart instruction in those branches of learning which they are prepared to teach, and that the new institution *should confine itself* (with the exception of military tactics, which is definitely prescribed) *to the applications of natural science to agriculture and the mechanic arts*, or should do so until its means are largely increased.

In a word, it should be considered a *professional school*, as much so as a law school, a medical school, or a divinity school; and we hold, too, that candidates for admission should be required to manifest such a degree of proficiency in the branches of learning taught in our common and high schools, as will enable them suitably to profit by the special instruction of the Industrial College.

To the other question of our topic, we can give only a general answer. Practice should be connected with scientific teaching, so far as it is necessary to turn out accomplished farmers. So far as agriculture is *an art*, practice is indispensable. As a mechanic may understand the principles of mathematics and of natural philosophy in their applications to his art without being able to

construct a machine, or even a tool, in a creditable manner, so a man may be taught the scientific principles which have a bearing upon agriculture without being able to milk a cow, drive a team, guide a plow, or handle a hoe or scythe in a workmanlike manner, nor even to determine when such work was skilfully done or not by another. The farm, with its stock, its implements and crops, should be deemed a portion of the apparatus of the institution, and should be in constant use by teachers and students alike, and for the sake of illustration—for the reducing to practice and so as to exhibit in active operation the results of the principles which are taught. To a considerable extent this may, perhaps, be left discretionary with the head of the institution, and vary somewhat with the character of the instruction given and with the season of the year; as for instance, more hours may be devoted to manual labor in summer than in winter.

This, it will be seen, is very different from the principle upon which the manual labor schools of years past were inaugurated. In them the labor was for the sake of gaining a support. Here it is primarily designed as a means of gaining knowledge—practical familiarity with the best methods of doing work. It is true the student may in this way earn something which may be properly credited towards his expenses, but its *prime* object is to enable him to make greater proficiency than he possibly could by merely studying or listening to instruction.

Again, it is a notorious fact that in only comparatively few instances do the graduates of our literary colleges ever enter upon any occupation in after life which involves the necessity of manual labor, and this, too, when they fail of success in the profession of their choice, and for which they have devoted years of preparation subsequent to the college course. This is undoubtedly due to the distaste for habitual labor which they acquired during the four years spent at college at a period when the habits which are formed cling with great pertinacity in after life. It is to be presumed that most of the students who may attend the Agricultural College, will go there with habits of industry acquired at home. Most certainly these should not be lost, and if any go without them, it is equally certain that they ought to be acquired.

Finally, we remark that the institution cannot answer the ends for which it is specially designed without practice. The act of Congress donating lands in aid, expressly states the object to be

"to promote the liberal *and practical education* of the industrial classes."

S. L. GOODALE.

The report was adopted.

The Committee on the Fourth Topic submitted the following report:

The Committee charged with the consideration of the following subject, to wit: "*Do any valid reasons exist why cows should not be used as animals of draft?*"

Report that they have searched for assistance to enable them to arrive at satisfactory conclusions, with very little success, at least in the way of facts and figures.

Your Committee have personal knowledge of so few cases where the experiment has been tried, that their conclusions regarding its utility may be somewhat speculative. In those cases which have fallen within our personal observation, the results have been highly satisfactory. One pair were of large size and of native breed. The owner informs us that he obtains as much milk since working them as before, although they require more and better feed. We have often seen them at work, and are of opinion that they are as kind and do as much work as any oxen of the same size. Admitting that they may be used with success, the consideration of expense of keeping both oxen and cows would seem to dispose of all objections, except loss of milk to some extent, and the loss of labor for some weeks about the time of calving. Your Committee would suggest that where a farmer has hitherto kept two cows and a yoke of oxen, he might keep four cows, and so arrange the period of calving that one pair might be used for labor while the other were unfit for it. In some cases an ox and a cow could be used together for a part of the time and the ox used singly during the latter period of gestation.

Your Committee, in comparing this with other similar cases, are not aware of any material difference between the ability of the cow and the mare to accomplish labor, or endure fatigue, and think it probable that cows might labor as near to the time of calving as mares should to the time of foaling. If they were so worked it is likely they would be less clumsy than at present.

Finally, your Committee are not aware of any valid reasons

why cows may not, to a considerable extent, be properly used as animals of draft.

GEORGE H. FREEMAN.

The report was accepted.

The Committee on the Sixth Topic reported as follows:

The mule is an animal seldom seen in this State, except in one locality; and the larger portion of those now used there were brought from the Middle States. No very extensive attempt to breed the animal has been made, though some time since considerable numbers were produced in towns lying northwesterly from Augusta; but the practice seems to have been abandoned.

Your Committee has had some experience in working the mule, but under circumstances and for purposes differing considerably from ours. After all we know of having been done here, to now enter upon it, or renew the practice, would be merely an experiment, and before doing so, the chances for success should be well considered. We should take into account his adaptation to the soil and climate, if we seek to produce simply for market, and if for the purpose of labor, his character becomes an element in the calculation. We are not aware that he has been bred to any extent in a climate like ours.

The mule is a hybrid, produced for special purposes, and excels his sire in size and pace, and possesses a more docile disposition. He exceeds his dam in longevity, excels her in freedom from disease, endurance of heat and thirst, is more sure-footed, and can subsist upon a more scanty and innutricious diet. He is inferior to her in disposition, size and fleetness. He derives from his sire the qualities that make him superior to the horse for service in a climate warmer and more dry than ours, and in regions mountainous and precipitous.

To breed mules here, the Jack of suitable quality should be sought in the Southwestern States; and even there it is thought he has deteriorated from the perfection in which he is produced in Southern Europe.

To obtain a good Jack by purchase in this country, or by importation, would be expensive, as he commands large prices everywhere. Then the common mares here would produce an animal light, and of little worth compared with those raised from

the larger breeds used for the purpose in Kentucky and Pennsylvania.

As an animal raised solely for market his vices are an objection, making it almost impossible to keep him within the bounds of pasture, or to work him, unless kept constantly at it. For labor, he is too light to come into general use here, though he might be used to advantage for some purposes. We believe our farmers should not have their attention turned from their oxen and horses, their dairies, and their sheep, to a field of adventure in the production of an animal of comparatively dubious merits, that must seek its return almost wholly in his market value, and that market at a distance.

We may take a hint from the success of the mule in climates to which he is adapted, and breed stock for special purposes. In the Canadian horse we have the type of an animal suited to our climate and soil, with almost all the good qualities of the mule without his defects. With such an animal as this, prepared for us, and at our door, we think the breeding of mules should not be encouraged.

P. M. JEFFERDS.

Mr. Bigelow, from the Committee on the Seventh Topic, reported as follows:

The best method of applying manures to the soil is a question as yet unsettled. There are many different modes of application, and the best on some soils would not prove best on others. Every cultivator of the soil should strive by experiment, observation, or otherwise, to come to his own conclusions as to the best manner or mode of applying manures to the soil he cultivates.

No one mode of application will produce the same results on all soils, but different results from the same method of application will occur on different soils. In any form that application is the best which makes the best returns at the lowest cost.

Many practical rules of great value might be suggested, all governed by the locality and quality of soil in which they are to be applied. In this State there is a great variety of soils to which manures are applied. The best application to the different soils is something yet to be learned, and only to be approached by experiment and thorough trial. On some soils the application of manure on the surface may be the best method; on others it may not be.

A very important point is thus left with the agriculturist, to examine into by experiment, for his own good and the better improvement of the soil. It is also important to apply manures in such methods as to secure the best and most permanent improvement of the soil.

The best manure, undoubtedly, is that which contains all the feeding matter required by plants. Barnyard manure we believe to be the best fertilizer, because it most fully supplies all the wants of plants. What fertilizer and what method of application is the best in particular cases can only be learned by experiment and close observation. Information can be attained by various and carefully repeated experiments, with due regard to the object to be attained in connection with careful observation of the results of the experiments made.

In whatever position we apply manures, either under or on the surface, the leading object should be, not merely the harvesting of one or two abundant crops, but the greatest permanent fertilization and improvement of the soil. There is as yet no unerring guide to such results. Natural fertilization is on the surface. All the vegetable matter from trees and plants is deposited on the surface; and, reasoning from the works of nature, we come to the conclusion that all fertilizing manures should be applied on or near the surface. Green manures, when applied to tillage land, should, in our opinion, be covered from one to two inches below the surface of the soil; and all well pulverized manures should be left upon the surface, or only be harrowed or brushed in so as to be thoroughly mixed with the surface soil. No practical agriculturist should neglect to do what he can within his own means and within the limits of his farm, to keep his soil in a healthy and productive state of fertilization.

From the road side, sand hill, clay bank, and muck bed may be gathered by every farmer a large quantity of fertilizing matter, or substances which will permanently benefit the condition of his lands. The sand applied to stiff clay soils will very much improve it, and the clay applied to the sandy soil will have a like result. The loam from the roadside and the muck from the bed may be composted together with wood ashes or lime, and used as a top dressing to meadow lands with good success and profit.

The greatest difficulty to encounter by the agriculturists of Maine is the actual want of fertilizers sufficient in amount to keep

the soil in a healthy and productive state. Therefore, care and attention to secure the best quality and greatest amount of fertilizers should be the leading object with every agriculturist of Maine.

Mr. Anderson regarded the report as a valuable one, and covered the whole subject—which, in fact, lies at the foundation of our agriculture—in a very practical way. Surface manuring should, of course, be governed by circumstances—though he believed as a general thing that manure should be near the surface. He hoped the experience of members of the Board would be given upon this point. The subject of mixing the different soils as a substitute for manure—as hinted at in the report—was also a matter of much importance, and he hoped it would receive attention.

Mr. Rogers regarded surface manuring—or placing it near the surface—to be the most proper and correct mode of applying it. He objected to the mixing of soils as being a work of too much labor and too great expense, though the principle of improving a soil in this way was no doubt correct. He had used some of the concentrated manures, and generally had received great benefit from using them. He regarded the soil from the roadsides as of equal if not greater value than muck as an absorbent. It is more easily obtained, and he believed it was worth more, load for load.

Mr. Goodale spoke of the value of night soil, which in nineteen cases out of twenty is almost lost. It decomposes so rapidly that attention to it must be given at once. He suggested this method: Have near your privies an abundant supply of perfectly dry soil. Throw in a few shovel-fulls once in one or two days. In some towns in England it was formerly the practice to use water and wash the contents of the privies into the sewers. Now in many towns soil is alone used. In some instances the soil has been used over and over again after drying, until the soil is worth more pound for pound than much which is sold for concentrated manure, and is perfectly deodorized. He had used it the past year, and had been surprised at the great deodorizing power of simple dried soil. If properly managed he believed that each farmer could make an amount of superior dressing—equal to five dollars invested in concentrated manure for each member of the family—from the privy, if composted in the manner above suggested.

Mr. French believed farmers should adopt some means by which liquid manure could be taken from yards and vaults, and applied

directly to grass lands. It had been suggested to him that an apparatus something like a street sprinkler would answer an excellent purpose. He had applied liquid manure to dry knolls in fields, and the results were most immediate and satisfactory. He alluded to the value of surface soil as an absorbent instead of muck, but regarded the latter as more valuable, as it is largely vegetable matter, and while being an absorbent, it is also a direct manurial agent, and its application is, indeed, in part returning to the soil what has been taken off. Our farmers are apt to look too far from home for manurial agents. There is enough close at hand —if one will but use it—to improve his farm and keep it in a constantly increasing state of productiveness.

Mr. Anderson had used the sprinkler as alluded to by Mr. French, and found it impracticable. He believed the best method was to absorb it in some material that could be applied to the soil in a different manner. He had rarely felt sure of beneficial results in using artificial manures, except in a few instances, and then in using superphosphate.

Mr. Smith spoke of the value of poultry manure when composted with plaster or ashes, and he believed it to be one of the most valuable fertilizers for garden crops, beans, &c. This he believed was often allowed to go to waste, but this should not be. He also spoke of the value and importance of muck, and urged its constant use as an absorbent for the liquid voidings of stock.

Mr. Jaquith said a neighbor had manured a half acre of land, wholly from the manure of twenty hens, and raised an excellent crop of corn. The next year, he manured with green manure and seeded down. Has good crops of grass upon the land. He composts the hen manure with dry muck, and applies about one cord to the acre. For himself, he would apply all his manure in the fall,—upon plowed land, where he intends to plant corn the following season. The foul seeds, of which the manure is full, have sprouted and are destroyed by harrowing them in the spring, and the manure becomes soaked into the soil ready for the use of the roots of plants.

Mr. Goodale said he would on no account mix ashes or lime with poultry manure, nor with any manure which contains a large amount of ammonia. Poultry manure should be mixed with muck or surface soil—if applied to muck, the quality of the muck is improved by mixing it with the droppings of poultry. He had rather use dirt than leached ashes to compost with hen manure.

Mr. Talbot had mixed hen manure and dry surface soil together, moistening it with soap-suds, urine, &c. He had two and a half barrels of hen manure, and when composted with soil, had three cart loads. The results of using this were most marked. He spoke of the use and value of fish manure—detailing the method of extracting the oil from the fish—and the offal is now hauled forty miles into the interior. It is used in the green state, and is cheaply and easily applied. The price now, for the green offal, is six dollars per ton; for that which is dry, $30. The results of its application are very marked. Applied to a poor field, and the next year the herdsgrass stands shoulder high. We cannot tell how lasting its effects upon land will be. Has been fed to sheep in some instances, but he believed it was killing them.

Mr. Leach had found the best success—upon a granite soil—by placing his manure near the surface. He had formerly spread his manure before plowing, for corn, but had abandoned the practice. Had noticed the excellent results of applying about fifteen loads of clay per acre to soil somewhat open, and believed it to be a valuable and permanent way of manuring.

The report was accepted.

Mr. Rogers, for the Committee on the Eighth Topic, reported as follows:

"*What is needed in Maine to elevate the standing and enhance the profits of her Agriculturists?*"

That the pursuit of agriculture, in this State, does not take that high rank among the various avocations in which our citizens engage, which its importance demands, and which justly belongs to it, is so evident that we need go into no argument to prove the fact.

Agriculture is the power that moves and sustains all other business, and it is upon this foundation all worldly enterprises rest. Such being the case, let us look about and see why those engaged in this pursuit, as a class, are not as much respected as those engaged in professional pursuits, in mercantile, manufacturing or other business, and if possible find a remedy.

In these late days, however degrading to humanity the fact, a man's rank and standing in society are apt to be regulated by the length of his purse. The man who, by almost any means, has attained wealth, has position, and that pursuit which furnishes the

most ready means of securing it, is too apt to be looked upon as the most honorable. Many *theoretically* will not assent to this statement, yet *practically* they admit it, for actions speak louder than words. Your Committee, like many others, would not be understood as assenting to the theory, whatever may be their practice. Yet it cannot be denied that a moderate amount of wealth, particularly where the heart of its possessor is endued with that grace which cometh from above, is a valuable auxiliary to assist in developing those qualities that make up true nobility, and is very desirable.

If the existing state of society is such as is portrayed above, it will be seen that, in order to elevate the standing of farmers in the eyes of the world, and enable them to rank as they should, among nature's noblemen, their business must be made to pay better. Inasmuch as all other clssses of society are dependent upon agriculture for existence, it would seem that under a healthy and well balanced state of society, the producing class should be, at least, as well remunerated as any other. But such never has been, and is not the case with the agricultural population of Maine.

True, there are instances, few and far between, where men among us have accumulated a moderate amount of wealth by farm operations, but it must be acknowledged, however unwelcome the truth, that a majority of our farmers labor hard, and eat the bread of carefulness, to procure barely a comfortable support for themselves and families.

This state of things ought not to be, and we trust will not long continue. There are many causes which have tended to produce it. It may be that too large a proportion of our population have heretofore been engaged in this pursuit; for a healthy state of society requires, that there be consumers as well as producers.

Commerce, manufactures, science, art and literature, should each be encouraged and receive the fostering care of government, not at the expense of, but in common with agriculture; for, in the language of another, "that is regarded as a state of high and complete development, whose people find the most varied and profitable employment, whose producing capacity keeps pace with its consuming capacity, its production always suggesting and supplying its consumption, and its consumption, at every stage of increase, exciting its production, thus maintaining within, a laboratory of demand and supply, and carrying on without, a free and profitable exchange of products that blesses alike those who give

and those who take." When Maine becomes what nature eminently fitted her for, and evidently intended she should be, largely a manufacturing State, then will our agriculturists find a ready market for their surplus, at or near their own doors, thus stimulating them to have an increased surplus to dispose of, enhancing their profits, increasing their wealth, and, as was said at the outset, causing them to be, if not more respectable, at least, more respected.

The influence of manufactures upon agriculture was thoroughly discussed before the Board at its last session. We cannot do better than to refer to the able and elaborate report of Dr. Weston of Penobscot, upon that topic, beginning at the fiftieth page of the last report of the Secretary, and commend it to all interested in the cause of agriculture, or who are desirous of promoting the best interests of the State.

Farmers, to increase their profits, and make theirs a more lucrative business, have much yet to learn. They must break away from the old loose way of farming, and conduct their business in a more systematic manner, giving it as much care and thought as those do who are successful in other pursuits. They should open an account with the different branches of their business, their several crops, their stock, &c., in order to see what pays and what does not. They should give more attention to the manufacture, care and application of manure, and bring to their aid every appliance that will lighten their labor, and when mind shall so far rise above matter as to cause machinery and brute force, to a large extent, to take the place of manual labor, then will they have commenced progress in the right direction. The fact that knowledge is power is none the less true in its application to the agriculturist, than to the merchant or statesman. Intelligent, well-directed labor, upon the farm as elsewhere, is sure to yield a rich reward, while that which is misdirected, however energetically applied, will end in failure. Farmers, as a class, require to be better educated than they now are, to have their minds trained to habits of thought and research, to know more of the *science* of agriculture, in order to conduct their farm operations in a more economical and successful manner, and they have a right to demand of the State the means to enable them to attain it.

When the nation shall have safely emerged from the ordeal to which it is being subjected, and peace shall again reign throughout our borders, we hope, yes, we *expect* to see agricultural colleges

established in our own and in sister States, the beneficial effects of which will be felt not alone by those who shall pursue a course of study within their walls, but will reach by means of the press and other agencies, to the humblest hamlet in the land, the effect of which will be to elevate the social condition of the farmer, give dignity to his calling, and enable him to conduct his operations more successfully.

GEORGE A. ROGERS.

Mr. Anderson, for Committee on Ninth Topic, submitted the following report on the

IMPROVEMENT OF PASTURES.

It is a matter of common remark that the condition of our grazing lands has far less attention than even the most neglected of our mowing fields; that in most cases they are utterly overlooked in the improvements of the farm, and yet upon reflection, all are ready to admit their great relative importance, and whenever in a neighborhood a pasture is known to be superior to the others, all are desirous of having that portion of their live stock which they most highly esteem, enjoy a share of it. Occasionally, when a field has apparently reached its lowest condition, and is too poor to pay for running a mower, or swinging a scythe over it, we turn it out for grazing and take up a portion of what, from such constant neglect, has become absolutely "waste land." Now this should not be so. Even as they are, we obtain most of our profit from the summer feeding of our cattle and sheep from these waste places. Then how much more might we obtain if we so improved them as to afford therefrom to our live stock a constant "full bite." If we should gradually take up these neglected pastures, piece after piece, until all, fit for tillage and grass crops, could be included in, and apportioned to, a regular rotation, by which the whole might be fed over once in about seven or eight years, it is believed that the entire farm might be greatly improved, and the profits from the live stock, in the profit yielding season, vastly increased.

It may not be unprofitable for us to consider for a few moments the condition of those farms in our sister States where the greatest reputation in dairying has been acquired. The writer of this report, in company with one of our most earnest agriculturists, some years since, visited a few of the noted farms we had read

about, and saw the cattle, at their grazing, looking so fat and sleek that, if taken to our Eastern homes, they would have been here pronounced "stall fed for the butcher," yet we were credibly informed that, in most instances, they had but their "pasture feed," and that the cows were then yielding a large flow of milk. We readily believed the most that was told, for we found them literally with the feed to their eyes, while grazing in what would here be called excellent fields of grass; which throughout would yield scarcely less than a ton of hay to the acre if mowed, and often more even than the *best mowing* of many of our farms in Maine. To our view, accustomed to the scanty picking of our closely gnawed and dried up hill sides, it seemed an extravagant waste, but the farmers there did not so believe it; they had *proved* to their own satisfaction that it was by far more profitable to give their grazing stock, throughout the season, the utmost abundance of growing plant food. The result of examinations and investigations then made, impressed our minds with the belief that whenever the state of the land and the nature of the soil admitted of this sort of treatment, the true and best mode of improving pastures was to include them within the course of regular rotation.

But there is a large, and, if properly cared for, a very valuable portion of our grazing lands producing, or capable of producing, the sweetest feed, which are not susceptible of this treatment, which must always be considered as permanent pastures, or be fenced about and suffered to grow up into wood. To such pastures we would earnestly ask our brother farmers to give more attention. We would not presume to set ourselves up as ruling authorities, or attempt to write a text-book on this subject; still, endeavoring to fulfil the duty set before us, we offer such suggestions for the general treatment of these places as have been obtained from a little experience in, and observation of such work. We would advise every farmer to go out upon this very ground and study there, for hours and days, the peculiarities of his stubborn lot, and when he has become by this inspection fully aware of its ugliness, set himself resolutely about such improvements, as it will then become clear to his mind he can make. He must not glance over it with despair, and say "that it is an infernal mean piece of territory, only fit to hold the world together"; but he should take its repulsive features, each by itself, and ask "how much of this or of that

can I shape to a more goodly and profitable form." If covered with loose rocks, "may I not place these into lastingly useful wall? If springy and "cold," "can I not in some way "tap the dropsy out?" If overgrown with mischievous and encroaching bushes, "can I not easily remove and destroy them?" If it presents to the eye a variegated covering of mosses, "can I not convert its surface into a uniform shade of green by the lively use of an old harrow and some one of those mixtures I have read of in agricultural books or papers?" Such, for example, as lime and salt with ashes and fine clay, and a generous abundance of good pasture grass seed. If bleak and without a shelter, "can I not and ought I not in mercy furnish that!" Is it altogether uncompromising and irremediable in his eyes? then, "can I not sell it to some one possessing more brains, or knowledge, or money, or all these, than I have, who can better its condition for pasturage, or afford to wait its return in wood for his investment, while I, adding enough to the proceeds of my sale, may perhaps buy a good and convenient piece of land, better suited to my wants."

Your Committee are unanimous in the belief that the result of some such careful thought and earnest consequent effort, adapted as it will thus assuredly be, to the peculiarities of these possessions, will, in a surprisingly short period of time, transform these forbidding places into valuable grazing; and, in more cases than, at first sight, we are inclined to admit, into really attractive portions of our farms.

J. F. ANDERSON.

Mr. Smith of Penobscot, said the subject was one of great importance, and he hoped a discussion would follow which would bring out the experiences of those of the Board who have made experiments in renovating and improving such pastures. They might be harrowed and thus improved for a few years, but they would soon fall back to their original sterility. Would recommend letting them grow up to wood.

Mr. Jaquith, in improving an old pasture, ledgy, covered with moss—bearing more moss than grass—plowed it thoroughly, harrowed the ground when moist, and sowed it with oats at the rate of four bushels per acre. Then planted the oat stubble and applied a gill of dry slacked lime to each hill. Then sowed and seeded

down. Grass was better, and cattle loved the grass better, on that portion to which lime was applied. In this way he had eradicated the moss. The pasture had, however, become somewhat infested with butter-cup, but by pasturing it with sheep a few years he thought he could eradicate it, and at the same time improve the pasture by the droppings of the sheep.

The Chairman (Mr. Chamberlain) remarked that in Massachusetts the farmers applied considerable quantities of plaster to the mossy knolls of pastures, cut down all bushes, and were careful not to overtask the pastures. By this method they kept their pastures in very good condition.

Mr. Bigelow inquired how long it would take a pasture, if fenced and kept free from cattle, to grow up into wood.

Mr. Chamberlain said in Massachusetts land would start up with wood much quicker than in this State. In Penobscot County, a pasture left to itself had not grown to large growth in wood in thirty years.

Mr. Smith remarked that in Aroostook and Penobscot counties land came into wood quickly and grew very fast.

Mr. Bigelow considered it important to mow the brakes so common in pastures, about the time of harvest. By this method, which he had practised for several years, he had succeeded in driving them from his pastures. Used them for compost and for litter. It was the opinion some years ago that low lands were not fit for pastures, but he did not want a pasture for any kind of stock without some low land. In the dry seasons we have had for several years past, we could not get along without low land pastures. Had found no benefit from using plaster, although he had tried it frequently. Thought it was of no use to expect much from pastures without manuring them, but it is more than most farmers can do to get manure enough to apply to their pastures.

Mr. Smith believed in plowing deep in the fall, for the purpose of eradicating brakes. In the spring harrowed and sowed oats. This followed for two or three years would completely kill them out. But this course is not practicable for rocky land. What shall be done with rocky, rough, sterile pastures?

Mr. Leach thought farmers generally turned cattle into their pastures too early in the spring—before grass had started. Nothing was so injurious to them. Believed that by underdraining any portion could be greatly improved.

Mr. French believed it was useless to plow pastures, get a crop or two off them, and then turn them out again. It is better to let them remain fallow for a year or two than to crop them. But in places where pastures cannot be plowed we must depend upon the scythe and harrow. Brakes, hardhacks, buckthorn, &c., must be subdued by this method. This should be done as often as once in three years. It is neglect that is ruining our pastures—not that they are really exhausted; if we but gave them proper attention in this particular. Thought sheep would renovate many pastures otherwise hard to be improved; sheep would not, however, subdue the sweet-fern; it was necessary to apply the scythe. If neglect is the cause, attention in the manner which he had stated, he believed to be the remedy, and he had determined to mow all pastures at least once in three years.

Mr. Bigelow found his pastures were not so productive after having been plowed, as they were before.

Mr. Goodale remarked that among practical questions, none came home to the farmers of Maine with more force than this. A large part of the farmer's profits come from his pastures, but his cares are least bestowed on them. Would it not be better to bestow more care, therefore, upon pastures? In some States—as for example in New York—farmers take their best lands for pastures, and you can buy their mowing lands cheaper than their pastures. The older the grass-sward for pasture the better. In this State we have a large amount of pasture land that cannot be treated with the plow. The supply of phosphate of lime in the soil is comparatively small. What have we done with it? It has gone off year after year in the cattle raised and fattened upon our pastures. Nothing has been done to make up this lack. Why will not white clover grow on the pastures in Somerset County—as Mr. Bigelow says it will not? Because there is no food for it to feed upon. One remedy for barren pastures is for the farmer to cut down his field of operations; turn out poor pastures and let them grow up to wood, and turn out the poorest fields to pasture. Farmers do not put enough on their farms, pastures, nor fields. They are more apt to invest money in notes where it will pay them six per cent., than to put it on their farms where it will pay them twenty per cent. We have cut down our forests too much, and we cannot do better than to let some of our pastures grow up to wood.

Mr. Anderson said he did not believe that merely plowing and seeding down a pasture would improve it. Time must be given to let them get well swarded over, and the grass roots well set in the soil, in order to fit them to the process of torture which our cattle subject them to in feeding them. He had made an application of plaster to bare spots in a clay loam pasture, which produced nothing but pennyroyal, and the white clover came in immediately. This gave evidence that the seeds in the soil only wanted nourishment to spring up and clothe the bare spots. The running juniper he had grubbed up root and branch, which was not a work of much labor if entered into with determination. It was a great pest in pastures in Cumberland County. He said the only way in which we can suggest any improvement in renovating pastures is to submit them to the careful attention of those farmers who possess them, with the assurance that they *must do something* to improve them, which, if they do not, must be sold to some neighbor with more money and greater knowledge of their improvement.

The report was accepted.

Mr. Ham, for the Committee on Tenth Topic, submitted the following report:

The Committee charged with the following Topic, viz:

"What action will the Board take with regard to Agricultural Statistics?"

Report, That the opinion of the Board as to the importance and value of Agricultural Statistics, has been often expressed. The same estimate is still entertained. The Legislature, three years ago, enacted a law for the purpose of collecting such statistics, if that may be called a law which has no penalty attached to neglect of its requirements. This law, or, perhaps more properly, this recommendation, was responded to the first year by 314 cities, towns and plantations, while from 191 none were received. The second year, returns were received from 237 only, while from 268, or more than one-half, none were received. The last year, the number which made returns was even less than the year previous, and so few that the Secretary of the Board did not deem it proper to subject the State to the expense of publishing an abstract of the returns. In view of these facts, your Committee submit the following resolve:

Resolved, That the Board recommend to the Legislature the adoption of more efficient means for the collection of Agricultural Statistics."

E. HAM.

The above report was accepted, and the resolve adopted.

Mr. French, for the Committee on the Eleventh Topic, submitted the following report:

" What methods of tillage are best adapted to the system of mixed farming usually pursued in this State, considering the circumstances of soil and climate?"

The cultivation of the soil is a subject that will always engage the attention of the agriculturist whether he regards it from a practical or scientific point of view. The endless variety of soil, the ever varying circumstances of climate and season, the adaptability to different crops, are topics that require constant thought and application. In a country so diversified as ours, no fixed rule can be laid down, applicable to every case; each has in a great measure to learn for himself; but there are general principles, nevertheless, that all should endeavor to understand and profit from, as, for instance, similar soils require similar treatment, like crops, like culture.

It is a fact established by the experience of ages, that no system of culture is correct that impoverishes the land; hence it is a question of primary importance to every farmer, how he shall preserve intact the elements of fertility the soil possesses, or, if need be, restore what has been lost, and add to what he already possesses, without bankrupting himself. He should consider first, what is the character of his lands and their needs, and set himself deliberately to supplying them.

A great diversity of opinion prevails with regard to breaking the ground, whether it shall be plowed deep or shoal, in the spring or fall. We give it as a rule that the ground should be deeply stirred, but how deeply, is to be determined by the character of the soil, and the extent to which the heat of summer will be felt; for we do not believe it to be good economy to extend our operations to subterranean cultivation where the influence of sun and shower are never felt. There has been, in our opinion, too much looseness and theorizing in this matter, and farmers who have not

reasoned for themselves, have been led to expend their labors unprofitably. Light soils should be stirred more deeply than heavy ones, for they are more influenced by the sun's rays, and more affected by the droughts of summer, but not so much at a time but that it can be thoroughly incorporated with the surface soil and properly manured. In this way the farmer can gradually increase the depth of the surface soil without exhausting his own means till a proper limit shall have been reached.

Hard and retentive soils should be treated in a similar manner, but by a more gradual process and to a more limited extent; their compact strata rendering them impervious to the influences that affect sandy loams. We believe that, as a general rule, the lighter soils may be profitably plowed to the depth of from 10 to 15 inches, and the more compact ones, clays, &c., from 8 to 12 inches. If we till to a great depth, and coax the roots of plants down to where they receive but little or no warmth, we induce a rank growth, and, for want of length of season, produce an immature crop. Where a grain crop is taken off before planting to hoed crops, we think it better to plow shoal at first, say five to six inches, and especially where no manure is to be used the first year, as the sod rots quicker and the crops derive advantage from the decomposing roots. Let the stubble stand till the seeds dropped have sprung up, and together with the grasses, make a green crop of considerable value, when turn all over together, letting the plow down to the desired depth. The after preparation of the land will depend upon circumstances. If the farmer have the implements necessary to thoroughly incorporate the manure with the surface soil and bring it to a fine tilth, plowing may not be necessary, otherwise plowing must be resorted to again in the spring.

Many farmers, perhaps a majority, plant the first year, keeping the land up but two years, and consequently must set the plow to the required depth the first year. It is still a question where this method is pursued, whether the turf should be entirely broken up in the after preparation for seeding down. We incline to the opinion that this should not be done unless thoroughly rotted, as the partially decomposed sward dries up on the surface, making the ground "soddy" and uneven. Farmers do not pay enough attention to the preparation of the ground before putting in their hoed crops—it is vastly easier to drive the harrow or cultivator,

than to handle the hoe afterwards, and a finer tilth is obtained. It will be found of great advantage on all our light and loamy soils to use the roller before putting on the harrow, as the harrow is rendered more effective thereby, and the sods being more evenly pressed together will rot quicker and withstand a drought better. Many have observed, doubtless, that head-lands on which the team has turned, are the most productive parts of the cornfield. This is owing, probably, to the greater capillary attraction of land thus treated, and we have observed that whenever the soil is turned up hill, it dries up less, but attribute this to the greater facility with which it receives the rains as they fall, while that turned down hill acts as a "water shed."

Lands naturally wet where underdraining has not been resorted to, should be plowed lengthwise, following descent, that the bottom of the furrows may act as a system of drainage, and not crosswise as is frequently done, as then the furrows falling over each other, dam up the water that would otherwise escape. Shoal plowing is generally practised on such land, because of the difficulty of rotting the tough roots of the water grasses that abound, but from observation and practice we are decidedly of opinion that deep plowing is preferable, and that time should be taken to thoroughly pulverize the cold, gravelly sub-soil turned up by the action of the elements and the incorporation of surface soils and manures. Lands broken to fallow, are deriving all the benefits of those under cultivation without anything being taken off, and hence, this method is oftener resorted to by those who have worn out fields and have not the manure at hand to apply immediately, but we very much question whether it would not be better to raise some kind of green crop to be plowed under at the proper season, than to wait the slow process of fallowing. There are, unquestionably, benefits to be derived from summer fallows, but we do not believe that a system is correct or should be recommended, that can be substituted for one of far greater utility. Fields thus treated, are much more liable to be washed by sudden showers, than if some crop were growing on them, and when the surface is thoroughly dried, much of it is carried off in the form of dust by the winds sweeping over it. This may benefit the surface of adjoining lots, but certainly can be of no benefit to the one exposed.

The question of spring or fall plowing, must be determined by

circumstances, but certain general principles and rules may be observed, which observation and practice have taught. If the ground be broken in the fall, it may be broken at any time, when the convenience of the farmer may dictate, unless exposed to wind or infested with twitch grass, in which case it should be turned over as late as possible, that the underground stem, exposed to the immediate action of the frost, may be killed down.

It may be laid down as a rule, that all new lands, clays and compact soils, are benefited by fall plowing, as the upheaval and crumbling, caused by freezing, more thoroughly disintegrates the sod, than plow or harrow will do without it, and the condition of the land is generally more favorable at this season than in the spring time. We prefer that spring plowing, for hoed crops, should be done just before planting, as by this time the grass has got a good start, the ground is warmer, and fermentation ensues almost immediately. It is claimed by many good farmers, that no little advantage is derived from the green crop thus turned under, while the advocates of fall plowing assert that the land is more easily worked by the team, than spring plowed, but it should be remembered that a green crop is turned under in the fall, as well as in the spring, and as to the latter point, if the roller is used, as already recommended, no great difficulty will be experienced. The question is yet an open one, as to which time of plowing is most beneficial to the crop grown.

The plowing for a grain crop, and especially wheat, should be done in the fall. It can be sowed earlier, the straw is stiffer, the ripening earlier, by at least three days, and you get a larger crop than where the preparation is precisely the same, except that it is spring plowed. It is an argument in favor of all fall operations that can be judiciously and profitably performed, that they relieve the farmer of work and hurry, at a season of the year when his labors are most abundant. We consider it also a principle well established, that the earlier the grain crop is, the more and better the grain in comparison with the amount of straw, unless it is deferred to so late a period in the season that the ripening does not take place till autumn.

A word with regard to the application of manures and their effect, may not be out of place here. We believe it to be the growing conviction of intelligent and thinking farmers, that manure should be applied at or near the surface, thoroughly

incorporated with it; that its decomposition and dilution there is vastly preferable to the evolution of its gases from below. It has never been satisfactorily settled to my mind, how much is really lost by exposure on the surface. The droppings of our domestic animals, when exposed to the sun, seem to be immediately sealed by the action of its rays and ripen in that condition, for future use. The older a manure is, to a certain extent, the more productive of immediate results, but in the remote and future benefits, to be derived from our forage crops, we feel justified in the liberal application of green manure.

The substitution of the cultivator and coulter harrows, for the old fashioned harrow, once in so general use, is a great improvement in the cultivation of the soil, especially in the more thorough incorporation of manure and the sowing of grain. We do not generally cover our grain deep enough, especially where the roller is not used afterward, and consequently much more has to be sown than is really needed, because so much is exposed on the surface that never germinates. The use of the drill for general seed-sowing, is at present considered too expensive, but nearly equal results in practice may be derived by the use of the implement above named.

We have come to the foregoing conclusions from our observation, practice and experience in matters pertaining to agriculture, as we find it among us, and yet we feel that we are far from comprehending the subject in all its entirety. There are so many ever varying circumstances that affect us, such as varieties of soil, difference of location and climatic influences, not to speak of the object to which our agriculture is directed, that every farmer in a measure must be a law unto himself in conducting his farm operations. All our experiments and investigations have been directed mainly with reference to the character of the soil itself, and yet but very little of practical result can ever be expected from special analysis. We have but just begun to enquire into the disturbing influences from without, that already begin to affect us, and which were not a part of the experience of the former cultivators of the soil. The physical changes a country undergoes more or less affect the methods of tillage pursued, and require the modification of old or the application of new principles. The destruction of our forests, and drying up of our streams, and consequent severity of summer droughts, are beginning to modify our method of

tillage, in order to grapple with these adverse circumstances. To what extent our winter frosts and snows are cultivators is but imperfectly known, or the comparative influence of wet and dry seasons in increasing fertility.

But we will not enlarge. The subject once entered into expands of itself, and embraces all the condition of agriculture. The cultivator of the soil has entered a school from which he may never expect to graduate with a full diploma. All time has been his teacher, science his handmaid, earth his laboratory, and the world in the ages to come, his arena.

Mr. Jaquith, for Committee on Twelfth Topic, submitted the following report:

No candid man will, after due reflection, deny that the elevation and improvement of agriculture, in its character as a business in which masses of human beings are engaged, or an occupation upon which the world depends for food, is of the first importance. Nor will reflecting minds hesitate in admitting, as equally true, that education, improvement in agricultural science and the intellectual advancement of farmers must form the chief elements in elevating and perfecting the noblest and best of all callings. Education is the lever which must raise to its true position the agricultural interest and elevate to their rightful position the farmers of the State.

In no land upon which the sun shines do the same inducements present themselves, and no where else can education work such magic influence for good to the masses as here; for no where else have republican institutions placed upon an elevated level all the people. Here personal freedom is unrestrained—here no cruel social distinctions prevail to crush rising aspirations and drive into hopeless obscurity rising genius. Here too, the right to prosperity is free, the title to land unfettered, and industry and perseverance render it procurable by all. Here all may acquire knowledge—that better inheritance than gold or silver—for on every side the school house stands with open door inviting all, almost without money and without price, to drink from its rich fountains of knowledge. It is indeed a goodly land, and there are few among us who are not proud to call it "my own, my native land." But far as we stand in advance of other nations, we have not, as yet, reached perfection. We have yet much to learn and much to do in order to stand in the front rank. In our educational department, in the

elevation and improvement of our schools, much remains to be done both by the State in her sovereign capacity and by the people in their private relations.

Legislators must enlarge their vision and boldly advance with the light of science and be prepared with a wise and liberal hand, to give new and increased facilities for the spread of knowledge and the education of the people where common sense and sound judgment point the way. There is no danger of too many schools or too much learning; at least, the farmers of the State have a wide margin on which to work, and a great advance yet to make, before they come up with other classes.

The idea is quite too prevalent, that the business or pursuit of farming requires little else but physical strength, endurance and capacity to labor; that it is a business of the hands and sinews, not of the heart and head; that any dolt can plow, and sow, and reap. While we grant that the above are essential to success in tilling the soil, we hold as all right thinking men must hold, that they are subordinate to, and should be directed by the higher and commanding power of intellect, and stand in relation to the mental influence in the same secondary capacity with the horse, the ox and the passive machinery of the farm. In truth, there is no trade or calling, be it ever so intricate or nice, that requires more intelligence, sounder judgment, or more discriminating wisdom and forecast than farming. In no business is there more need of scientific knowledge. The farmer, above everybody else, if he would receive the full recompense for his toil, should understand the power of chemical action, the result of the combination of simple substances and the changes produced by such combinations. Long practice and close observation will do much to fit the farmer for his business, but they cannot, from the nature of things, provide him with all the information he needs; for there is a kind of knowledge that cannot be received by intuition nor learned by simple observation. Effects may thus be witnessed and scanned, and be oftentimes rendered vastly useful in the conduct of the farm; but the farmer should understand causes as well as witness effects, for thus he can oftentimes accomplish results indispensably necessary to his success. Scientific knowledge, combined with a quick perception, sound judgment, and every day practice on the farm, are the chief requisites for the perfect farmer, and it is idle to look for these unless agriculture is taught in our common schools, as a dis-

tinct, separate branch of education. It is true the teachings of agricultural science are all about us; but it is also true that the wisest cannot comprehend or render them practically useful without much patient study, long and critical examination, and by sure and oft repeated experiments, and all experience teaches us how difficult it is to begin to acquire an education in old age. Men acquire habits of thought as they do physical habits; therefore it is hard to break up old associations and commence to learn new things, and though men sometimes break through all obstacles and become celebrated scholars after the meridian of life has passed, yet there can be no doubt that education, to become thorough and perfect, should begin in youth. Impressions then made are seldom eradicated; and so of principles, whether they relate to morals or to science, when once impressed on the youthful mind and carefully indented there by days and weeks of constant drilling, they will almost always retain their legibility to the end of life.

Men are always adding to their stock of knowledge, day by day they learn new facts, and education is only finished with life or the beginning of dotage. But such is not the true meaning, certainly not the received definition of the term. Education, in its usual acceptation, belongs to the earliest years of life, and is the storing up of knowledge, the acquisition of facts and principles, rules and memoranda, to be used in all subsequent life, as circumstances require or occasion demands. If this view of the subject is correct, all must at once see the importance of introducing agricultural instruction into our system of common school education, and of making it a permament branch of study for those who expect or desire to till the soil for a livelihood.

It is not true that farming is governed by certain fixed laws and principles, that the soil, in its combinations, has certain fixed rules, that mother earth, in all her diversified forms, is governed by laws as unalterable as those of the Medes and Persians. In truth, earth and air and sky, with all the laws pertaining to each, are properly within the sphere of the farmer's study, and may and should form part of his education. He toils and sweats and is encouraged by hopes of a plentiful harvest; and should he not then be able to take full advantage of every law of production to aid him in his labors and ensure the end he seeks? It is idle to expect results such as we have glanced at without adequate means; without introducing the study of agriculture into our schools, and making it

a fixed and permanent department of education. The great truths and principles upon which it is founded, should be indented upon the minds of our youth by patient persevering study.

To accomplish this desirable result, we should make our contemplated Industrial College a school of the highest order, a rallying point for agricultural science. Let it occupy an elevated position, where it can make itself known and respected, and from which it can scatter its precious influences over the entire State. Sound philosophy would dictate a commencement at the highest point, with the college instead of district schools; for in a question of this character it is better and easier to expand from such a point, from a fountain broad and pure, than from one circumscribed and obscure.

Let the minds of our farmers be directed to this subject by the establishment of an Agricultural College and Experimental Farm in our State; let a few of their sons enter this institution and study the art and the science of farming; let it be clearly demonstrated that such a thing is practicable, and soon in the natural and regular order of events, we shall witness the gradual spread of agricultural schools, an increased and increasing interest in agricultural knowlege, and in good time most, if not all our district schools will have a regular permanent class studying and preparing, by acquiring a proper education, to be intelligent, scientific, successful farmers.

Mr. French regarded agriculture as one of the natural sciences, and as common schools were merely for elementary instruction in in the common branches of an English education, he thought it impracticable to introduce any of the natural sciences into them. Even chemistry and philosophy had better be left out. Then again, teachers are often unqualified for the teaching of these branches. If it was introduced it would be but a mere smattering of the science that could be received, and he thought we had better go thoroughly as far as we do go, and not attempt anything but what can be carried out properly.

Mr. Anderson favored the sentiments of the report. He would not prescribe any particular form for its introduction; but if the reading books were so prepared as to admit of knowledge in agricultural matters being introduced, he thought it would greatly assist in preparing the students to more readily receive higher and more

advanced instruction in the science, when they should arrive at a suitable age.

Mr. Jaquith, author of the report, replied to Mr. French's remarks, advocating the principles contained in the paper presented by him, favoring the study of agriculture in our common schools.

Mr. Bigelow said that the difficulty of obtaining teachers qualified to instruct in the practice as well as theory of agriculture, was one great obstacle connected with its introduction into our schools.

Mr. Johnson thought we should encourage the study of botany in our common schools. The summer furnishes an excellent opportunity for this pleasing study, and he believed if a resolve recommending the study of botany was appended to the report, it would be more definite and accomplish much good.

Mr. French thought if the natural sciences, including agriculture, &c., were introduced into our common schools, the standard of our teachers would need to be raised almost upon a level with the professors of natural science in our Colleges. This was a great difficulty. Again, in the study of agriculture, theory and practice should go hand in hand, which in a common school is impracticable.

Mr. Goodale remarked that the matter was one which should not be acted upon in haste. He deemed it impracticable to introduce the study of agriculture in our common schools. If teachers attended properly to the usual studies, he thought that was all that could be expected. In our high schools and academies it might be introduced to some extent, and he hoped the day was not far off when it should be so done, but he regarded it impracticable to introduce it into our common schools, certainly at the present time.

It was further discussed at some length, and on motion of Mr. Johnson was accepted and placed in the hands of the Secretary.

The Board adjourned after a session of fourteen days.

INFLUENCE OF THE FOREST ON CLIMATE.

The latter part of the past season has been marked by a severe drought, extending throughout the Eastern, and to some extent in the Middle States also. During the year previous, a drought appeared of considerable severity, although at an earlier period in the season.

While thus suffering from July through September, it was little consolation to be told that in the Western States on one side, and in England toward the East, the season was a very rainy one, insomuch that the harvests of hay and grain were extensively injured.

The evidence appears to be ample that a full average of rain falls somewhere every year, but it seems, latterly, to be distributed more unevenly and irregularly than in former years; I say, *seems*, for we have little positive evidence on the subject; the keeping of accurate meteorological tables being of comparatively recent date.

Whether the fact be so or not, certain it is, that an impression prevails extensively that droughts are becoming more frequent and more severe in New England than formerly.

Hitherto, the people of Maine have given little thought to the forest except as regards two points,—first, as furnishing timber and fuel, and secondly, as an obstacle to Agriculture, something to be "cleared." It seems however, to have been historically ascertained that various countries which have been largely cleared of forests have a less rain-fall than formerly; and on the other hand, extensive tree planting, or the spontaneous growth of woods, have been followed by an increase of the annual fall of rain, and a greater degree of moisture in the soil.

That the forests do play a most important part in the economy of nature, and especially in regard to both the conservation of moisture in the soil and its precipitation from the clouds, no reflecting and observing mind can doubt.

If it be a fact that an injurious change of climate has come to pass through any ill-advised agency of ours, it behooves us to learn the facts in the case, and so far as may be practicable, to correct

the practice. The subject is one which has received the attention of many scientific and observing men, and although their conclusions do not fully agree on all points, nearly or quite all do concur as to the influence of forests upon the moisture of the air and of the soil.

At the last session of the Board a request was made that some of the facts and considerations bearing on this point should be presented in this report. I know not how this can be done so well as by giving some extracts from the chapter on "The Woods" in a recent elaborate, instructive and suggestive Work from the pen of Hon. George P. Marsh, entitled MAN AND NATURE, the object of which, in the words of the author, is, "to indicate the character and, approximately, the extent of the changes produced by human action in the physical conditions of the globe we inhabit; to point out the dangers of imprudence and the necessity of caution in all operations which, on a large scale, interfere with the spontaneous arrangements of the organic or the inorganic world; to suggest the possibility and the importance of the restoration of disturbed harmonies and the material improvement of waste and exhausted regions," etc. The chapter on "The Woods" alone fills two hundred large octavo pages, of which our extracts, necessarily limited as they are, give only a small portion. The whole work will richly repay the student of nature for a careful perusal.

After some preliminary observations, and treating at considerable length of the electrical and chemical influence of the forest, its effects upon temperature and other influences, the author proceeds as follows regarding

INFLUENCE OF FORESTS ON THE HUMIDITY OF THE AIR AND THE EARTH.

AS INORGANIC MATTER.

"The most important influence of the forest on climate is, no doubt, that which it exercises on the humidity of the air and the earth, and this climatic action it exerts partly as dead, partly as living matter. By its interposition as a curtain between the sky and the ground, it intercepts a large proportion of the dew and the lighter showers, which would otherwise moisten the surface of the soil, and restores it to the atmosphere by evaporation; while in heavier rains, the large drops which fall upon the leaves and branches are broken into smaller ones, and consequently strike the

ground with less mechanical force, or are perhaps even dispersed into vapor without reaching it. As a screen, it prevents the access of the sun's rays to the earth, and, of course, an elevation of temperature which would occasion a great increase of evaporation. As a mechanical obstruction, it impedes the passage of air currents over the ground, which, as is well known, is one of the most efficient agents in promoting evaporation and the refrigeration resulting from it. In the forest, the air is almost quiescent, and moves only as local changes of temperature affect the specific gravity of its particles. Hence there is often a dead calm in the woods when a furious blast is raging in the open country at a few yards' distance. The denser the forest—as for example, where it consists of spike-leaved trees, or is thickly intermixed with them—the more obvious is its effect, and no one can have passed from the field to the wood in cold, windy weather, without having remarked it.

The vegetable mould, resulting from the decomposition of leaves and of wood, carpets the ground with a spongy covering which obstructs the evaporation from the mineral earth below, drinks up the rains and melting snows that would otherwise flow rapidly over the surface and perhaps be conveyed to the distant sea, and then slowly gives out, by evaporation, infiltration, and percolation, the moisture thus imbibed. The roots, too, penetrate far below the superficial soil, conduct the water along their surface to the lower depths to which they reach, and thus serve to drain the superior strata and remove the moisture out of the reach of evaporation.

The Forest as Organic.

These are the principal modes in which the humidity of the atmosphere is affected by the forest regarded as lifeless matter. Let us inquire how its organic processes act upon this meteorological element.

The commonest observation shows that the wood and bark of living trees are always more or less pervaded with watery and other fluids, one of which, the sap, is very abundant in trees of deciduous foliage when the buds begin to swell and the leaves to develop themselves in the spring. The outer bark of most trees is of a corky character, not admitting the absorption of much moisture from the atmosphere through its pores, and we can

hardly suppose that the buds are able to extract from the air a much larger supply. The obvious conclusion as to the source from which the extraordinary quantity of sap at this season is derived, is that to which scientific investigation leads us, namely, that it is absorbed from the earth by the roots, and thence distributed to all parts of the plant. Popular opinion, indeed, supposes that all the vegetable fluids, during the entire period of growth, are thus drawn from the bosom of the earth, and that the wood and other products of the tree are wholly formed from matter held in solution in the water abstracted by the roots from the ground. This is an error, for, not only is the solid matter of the tree, in a certain proportion not important to our present inquiry, received from the atmosphere in a gaseous form, through the pores of the leaves and of the young shoots, but water in the state of vapor is absorbed and contributed to the circulation, by the same organs. The amount of water taken up by the roots, however, is vastly greater than that imbibed through the leaves, especially at the season when the juices are most abundant, and when, as we have seen, the leaves are yet in embryo. The quantity of water thus received from the air and the earth, in a single year, by a wood of even a hundred acres is very great, though experiments are wanting to furnish the data for even an approximate estimate of its measure; for only the vaguest conclusions can be drawn from the observations which have been made on the imbibation and exhalation of water by trees and other plants reared in artificial conditions diverse from those of the natural forest.

Wood Mosses and Fungi.

Besides the water drawn by the roots from the earth, and the vapor absorbed by the leaves from the air, the wood mosses and fungi, which abound in all dense forests, take up a great quantity of moisture from the atmosphere when it is charged with humidity, and exhale it again when the air is dry. These humble organizations, which play a more important part in regulating the humidity of the air than writers on the forest have usually assigned to them, perish with the trees they grow on; but, in many situations, nature provides a compensation for the tree mosses in ground species, which, on cold soils, especially those with a northern exposure, spring up abundantly both before the woods are felled, and when the land is cleared and employed for pasturage, or

deserted. These mosses discharge a portion of the functions appropriated to the wood, and while they render the soil of improved lands much less fit for agricultural use, they, at the same time, prepare it for the growth of a new harvest of trees, when the infertility they produce shall have driven man to abandon it and suffer it to relapse into the hands of nature.

Flow of Sap.

The amount of sap which can be withdrawn from living trees furnishes, not indeed a measure of the quantity of water sucked up by their roots from the ground—for we cannot extract from a tree its whole moisture—but numerical data which may aid the imagination to form a general notion of the powerful action of the forest as an absorbent of humidity from the earth.

The only forest tree known to Europe and North America, the sap of which is largely enough applied to economical uses to have made the amount of its flow a matter of practical importance and popular observation, is the sugar maple, *Acer saccharinum*, of the Anglo-American Provinces and States. In the course of a single "sugar season," which lasts ordinarily from twenty-five to thirty days, a sugar maple two feet in diameter will yield not less than twenty gallons of sap, and sometimes much more.* This, however, is but a trifling proportion of the water abstracted from the earth by the roots, during this season, when the yet undeveloped

* Emerson (*Trees of Massachusetts*, p. 493) mentions a maple six feet in diameter, as having yielded a barrel, or thirty-one and a half gallons of sap in twenty-four hours, and another, the dimensions of which are not stated, as having yielded one hundred and seventy-five gallons in the course of the season. The *Cultivator*, an American agricultural journal, for June, 1842, states that twenty gallons of sap were drawn in eighteen hours from a single maple, two and a half feet in diameter, in the town of Warner, New Hampshire, and the truth of this account has been verified by personal inquiry made in my behalf. This tree was of the original forest growth, and had been left standing when the ground around it was cleared. It was tapped only every other year, and then with six or eight incisions. Dr. Williams (*History of Vermont*, i, p. 91) says: "A man much employed in making maple sugar, found that, for twenty-one days together, a maple tree discharged seven and a half gallons per day."

An intelligent correspondent, of much experience in the manufacture of maple sugar, writes me that a second growth maple, of about two feet in diameter, standing in open ground, tapped with four incisions, has, for several seasons, generally run eight gallons per day in fair weather. He speaks of a very large tree, from which sixty gallons were drawn in the course of a season, and of another, something more than three feet through, which made forty-two pounds of wet sugar, and must have yielded not less than one hundred and fifty gallons.

leaves can hardly absorb an appreciable quantity of vapor from the atmosphere; * for all this fluid runs from two or three incisions or auger holes, so narrow as to intercept the current of comparatively few sap vessels, and besides, experience shows that large as is the quantity withdrawn from the circulation, it is relatively too small to affect very sensibly the growth of the tree.† The number of large maple trees on an acre is frequently not less than fifty, ‡ and of course the quantity of moisture abstracted from the soil by this tree alone is measured by thousands of gallons to the acre. The sugar orchards, as they are called, contain also many young maples too small for tapping, and numerous other trees—two of which, at least, the black birch, *Betula lenta*, and *Betula excelsa*, both very common in the same climate, are far more abundant in sap than the maple §—are scattered among the

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* "The buds of the maple," says the same correspondent, "do not start till toward the close of the sugar season. As soon as they begin to swell, the sap seems less sweet, and the sugar made from it is of a darker color, and with less of the distinctive maple flavor."

† "In this region, maples are usually tapped with a three-quarter inch bit, boring to the depth of one and a half or two inches. In the smaller trees, one incision only is made, two in those of eighteen inches in diameter, and four in trees of larger size. Two ¾-inch holes in a tree twenty-two inches in diameter = 1-46 of the circumference, and 1-169 of the area of section."

"Tapping does not check the growth, but does injure the quality of the wood of maples. The wood of trees often tapped is lighter and less dense than that of trees which have not been tapped, and give less heat in burning. No difference has been observed in the starting of the buds of tapped and untapped trees.—*Same correspondent.*

‡ Dr. Rush, in a letter to Jefferson, states the number of maples fit for tapping on an acre at from thirty to fifty. "This," observes my correspondent, "is correct with regard to the original growth, which is always more or less intermixed with other trees; but in second growth, composed of maples alone, the number greatly exceeds this. I have had the maples on a quarter of an acre, which I thought about an average of second-growth 'maple orchards,' counted. The number was found to be fifty-two, of which thirty-two were ten inches or more in diameter, and, of course, large enough to tap. This gives two hundred and eight trees to the acre, one hundred and twenty-eight of which were of proper size for tapping."

According to the census returns, the quantity of maple sugar made in the United States in 1850 was 34,253,436 pounds; in 1860, it was 38,863,884 pounds, besides 1,944,594 gallons of molasses. The cane sugar made in 1850 amounted to 237,133,000 pounds; in 1859, to 302,205,000.—*Preliminary Report on the Eighth Census*, p. 88.

§ The correspondent already referred to informs me that a black birch, tapped about noon with two incisions, was found the next morning to have yielded sixteen gallons. Dr. Williams (*History of Vermont*, i, p. 91) says: "A large birch, tapped in the spring, ran at the rate of five gallons an hour when first tapped. Eight or nine days after, it was found to run at the rate of about two and a half gallons an hour, and at the end of

sugar trees; for the North American native forests are remarkable for the mixture of their crops.

The sap of the maple and of other trees with deciduous leaves which grow in the same climate, flows most freely in the early spring, and especially in clear weather, when the nights are frosty and the days warm; for it is then that the melting snows supply the earth with moisture in the justest proportion, and that the absorbent power of the roots is stimulated to its highest activity.

When the buds are ready to burst, and the green leaves begin to show themselves beneath their scaly covering, the ground has become drier, the thirst of the roots is quenched, and the flow of sap from them to the stem is greatly diminished.

The Absorption and Exhalation of Moisture.

The leaves now commence the process of absorption, and imbibe both uncombined gases and an unascertained but perhaps considerable quantity of watery vapor from the humid atmosphere of spring which bathes them.

The organic action of the tree, as thus far described, tends to the desiccation of air and earth; but when we consider what volumes of water are daily absorbed by a large tree, and how small a proportion of the weight of this fluid consists of matter which enters into new combinations, and becomes a part of the solid framework of the vegetable, or a component of its deciduous products, it is evident that the superfluous moisture must somehow be carried off almost as rapidly as it flows into the tree.* At the

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fifteen days the discharge continued in nearly the same quantity. The sap continued to flow for four or five weeks, and it was the opinion of the observers that it must have yielded as much as sixty barrels [1,890 gallons]."

* We might obtain a contribution to an approximate estimate of the quantity of moisture abstracted by forest vegetation from the earth and the air, by ascertaining, as nearly as possible, the quantity of wood on a given area, the proportion of assimilable matter contained in the fluids of the tree at different seasons of the year, the ages of the trees respectively, and the quantity of leaf and seed annually shed by them. The results would, indeed, be very vague, but they might serve to check or confirm estimates arrived at by other processes. The following facts are items too loose perhaps to be employed as elements in such a computation.

Dr. Williams, who wrote when the woods of Northern New England were generally in their primitive condition, states the number of trees growing on an acre at from one hundred and fifty to six hundred and fifty, according to their size and the quality of the soil; the quantity of wood, at from fifty to two hundred cords, or from 237 to 1,048 cubic yards, but adds that on land covered with pines, the quantity of wood would be much

very commencement of vegetation in spring, some of this fluid certainly escapes through the buds, the nascent foliage, and the pores of the bark, and vegetable physiology tells us that there is a current of sap toward the roots as well as from them. I do not know that the exudation of water into the earth, through the bark or at the extremities of these latter organs, has been directly proved, but the other known modes of carrying off the surplus do not seem adequate to dispose of it at the almost leafless period when it is most abundantly received, and it is therefore difficult to believe that the roots do not, to some extent, drain as well as flood the watercourses of their stem. Later in the season the roots absorb less, and the now developed leaves exhale a vastly increased quantity of moisture into the air. In any event, all the water derived by the growing tree from the atmosphere and the ground is returned again by transpiration or exudation, after having surrendered to the plant the small proportion of matter required for vegetable growth which it held in solution or suspension. The hygrometical equilibrium is then restored, so far as this: the tree yields up again the moisture it had drawn from the earth and the air, though it does not return it each to each; for the vapor carried off by transpiration greatly exceeds the quantity of water absorbed by the foliage from the atmosphere, and the amount, if any, carried back to the ground by the roots.

The evaporation of the juices of the plant, by whatever process effected, takes up atmospheric heat and produces refrigeration. This effect is not less real, though much less sensible, in the forest than in meadow or pasture land, and it cannot be doubted that the local temperature is considerably affected by it. But the evapora-

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greater. Whether he means to give the entire solid contents of the tree, or, as is usual in ordinary estimates in New England, the marketable wood only, the trunks and larger branches, does not appear. Next to the pine, the maple would probably yield a larger amount to a given area than any of the other trees mentioned by Dr. Williams, but mixed wood, in general, measures most. In a good deal of observation on this subject, the largest quantity of marketable wood I have ever known cut on an acre of virgin forest was one hundred and four cords, or 493 cubic yards, and half that amount is considered a very fair yield. The smaller trees, branches, and twigs would not increase the quantity more than twenty-five per cent., and if we add as much more for the roots, we should have a total of about 750 cubic yards. I think Dr. Williams' estimate too large, though it would fall much below the product of the great trees of the Mississippi Valley, of Oregon, and of California. It should be observed that these measurements are those of the wood as it lies when 'corded' or piled up for market, and exceed the real solid contents by not less than fifteen per cent.

tion that cools the air diffuses through it, at the same time, a medium which powerfully resists the escape of heat from the earth by radiation. Visible vapors or clouds, it is well known, prevent frosts by obstructing radiation, or rather by reflecting back again the heat radiated by the earth, just as any mechanical screen would do. On the other hand, clouds intercept the rays of the sun also, and hinder its heat from reaching the earth. The invisible vapors given out by leaves impede the passage of heat reflected and radiated by the earth and by all terrestrial objects, but oppose much less resistance to the transmission of direct solar heat, and indeed the beams of the sun seem more scorching when received through clear air charged with uncondensed moisture than after passing through a dry atmosphere. Hence the reduction of temperature by the evaporation of moisture from vegetation, though sensible, is less than it would be if water in the gaseous state were as impervious to heat given out by the sun as to that emitted by terrestrial objects.

The hygroscopicity of vegetable mould is much greater than that of any mineral earth, and therefore the soil of the forest absorbs more atmospheric moisture than the open ground. The condensation of the vapor by absorption disengages heat, and consequently raises the temperature of the soil which absorbs it. Von Babo found the temperature of sandy earth thus elevated from 20° to 27° centigrade, making a difference of nearly thirteen degrees of Fahrenheit, and that of soil rich in humus from 20° to 31° centigrade, a difference of almost twenty degrees of Fahrenheit.

Balance of Conflicting Influences.

We have shown that the forest, considered as dead matter, tends to diminish the moisture of the air, by preventing the sun's rays from reaching the ground and evaporating the water that falls upon the surface, and also by spreading over the earth a spongy mantle which sucks up and retains the humidity it receives from the atmosphere, while, at the same time, this covering acts in the contrary direction by accumulating, in a reservoir, not wholly inaccessible to vaporizing influences, the water of precipitation which might otherwise suddenly sink deep into the bowels of the earth, or flow by superficial channels to other climatic regions. We now see that, as a living organism, it tends, on the one hand, to dimin-

ish the humidity of the air by absorbing moisture from it, and, on the other, to increase that humidity by pouring out into the atmosphere, in a vaporous form, the water it draws up through its roots. This last operation, at the same time, lowers the temperature of the air in contact with or proximity to the wood, by the same law as in other cases of the conversion of water into vapor.

As I have repeatedly said, we cannot measure the value of any one of these elements of climatic disturbances, raising or lowering of temperature, increase or diminution of humidity, nor can we say that in any one season, any one year, or any one fixed cycle, however long or short, they balance and compensate each other. They are sometimes, but certainly not always, contemporaneous in their action, whether their tendency is in the same or in opposite directions, and, therefore, their influence is sometimes cumulative, sometimes conflicting; but, upon the whole, their general effect seems to be to mitigate extremes of atmospheric heat and cold, moisture and drought. They serve as equalizers of temperature and humidity, and it is highly probable that, in analogy with most other works and workings of nature, they, at certain or uncertain periods, restore the equilibrium which, whether as lifeless masses or as living organisms, they may have temporarily disturbed.

When, therefore, man destroyed these natural harmonizers of climatic discords, he sacrificed an important conservative power, though it is far from certain that he has thereby affected the mean, however much he may have exaggerated the extremes of atmospheric temperature and humidity, or, in other words, may have increased the range and lengthened the scale of thermometric and hygrometric variation.

Influence of the Forest on Temperature and Precipitation.

Aside from the question of compensation, it does not seem probable that the forests sensibly affect the total quantity of precipitation, or the general mean of atmospheric temperature of the globe, or even that they had this influence when their extent was vastly greater than at present. The waters cover about three fourths of the face of the earth, and if we deduct the frozen zones, the peaks and crests of lofty mountains and their craggy slopes, the Sahara and other great African and Asiatic deserts, and all such other portions of the solid surface as are permanently unfit for the growth of wood, we shall find that probably not one tenth of the

total superficies of our planet was ever, at any one time in the present geological epoch, covered with forests. Besides this distribution of forest land, of desert, and of water, is such as to reduce the possible influence of the former to a low expression; for the forests are, in large proportion, situated in cold or temperate climates, where the action of the sun is comparatively feeble both in elevating temperature and in promoting evaporation; while, in the torrid zone, the desert and the sea—the latter of which always presents an evaporable surface—enormously preponderate. It is, upon the whole, not probable that so small an extent of forest, so situated, could produce an appreciable influence on the *general* climate of the globe, though it might appreciably affect the local action of all climatic elements. The total annual amount of solar heat absorbed and radiated by the earth, and the sum of terrestrial evaporation and atmospheric precipitation must be supposed constant; but the distribution of heat and humidity is exposed to disturbance in both time and place, by a multitude of local causes, among which the presence or absence of the forest is doubtless one.

So far as we are able to sum up the general results, it would appear that, in countries in the temperate zone still chiefly covered with wood, the summers would be cooler, moister, shorter, the winters milder, drier, longer, than in the same regions after the removal of the forest. The slender historical evidence we possess seems to point to the same conclusion, though there is some conflict of testimony and of opinion on this point, and some apparently well-established exceptions to particular branches of what appears to be the general law.

One of these occurs both in climates where the cold of winter is severe enough to freeze the ground to a considerable depth, as in Sweden and the Northern States of the American Union, and in milder zones, where the face of the earth is exposed to cold mountain winds, as in some parts of Italy and of France; for there, as we have seen, the winter is believed to extend itself into the months which belong to the spring, later than at periods when the forest covered the greater part of the ground.* More causes than

* It has been observed in Sweden that the spring, in many districts where the forests have been cleared off, now comes on a fortnight later than in the last century.—ASBJORNSEN, *Om Skovene i Norge*, p. 101.

The conclusion arrived at by Noah Webster, in his very learned and able paper on the supposed change in the temperature of winter, read before the Connecticut Academy of Arts and Sciences in 1799, was as follows: "From a careful comparison of these facts, it

one doubtless contribute to this result; but in the case of Sweden and the United States, the most obvious explanation of the fact is to be found in the loss of the shelter afforded to the ground by the thick coating of leaves which the forest sheds upon it, and the snow which the woods protect from blowing away, or from melting in the brief thaws of winter. I have already remarked that bare ground freezes much deeper than that which is covered by beds of leaves, and when the earth is thickly coated with snow, the strata frozen before it fell begin to thaw. It is not uncommon to find the ground in the woods, where the snow lies two or three feet deep, entirely free from frost, when the atmospheric temperature has been for several weeks below the freezing point, and for some days even below the zero of Fahrenheit. When the ground is cleared and brought under cultivation, the leaves are ploughed into the soil and decomposed, and the snow, especially upon knolls and eminences, is blown off, or perhaps half thawed, several times during the winter. The water from the melting snow runs into the depressions, and when, after a day or two of warm sunshine or tepid rain, the cold returns, it is consolidated to ice, and the bared ridges and swells of earth are deeply frozen.* It requires many days of mild weather to raise the temperature of soil in this condition, and of the air in contact with it, to that of the earth in the forests of the same climatic region. Flora is already plaiting her sylvan wreath before the corn flowers which are to deck the garland of Ceres have waked from their winter's sleep; and it is not a popular error to believe that, where man has substituted his artificial crops for the spontaneous harvest of nature, spring delays her coming.

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appears that the weather, in modern winters, in the United States, is more inconstant than when the earth was covered with woods, at the first settlement of Europeans in the country; that the warm weather of autumn extends further into the winter months, and the cold weather of winter and spring encroaches upon the summer; that, the wind being more variable, snow is less permanent, and perhaps the same remark may be applicable to the ice of the rivers. These effects seem to result necessarily from the greater quantity of heat accumulated in the earth in summer since the ground has been cleared of wood and exposed to the rays of the sun, and to the greater depth of frost in the earth in winter by the exposure of its uncovered surface to the cold atmosphere."—*Collection of Papers by* NOAH WEBSTER, p. 162.

* I have seen, in Northern New England, the surface of the open ground frozen to the depth of twenty-two inches, in the month of November, when in the forest earth no frost was discoverable; and later in the winter, I have known an exposed sand knoll to remain frozen six feet deep, after the ground in the woods was completely thawed.

In many cases, the apparent change in the period of the seasons is a purely local phenomenon, which is probably compensated by a higher temperature in other months, without any real disturbance of the average thermometrical equilibrium. We may easily suppose that there are analogous partial deviations from the general law of precipitation; and, without insisting that the removal of the forest has diminished the sum total of snow and rain, we may well admit that it has lessened the quantity which annually falls within particular limits. Various theoretical considerations make this probable, the most obvious argument, perhaps, being that drawn from the generally admitted fact, that the summer and even the mean temperature of the forest is below that of the open country in the same latitude. If the air in a wood is cooler than that around it, it must reduce the temperature of the atmospheric stratum immediately above it, and, of course, whenever a saturated current sweeps over it, it must produce precipitation which would fall upon or near it.

But the subject is so exceedingly complex and difficult, that it is safer to regard it as a historical problem, or at least as what lawyers call a mixed question of law and fact, than to attempt to decide it upon *à priori* grounds. Unfortunately the evidence is conflicting in tendency, and sometimes equivocal in interpretation, but I believe that a majority of the foresters and physicists who have studied the question are of opinion that in many, if not in all cases, the destruction of the woods has been followed by a diminution in the annual quantity of rain and dew. Indeed, it has long been a popularly settled belief that vegetation and the condensation and fall of atmospheric moisture are reciprocally necessary to each other, and even the poets sing of

> Afric's barren sand,
> Where nought can grow, because it raineth not,
> And where no rain can fall to bless the land,
> Because nought grows there.

Before stating the evidence on the general question and citing the judgments of the learned upon it, however, it is well to remark that the comparative variety or frequency of inundations in earlier and later centuries is not necessarily, in most cases not probably, entitled to any weight whatever, as a proof that more or less rain fell formerly than now; because the accumulation of water in the channel of a river depends far less upon the quantity of precipita-

tion in its valley, than upon the rapidity with which it is conducted, on or under the surface of the ground, to the central artery that drains the basin. But this point will be more fully discussed in a subsequent chapter.

There is another important observation which may properly be introduced here. It is not universally, or even generally true, that the atmosphere returns its humidity to the local source from which it receives it. The air is constantly in motion,

> —— howling tempests scour amain
> From sea to land, from land to sea.

and, therefore, it is always probable that the evaporation drawn up by the atmosphere from a given river, or sea, or forest, or meadow, will be discharged by precipitation, not at or near the point where it rose, but at a distance of miles, leagues, or even degrees. The currents of the upper air are invisible, and they leave behind them no landmark to record their track. We know not whence they come, or whither they go. We have a certain rapidly increasing acquaintance with the laws of general atmospheric motion, but of the origin and limits, the beginning and end of that motion, as it manifests itself at any particular time and place, we know nothing. We cannot say where or when the vapor, exhaled to-day from the lake on which we float, will be condensed and fall; whether it will waste itself on a barren desert, refresh upland pastures, descend in snow on Alpine heights, or contribute to swell a distant torrent which shall lay waste square miles of fertile corn land; nor do we know whether the rain which feeds our brooklets is due to the transpiration from a neighboring forest, or to the evaporation from a far-off sea. If, therefore, it were proved that the annual quantity of rain and dew is now as great on the plains of Castile, for example, as it was when they were covered with the native forest, it would by no means follow that those woods did not augment the amount of precipitation elsewhere.

But I return to the question. Beginning with the latest authorities, I cite a passage from Clavé. After arguing that we cannot reason from the climatic effects of the forest in tropical and sub-tropical countries as to its influence in temperate latitudes, the author proceeds: "The action of the forests on rain, a consequence of that which they exercise on temperature, is difficult to estimate in our climate, but is very pronounced in hot countries, and is established by numerous examples. M. Boussingault states that in the region

comprised between the Bay of Cupica and the Gulf of Guayaquil, which is covered with immense forests, the rains are almost continual, and that the mean temperature of this humid country rises hardly to twenty-six degrees (= 80° Fahr.). M. Blanqui, in his 'Travels in Bulgaria,' informs us that at Malta rain has become so rare, since the woods were cleared to make room for the growth of cotton, that at the time of his visit in October, 1841, not a drop of rain had fallen for three years. The terrible droughts which desolate the Cape Verd Islands must also be attributed to the destruction of the forests. In the Island of St. Helena, where the wooded surface has considerably extended within a few years, it has been observed that the rain has increased in the same proportion. It is now in quantity double what it was during the residence of Napoleon. In Egypt, recent plantations have caused rains, which hitherto were almost unknown."

Schacht observes: "In wooded countries, the atmosphere is generally humid, and rain and dew fertilize the soil. As the lightning rod abstracts the electric fluid from the stormy sky, so the forest attracts to itself the rain from the clouds, which, in falling, refreshes not it alone, but extends its benefits to the neighboring fields. * * The forest, presenting a considerable surface for evaporation, gives to its own soil and to all the adjacent ground an abundant and enlivening dew. There falls, it is true, less dew on a tall and thick wood than on the surrounding meadows, which, being more highly heated during the day by the influence of insolation, cool with greater rapidity by radiation. But it must be remarked, that this increased deposition of dew on the neighboring fields is partly due to the forests themselves; for the dense, saturated strata of air which hover over the woods descend in cool, calm evenings, like clouds, to the valley, and in the morning, beads of dew sparkle on the leaves of the grass and the flowers of the field. Forests, in a word, exert, in the interior of continents, an influence like that of the sea on the climate of islands and of coasts: both water the soil and thereby insure its fertility." In a note upon this passage, quoting as authority the *Historia de la Conquista de las siete islas de Gran Canaria, de Juan de Abreu Galindo*, 1632, p. 47, he adds: "Old historians relate that a celebrated laurel in Ferro formerly furnished drinkable water to the inhabitants of the island. The water flowed from its foliage, uninterruptedly, drop by drop, and was collected in cisterns.

Every morning the sea breeze drove a cloud toward the wonderful tree, which attracted it to its huge top," where it was condensed to a liquid form.

In a number of the *Missionary Herald*, published at Boston, the date of which I have mislaid, the Rev. Mr. Van Lennep, well known as a competent observer, gives the following remarkable account of a similar fact witnessed by him in an excursion to the east of Tocat in Asia Minor:

"In this region, some 3,000 feet above the sea, the trees are mostly oak, and attain a large size. I noticed an illustration of the influence of trees in general in collecting moisture. Despite the fog, of a week's duration, the ground was everywhere perfectly dry. The dry oak leaves, however, had gathered the water, and the branches and trunks of the trees were more or less wet. In many cases the water had run down the trunk and moistened the soil around the roots of the tree. In two places, several trees had each furnished a small stream of water, and these, uniting, had run upon the road, so that travellers had to pass through the mud; although, as I said, everywhere else the ground was perfectly dry. Moreover, the collected moisture was not sufficient to drop directly from the leaves, but in every case it ran down the branches and trunk to the ground. Farther on we found a grove, and at the foot of each tree, on the north side, was a lump of ice, the water having frozen as it reached the ground. This is a most striking illustration of the acknowledged influence of trees in collecting moisture; and one cannot for a moment doubt, that the parched regions which commence at Sivas, and extend in one direction to the Persian Gulf, and in another to the Red Sea, were once a fertile garden, teeming with a prosperous population, before the forests which covered the hillsides were cut down—before the cedar and the fir tree were rooted up from the sides of Lebanon.

"As we now descended the northern side of the watershed, we passed through the grove of walnut, oak, and black mulberry trees, which shade the village of Oktab, whose houses, cattle, and ruddy children were indicative of prosperity."

Coultas thus argues: "The ocean, winds, and woods may be regarded as the several parts of a grand distillatory apparatus. The sea is the boiler in which vapor is raised by the solar heat, the winds are the guiding tubes which carry the vapor with them to the forests where a lower temperature prevails. This naturally

condenses the vapor, and showers of rain are thus distilled from the cloud masses which float in the atmosphere, by the woods beneath them."

Sir John F. W. Herschel enumerates among "the influences unfavorable to rain," "absence of vegetation in warm climates, and especially of trees. This is, no doubt," continues he, "one of the reasons of the extreme aridity of Spain. The hatred of a Spaniard toward a tree is proverbial. Many districts in France have been materially injured by denudation (Earl of Lovelace on Climate, etc.), and, on the other hand, rain has become more frequent in Egypt since the more vigorous cultivation of the palm tree."

Hohenstein remarks: "With respect to the temperature in the forest, I have already observed that, at certain times of the day and of the year, it is less than in the open field. Hence the woods may, in the daytime, in summer and toward the end of winter, tend to increase the fall of rain; but it is otherwise in summer nights and at the beginning of winter, when there is a higher temperature in the forest, which is not favorable to that effect. * * * The wood is, further, like the mountain, a mechanical obstruction to the motion of rain clouds, and, as it checks them in their course, it gives them occasion to deposit their water. These considerations render it probable that the forest increases the quantity of rain; but they do not establish the certainty of this conclusion, because we have no positive numerical data to produce on the depression of temperature, and the humidity of the air in the woods."

Barth presents the following view of the subject: "The ground in the forest, as well as the atmospheric stratum over it, continues humid after the woodless districts have lost their moisture; and the air, charged with the humidity drawn from them, is usually carried away by the winds before it has deposited itself in a condensed form on the earth. Trees constantly transpire through their leaves a great quantity of moisture, which they partly absorb again by the same organs, while the greatest part of their supply is pumped up through their widely ramifying roots from considerable depths in the ground. Thus a constant evaporation is produced, which keeps the forest atmosphere moist even in long droughts, when all other sources of humidity in the forest itself are dried up. * * * Little is required to compel the stratum of air resting upon a wood to give up its moisture, which thus, as rain, fog, or dew, is returned

to the forest. * * * The warm, moist currents of air which come from other regions are cooled as they approach the wood by its less heated atmosphere, and obliged to let fall the humidity with which they are charged. The woods contribute to the same effect by mechanically impeding the motion of fog and rain cloud, whose particles are thus accumulated and condensed to rain. The forest thus has a greater power than the open ground to retain within its own limits already existing humidity, and to preserve it, and it attracts and collects that which the wind brings it from elsewhere, and forces it to deposit itself as rain or other precipitation. * * * In consequence of these relations of the forest to humidity, it follows that wooded districts have both more frequent and more abundant rain, and in general are more humid, than woodless regions; for what is true of the woods themselves, in this respect, is true also of their treeless neighborhood, which, in consequence of the ready mobility of the air and its constant changes, receive a share of the characteristics of the forest atmosphere, coolness and moisture. * * * When the districts stripped of trees have long been deprived of rain and dew, * * * and the grass and the fruits of the field are ready to wither, the grounds which are surrounded by woods are green and flourishing. By night they are refreshed with dew, which is never wanting in the moist air of the forest, and in due season they are watered by a beneficent shower, or a mist which rolls slowly over them."

Asbjörnsen, after adducing the familiar theoretical aguments on this point, adds: "The rainless territory in Peru and North Africa establish this conclusion, and numerous other examples show that woods exert an influence in producing rain, and that rain fails where they are wanting; for many countries have, by the destruction of the forests, been deprived of rain, moisture, springs, and watercourses, which are necessary for vegetable growth. * * * The narratives of travellers show the deplorable consequences of felling the woods in the Islands of Trinidad, Martinique, San Domingo, and indeed, in almost the entire West Indian group. * * * In Palestine and many other parts of Asia and Northern Africa, which in ancient times were the granaries of Europe, fertile and populous, similar consequences have been experienced. These lands are now deserts, and it is the destruction of the forests alone which has produced this desolation. * * * In Southern France, many districts have, from the same cause, become barren wastes of

stone, and the cultivation of the vine and the olive has suffered severely since the baring of the neighboring mountains. Since the extensive clearings between the Spree and Oder, the inhabitants complain that the clover crop is much less productive than before. On the other hand, examples of the beneficial influence of planting and restoring the woods are not wanting. In Scotland, where many square miles have been planted with trees, this effect has been manifest, and similar observations have been made in several places in Southern France. In Lower Egypt, both at Cairo and near Alexandria, rain rarely fell in considerable quantity—for example, during the French occupation of Egypt, about 1798, it did not rain for sixteen months—but since Mehemet Ali and Ibrahim Pacha executed their vast plantations (the former alone having planted more than twenty millions of olive and fig trees, cottonwood, oranges, acacias, planes, &c.), there now falls a good deal of rain, especially along the coast, in the months of November, December, and January; and even at Cairo it rains both oftener and more abundantly, so that real showers are no rarity."

Babinet, in one of his lectures, cites the supposed fact of the increase of rain in Egypt in consequence of the planting of trees, and thus remarks upon it: "A few years ago it never rained in Lower Egypt. The constant north winds, which almost exclusively prevail there, passed without obstruction over a surface bare of vegetation. Grain was kept on the roofs in Alexandria, without being covered or otherwise protected from injury by the atmosphere; but since the making of plantations, an obstacle has been created which retards the current of air from the north. The air thus checked, accumulates, dilates, cools, and yields rain. The forests of the Vosges and Ardennes produce the same effects in the northeast of France, and send us a great river, the Meuse, which is as remarkable for its volume as for the small extent of its basin. With respect to the retardation of the atmospheric currents, and the effects of that retardation, one of my illustrious colleagues, M. Mignet, who is not less a profound thinker than an eloquent writer, suggested to me that, to produce rain, a forest was as good as a mountain, and this is literally true."

Monestier-Savignat arrives at this conclusion: "Forests on the one hand diminish evaporation; on the other, they act on the atmosphere as refrigerating causes. The second scale of the balance predominates over the other, for it is established that in

wooded countries it rains oftener, and that, the quantity of rain being equal, they are more humid."

Boussingault—whose observations on the drying up of lakes and springs, from the destruction of the woods, in tropical America, have often been cited as a conclusive proof that the quantity of rain was thereby diminished—after examining the question with much care, remarks: "In my judgment it is settled that very large clearings must diminish the annual fall of rain in a country;" and on a subsequent page, he concludes that, "arguing from meteorological facts collected in the equinoctial regions, there is reason to presume that clearings diminish the annual fall of rain." * * *

Influence of the Forest on the Humidity of the Soil.

I have hitherto confined myself to the influence of the forest on meteorological conditions, a subject, as has been seen, full of difficulty and uncertainty. Its comparative effects on the temperature, the humidity, the texture, and consistence, the configuration and distribution of the mould or arable soil, and, very often, of the mineral strata below, and on the permanence and regularity of springs and greater superficial watercourses, are much less disputable, and more easily estimated, and much more important, than its possible value as a cause of strictly climatic equilibrium or disturbance.

The action of the forest on the earth is chiefly mechanical, but the organic process of abstraction of water by its roots effects the quantity of that fluid contained in the vegetable mould, and in the mineral strata near the surface, and, consequently, the consistency of the soil. In treating of the effects of trees on the moisture of the atmosphere, I have said that the forest, by interposing a canopy between the sky and the ground, and by covering the surface with a thick mantle of fallen leaves, at once obstructed insolation and prevented the radiation of heat from the earth. These influences go far to balance each other; but familiar observation shows that, in summer, the forest soil is not raised to so high a temperature as open grounds exposed to irradiation. For this reason, and in consequence of the mechanical resistance opposed by the bed of dead leaves to the escape of moisture, we should expect that, except after recent rains, the superficial strata of woodland soil would be more humid than that of cleared land. This agrees with experience. The soil of the forest is always

moist, except in the extremest droughts, and it is exceedingly rare that a primitive wood suffers from want of humidity. How far this accumulation of water affects the condition of neighboring grounds by lateral infiltration, we do not know, but we shall see, in a subsequent chapter, that water is conveyed to great distances by this process, and we may hence infer that the influence in question is an important one.

Influence of the Forest on the Flow of Springs.

It is well established that the protection afforded by the forest against the escape of moisture from its soil, insures the permanence and regularity of natural springs, not only within the limits of the wood, but at some distance beyond their borders, and thus contributes to the supply of an element essential to both vegetable and animal life. As the forests are destroyed, the springs which flowed from the woods, and, consequently, the greater watercourses fed by them, diminish both in number and in volume. This fact is so familiar throughout the American States and the British Provinces, that there are few old residents of the interior of those districts who are not able to testify to its truth as a matter of personal observation. My own recollection suggests to me many instances of this sort, and I remember one case where a small mountain spring, which disappeared soon after the clearing of the ground where it rose, was recovered about ten or twelve years ago, by simply allowing the bushes and young trees to grow up on a rocky knoll, not more than half an acre in extent, immediately above it, and has since continued to flow uninterruptedly. The uplands in the Atlantic States formerly abounded in sources and rills, but in many parts of those States which have been cleared for above a generation or two, the hill pastures now suffer severely from drought, and in dry seasons no longer afford either water or herbage for cattle. * * * * * *

The Forest in Winter.

To estimate rightly the importance of the forest as a natural apparatus for accumulating the water that falls upon the surface and transmitting it to subjacent strata, we must compare the condition and properties of its soil with those of cleared and cultivated earth, and examine the consequently different action of these soils at different seasons of the year. The disparity between them is

greatest in climates where, as in the Northern American States and in the North of Europe, the open ground freezes and remains impervious to water during a considerable part of the winter; though, even in climates where the earth does not freeze at all, the woods have still an important influence of the same character. The difference is yet greater in countries which have regular wet and dry seasons, rain being very frequent in the former period, while, in the latter, it scarcely occurs at all. These countries lie chiefly in or near the tropics, but they are not wanting in higher latitudes; for a large part of Asiatic and even of European Turkey is almost wholly deprived of summer rains. In the principal regions occupied by European cultivation, and where alone the questions discussed in this volume are recognized as having, at present, any practical importance, rain falls at all seasons, and it is to these regions that, on this point as well as others, I chiefly confine my attention.

The influence of the forest upon the waters of the earth has been more studied in France than in any other part of the civilized world, because that country has, in recent times, suffered most severely from the destruction of the woods. But in the southern provinces of that empire, where the evils resulting from this cause are most sensibly felt, the winters are not attended with much frost, while, in Northern Europe, where the winters are rigorous enough to freeze the ground to the depth of some inches, or even feet, a humid atmosphere and frequent summer rains prevent the drying up of the springs observed in southern latitudes when the woods are gone. For these reasons, the specific character of the forest, as a winter reservoir of moisture in countries with a cold and dry atmosphere, has not attracted so much attention in France and Northern Europe as it deserves in the United States, where an excessive climate renders that function of the woods more important.

In New England, irregular as the climate is, the first autumnal snows usually fall before the ground is frozen at all, or when the frost extends at most to the depth of only a few inches. In the woods, especially those situated upon the elevated ridges which supply the natural irrigation of the soil and feed the perennial fountains and streams, the ground remains covered with snow during the winter; for the trees protect the snow from blowing from the general surface into the depressions, and new accessions are

received before the covering deposited by the first fall is melted. Snow is of a color unfavorable for radiation, but, even when it is of considerable thickness, is not wholly impervious to the rays of the sun, and for this reason, as well as from the warmth of lower strata, the frozen crust, if one has been formed, is soon thawed, and does not again fall below the freezing point during the winter.

The snow in contact with the earth now begins to melt, with greater or less rapidity, according to the relative temperature of the earth and the air, while the water resulting from its dissolution is imbibed by the vegetable mould, and carried off by infiltration so fast that both the snow and the layers of leaves in contact with it often seem comparatively dry, when, in fact, the under surface of the former is in a state of perpetual thaw. No doubt a certain proportion of the snow is returned to the atmosphere by direct evaporation, but in the woods it is partially protected from the action of the sun, and as very little water runs off in the winter by superficial water courses, except in rare cases of sudden thaw, there can be no question that much the greater part of the snow deposited in the forest is slowly melted and absorbed by the earth.

The quantity of snow that falls in extensive forests, far from the open country, has seldom been ascertained by direct observation, because there are few meteorological stations in such situations. In the Northeastern border States of the American Union, the ground in the deep woods is covered with snow four or five months, and the proportion of water which falls in snow does not exceed one fifth of the total precipitation for the year. Although, in the open grounds, snow and ice are evaporated with great rapidity in clear weather, even when the thermometer stands far below the freezing point, the surface of the snow in the woods does not indicate much loss in this way. Very small deposits of snowflakes remain unevaporated in the forest, for many days after snow let fall at the same time in the cleared field has disappeared without either a thaw to melt it or a wind powerful enough to drift it away. Even when bared of their leaves, the trees of a wood obstruct, in an important degree, both the direct action of the sun's rays on the snow, and the movement of drying and thawing winds.

Dr. Piper records the following observations: "A body of snow, one foot in depth, and sixteen feet square, was protected from the wind by a tight board fence about five feet high, while another

body of snow, much more sheltered from the sun than the first, six feet in depth, and about sixteen feet square, was fully exposed to the wind. When the thaw came on, which lasted about a fortnight, the larger body of snow was entirely dissolved in less than a week, while the smaller body was not wholly gone at the end of the second week.

"Equal quantities of snow were placed in vessels of the same kind and capacity, the temperature of the air being seventy degrees. In the one case, a constant current of air was kept passing over the open vessel, while the other was protected by a cover. The snow in the first was dissolved in sixteen minutes, while the latter had a small unthawed proportion remaining at the end of eighty-five minutes."

The snow in the woods is protected in the same way, though not literally to the same extent as by the fence in one of these cases and the cover in the other. Little of the winter precipitation, therefore, is lost by evaporation, and as it slowly melts at bottom it is absorbed by the earth, but a very small quantity of water runs off from the surface. The immense importance of the forest, as a reservoir of this stock of moisture, becomes apparent, when we consider that a large proportion of the summer rain either flows into the valleys and the rivers, because it falls faster than the ground can imbibe it; or, if absorbed by the warm superficial strata, is evaporated from them without sinking deep enough to reach wells and springs, which, of course, depend very much on winter rains and snows for their entire supply. This observation, though specially true of cleared and cultivated grounds, is not wholly inapplicable to the forest, particularly when, as is too often the case in Europe, the underwood and the decaying leaves are removed.

The general effect of the forest in cold climates is to assimilate the winter state of the ground to that of wooded regions under softer skies; and it is a circumstance well worth noting, that in Southern Europe, where nature has denied to the earth a warm winter-garment of flocculent snow, she has, by one of those compensations in which her empire is so rich, clothed the hillsides with umbrella pines, ilexes, cork oaks, and other trees of persistent foliage, whose evergreen leaves afford to the soil a protection analogous to that which it derives from snow in more northern climates.

The water imbibed by the soil in winter sinks until it meets a

more or less impermeable, or a saturated stratum, and then, by unseen conduits, slowly finds its way to the channels of springs, or oozes out of the ground in drops which unite in rills, and so all is conveyed to the larger streams, and by them finally to the sea. The water, in percolating through the vegetable and mineral layers, acquires their temperature, and is chemically affected by their action, but it carries very little matter in mechanical suspension.

The process I have described is a slow one, and the supply of moisture derived from the snow, augmented by the rains of the following seasons, keeps the forest ground, where the surface is level or but moderately inclined, in a state of saturation through almost the whole year. The rivers fed by springs and shaded by woods are comparatively uniform in volume, in temperature, and in chemical composition. Their banks are little abraded, nor are their courses much obstructed by fallen timber, or by earth and gravel washed down from the highlands. Their channels are subject only to slow and gradual changes, and they carry down to the lakes and the sea no accumulation of sand or silt to fill up their outlets, and, by raising their beds, to force them to spread over the low grounds near their mouth.

In this state of things, destructive tendencies of all sorts are arrested or compensated, and tree, bird, beast, and fish, alike, find a constant uniformity of condition most favorable to the regular and harmonious coëxistence of them all.

General Consequences of the Destruction of the Forest.

With the disappearance of the forest, all is changed. At one season, the earth parts with its warmth by radiation to an open sky—receives, at another, an immoderate heat from the unobstructed rays of the sun. Hence the climate becomes excessive, and the soil is alternately parched by the fervors of summer, and seared by the rigors of winter. Bleak winds sweep unresisted over its surface, drift away the snow that sheltered it from the frost, and dry up its scanty moisture. The precipitation becomes as regular as the temperature; the melting snows and vernal rains, no longer absorbed by a loose and bibulous vegetable mould, rush over the frozen surface, and pour down the valleys seaward, instead of filling a retentive bed of absorbent earth, and storing up a supply of moisture to feed perennial springs. The soil is bared of its covering of leaves, broken and loosened by the

plough, deprived of the fibrous rootlets which held it together, dried and pulverized by sun and wind, and at last exhausted by new combinations. The face of the earth is no longer a sponge, but a dust heap, and the floods which the waters of the sky pour over it hurry swiftly along its slopes, carrying in suspension vast quantities of earthy particles which increase the abrading power and mechanical force of the current, and, augmented by the sand and gravel of falling banks, fill the beds of the streams, divert them into new channels and obstruct their outlets. The rivulets, wanting their former regularity of supply and deprived of the protecting shade of the woods, are heated, evaporated, and thus reduced in their summer currents, but swollen to raging torrents in autumn and in spring. From these causes, there is a constant degradation of the uplands, and a consequent elevation of the beds of watercourses and of lakes by the deposition of the mineral and vegetable matter carried down by the waters. The channels of great rivers become unnavigable, their estuaries are choked up, and harbors which once sheltered large navies are shoaled by dangerous sandbars. The earth, stripped of its vegetable glebe, grows less and less productive, and, consequently, less able to protect itself by weaving a new network of roots to bind its particles together, a new carpeting of turf to shield it from wind and sun and scouring rain. Gradually it becomes altogether barren. The washing of the soil from the mountains leaves bare ridges of sterile rock, and the rich organic mould which covered them, now swept down into the dank low grounds, promotes a luxuriance of aquatic vegetation that breeds fever, and more insidious form of mortal disease, by its decay, and thus the earth is rendered no longer fit for the habitation of man.

To the general truth of this sad picture there are many exceptions, even in countries of excessive climates. Some of these are due to favorable conditions of surface, of geological structure, and of the distribution of rain ; in many others, the evil consequences of man's improvidence have not yet been experienced, only because a sufficient time has not elapsed, since the felling of the forest, to allow them to develop themselves. But the vengeance of nature for the violation of her harmonies, though slow, is sure, and the gradual deterioration of soil and climate in such exceptional regions is as certain to result from the destruction of the woods as is any natural effect to follow its cause.

In the vast farrago of crudities which the elder Pliny's ambition of encyclopædic attainment and his ready credulity have gathered together, we meet some judicious observations. Among these we must reckon the remark with which he accompanies his extraordinary statement respecting the prevention of springs by the growth of forest trees, though, as is usual with him, his philosophy is wrong. "Destructive torrents are generally formed when hills are stripped of the trees which formerly confined and absorbed the rains." The absorption here referred to is not that of the soil, but of the roots, which, Pliny supposed, drank up the water to feed the growth of the trees.

Although this particular evil effect of too extensive clearing was so early noticed, the lesson seems to have been soon forgotten. The legislation of the Middle Ages in Europe is full of absurd provisions concerning the forests, which sovereigns sometimes destroyed because they furnished a retreat for rebels and robbers, sometimes protected because they were necessary to breed stags and boars for the chase, and sometimes spared with the more enlightened view of securing a supply of timber and of fuel to future generations. It was reserved to later ages to appreciate their geographical importance, and it is only in very recent times, only in a few European countries, that the too general felling of the woods has been recognized as the most destructive among the many causes of the physical deterioration of the earth."

It is to be hoped that a knowledge of the important agency which the forest exercises on climate may, at the least, lead to caution, that no harm accrue from needless clearings and burnings and to allowing all the breadth of surface not actually required for other uses to grow up to forests. The time is not far distant when the value of woods for economical purposes will be greatly enhanced. In many sections of our State fuel and timber are rapidly becoming scarcer and dearer. Besides this, we have, in Maine, with abundance of good soil, better naturally, it is believed, than the other New England States, a great deal which is *not worth cultivating*. A great advance in agriculture will have been made *when we learn to let such lands alone*, and to devote our labor to those which will yield a fair renumeration for labor and capital expended upon them.

Many a man has worn himself out in a wearisome, lifelong

struggle for subsistence upon lands poorer than were equally within his reach when starting in life; poorer oftentimes than have, during all those years, been included among his own acres, only the richer ones were encumbered with some natural disability which he failed to remove—perhaps spread out below his comparatively barren hills they only needed relief from stagnant water to enable them to yield up, in plentiful crops, the elements of fertility washed thither from the impoverished uplands above during ages past. So long as we have plenty of land possessing sufficient natural capabilities for profitable cultivation unoccupied, no one is called upon, by fidelity to himself, his family or his country, to give his strength to that which both for private and public welfare will better be left to grow up to wood.

I am unwilling to close these extracts without including the author's remarks on the influence of trees as *shelter*—a subject frequently dwelt upon in former reports, but by no means threadbare as yet, nor unnecessary from being sufficiently understood and practiced—and also regarding their influence as a protection against malaria.

"Trees as a Shelter to Ground to the Leeward.

The action of the forest, considered merely as a mechanical shelter to grounds lying to the leeward of it, would seem to be an influence of too restricted a character to deserve much notice; but many facts concur to show that it is an important element in local climate, and that it is often a valuable means of defence against the spread of miasmatic effluvia, though, in this last case, it may exercise a chemical as well as a mechanical agency. In the report of a committee appointed in 1836 to examine an article of the forest code of France, Arago observes: "If a curtain of a forest on the coasts of Normandy and Brittany were destroyed, these two provinces would become accessible to the winds from the west, to the mild breezes of the sea. Hence a decrease of the cold of winter. If a similar forest were to be cleared on the eastern border of France, the glacial east wind would prevail with greater strength, and the winters would become more severe. Thus the removal of a belt of wood would produce opposite effects in the two regions."

This opinion receives confirmation from an observation of Dr. Dwight, who remarks, in reference to the woods of New England

"Another effect of removing the forest will be the free passage of the winds, and among them of the southern winds, over the surface. This, I think, has been an increasing fact within my own remembrance. As the cultivation of the country has extended farther to the north, the winds from the south have reached distances more remote from the ocean, and imparted their warmth frequently, and in such degrees as, forty years since, were in the same places very little known. This fact, also contributes to lengthen the summer, and to shorten the winter-half of the year."

It is thought in Italy that the clearing of the Apennines has very materially affected the climate of the valley of the Po. It is asserted in Le Alpi che cingono l'Italia that: "In consequence of the felling of the woods on the Apennines, the sirocco prevails greatly on the right bank of the Po, in the Parmesan territory, and in a part of Lombardy; it injures the harvests and the vineyards, and sometimes ruins the crops of the season. To the same cause many ascribe the meteorological changes in the precincts of Modena and of Reggio. In the communes of these districts, where formerly straw roofs resisted the force of the winds, tiles are now hardly sufficient; in others, where tiles answered for roofs, large slabs of stone are now ineffectual; and in many neighboring communes the grapes and the grain are swept off by the blasts of the south and southwest winds."

On the other hand, according to the same authority, the pinery of Porto, near Ravenna—which is 33 kilometres long, and is one of the oldest pine woods in Italy—having been replanted with resinous trees after it was unfortunately cut, has relieved the city from the sirocco to which it had become exposed, and in a great degree restored its ancient climate.

The felling of the woods on the Atlantic coast of Jutland has exposed the soil not only to drifting sands, but to sharp sea winds, that have exerted a sensible deteriorating effect on the climate of that peninsula, which has no mountains to serve at once as a barrier to the force of the winds, and as a storehouse of moisture received by precipitation or condensed from atmospheric vapors.

It is evident that the effect of the forest, as a mechanical impediment to the passage of the wind, would extend to a very considerable distance above its own height, and hence protect while standing, or lay open when felled, a much larger surface than might at first thought be supposed. The atmosphere, movable as are its

particles, and light and elastic as are its masses, is nevertheless held together as a continuous whole by the law of attraction between its atoms, and, therefore, an obstruction which mechanically impedes the movement of a given stratum of air, will retard the passage of the strata above and below it. To this effect may often be added that of an ascending current from the forest itself, which must always exist when the atmosphere within the wood is warmer than the stratum of air above it, and must be of almost constant occurrence in the case of cold winds, from whatever quarter, because the still air in the forest is slow in taking up the temperature of the moving columns and currents around and above it. Experience, in fact, has shown that mere rows of trees, and even much lower obstructions, are of essential service in defending vegetation against the action of the wind. Hardy proposes planting, in Algeria, belts of trees at the distance of one hundred mètres from each other, as a shelter which experience had proved to be useful in France. "In the valley of the Rhone," says Becquerel, "a simple hedge, two mètres in height, is a sufficient protection for a distance of twenty-two mètres." The mechanical shelter acts, no doubt, chiefly as a defence against the mechanical force of the wind, but its uses are by no means limited to this effect. If the current of air which it resists moves horizontally, it would prevent the access of cold or parching blasts to the ground for a great distance; and did the wind even descend at a large angle with the surface, still a considerable extent of ground would be protected by a forest to the windward of it. If we suppose the trees of a wood to have a mean height of only twenty yards, they would often beneficially affect the temperature or the moisture of a belt of land two or three hundred yards in width, and thus perhaps rescue valuable crops from destruction.*

* The following well-attested instance of a local change of climate is probably to be referred to the influence of the forest as a shelter against cold winds. To supply the extraordinary demand for Italian iron occasioned by the exclusion of English iron in the time of Napoleon I, the furnaces of the valleys of Bergamo were stimulated to great activity. "The ordinary production of charcoal not sufficing to feed the furnaces and the forges, the woods were felled, the copses cut before their time, and the whole economy of the forest was deranged. At Piazzatorre there was such a devastation of the woods, and consequently such an increased severity of climate, that maize no longer ripened. An association, formed for the purpose, effected the restoration of the forest, and maize flourishes again in the fields of Piazzatorre."—Report by G. Rosa, in *Il Politecnico*, Dicembre, 1861, p. 614.

Similar ameliorations have been produced by plantations in Belgium. In an interest-

The local retardation of spring so much complained of in Italy, France, and Switzerland, and the increased frequency of late frosts at that season, appear to be ascribable to the admission of cold blasts to the surface, by the felling of the forests which formerly both screened it as by a wall, and communicated the warmth of their soil to the air and earth to the leeward. Caimai states that since the cutting down of the woods of the Apennines, the cold winds destroy or stunt the vegetation, and that, in consequence of "the usurpation of winter on the domain of spring," the district of Mugello has lost all its mulberries, except the few which find in the lee of the buildings a protection like that once furnished by the forest.

"It is proved," says Clavé, Études, p. 44, "that the department of Ardèche, which now contains not a single considerable wood, has experienced within thirty years a climatic disturbance, of which the late frosts, formerly unknown in the country, are one of the most melancholy effects. Similar results have been observed in the plain of Alsace, in consequence of the denudation of several of the crests of the Vosges."

Dussard, as quoted by Ribbe, maintains that even the *mistral*, or northwest wind, whose chilling blasts are so fatal to tender vegetation in the spring, "is the child of man, the result of his devastations." "Under the reign of Augustus," continues he, "the forests which protected the Cévennes were felled, or destroyed by fire, in mass. A vast country, before covered with impenetrable woods—powerful obstacles to the movement and even to the formation of hurricanes—was suddenly denuded, swept bare, stripped, and soon after, a scourge hitherto unknown struck terror over the land from Avignon to the Bouches du Rhone, thence to Marseilles, and then extended its ravages, diminished indeed by a long career which had partially exhausted its force, over the whole

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ing series of articles by Baude, entitled "Les Cotes de la Manche," in the *Revue des Deux Mondes*, I find this statement: "A spectator placed on the famous bell tower of the cathedral of Antwerp, saw, not long since, on the opposite side of the Schelde only a vast desert plain; now he sees a forest, the limits of which are confounded with the horizon. Let him enter within its shade. The supposed forest is but a system of regular rows of trees, the oldest of which is not forty years of age. These plantations have ameliorated the climate which had doomed to sterility the soil where they are planted. While the tempest is violently agitating their tops, the air a little below is still, and sands far more barren than the plateau of La Hague have been transformed, under their protection, into fertile fields."—*Revue des Deux Mondes*, January, 1859, p. 277.

maritime frontier. The people thought this wind a curse sent of God. They raised altars to it and offered sacrifices to appease its rage." It seems, however, that this plague was less destructive than at present, until the close of the sixteenth century, when further clearings had removed most of the remaining barriers to its course. Up to that time, the northwest wind appears not to have attained to the maximum of specific effect which now characterizes it as a local phenomenon. Extensive districts, from which the rigor of the seasons has now banished valuable crops, were not then exposed to the loss of their harvests by tempests, cold, or drought. The deterioration was rapid in its progress. Under the Consulate, the clearings had exerted so injurious an effect upon the climate, that the cultivation of the olive had retreated several leagues, and since the winters and springs of 1820 and 1836, this branch of rural industry has been abandoned in a great number of localities where it was advantageously pursued before. The orange now flourishes only at a few sheltered points of the coast, and it is threatened even at Hyères, where the clearing of the hills near the town has proved very prejudicial to this valuable tree.

Marschand informs us that, since the felling of the woods, late spring frosts are more frequent in many localities north of the Alps; that fruit trees thrive well no longer, and that it is difficult to raise young trees.

Trees as a Protection against Malaria.

The influence of forests in preventing the diffusion of miasmatic vapors is a matter of less familiar, and perhaps does not come strictly within the sphere of the present inquiry, but its importance will justify me in devoting some space to the subject. "It has been observed" (I quote again from Becquerel) "that humid air, charged with miasmata, is deprived of them in passing through the forest. Rigaud de Lille observed localities in Italy where the interposition of a screen of trees preserved everything beyond it, while the unprotected grounds were subject to fevers." Few European countries present better opportunities for observation on this point than Italy, because in that kingdom the localities exposed to miasmatic exhalations are numerous, and belts of trees, if not forests, are of so frequent occurrence that their efficacy in this respect can be easily tested. The belief that rows of trees afford an important protection against malarious influences is very general among

Italians best qualified by intelligence and professional experience to judge upon the subject. The commissioners appointed to report on the measures to be adopted for the improvement of the Tuscan Maremme advised the planting of three or four rows of poplars, *Populus alba*, in such directions as to obstruct the currents of air from malarious localities, and thus intercept a great proportion of the pernicious exhalations." Lieutenant Maury even believed that a few rows of sunflowers, planted between the Washington Observatory and the marshy banks of the Potomac, had saved the inmates of that establishment from the intermittent fevers to which they had been formerly liable. Maury's experiments have been repeated in Italy. Large plantations of sunflowers have been made upon the alluvial deposits of the Oglio, above its entrance into the Lake of Iseo near Pisogne, and it is said with favorable results to the health of the neighborhood. In fact, the generally beneficial effects of a forest wall or other vegetable screen, as a protection against noxious exhalations from marshes or other sources of disease situated to the windward of them are very commonly admitted.

It is argued that, in these cases, the foliage of trees and of other vegetables exercises a chemical as well as a mechanical effect upon the atmosphere, and some, who allow that forests may intercept the circulation of the miasmatic effluvia of swampy soils, or even render them harmless by decomposing them, contend, nevertheless, that they are themselves active causes of the production of malaria. The subject has been a good deal discussed in Italy, and there is some reason to think that under special circumstances the influence of the forest in this respect may be prejudicial rather than salutary, though this does not appear to be generally the case. It is, at all events, well known that the great swamps of Virginia and the Carolinas, in climates nearly similar to that of Italy, are healthy even to the white man, so long as the forests in and around them remain, but become very insalubrious when the woods are felled."*

* Except in the seething marshes of the tropics, where vegetable decay is extremely rapid, the uniformity of temperature and of atmospheric humidity renders all forests eminently healthful.

There is no question that open squares and parks conduce to the salubrity of cities, and many observers are of opinion that the trees and other vegetables with which such grounds are planted contribute essentially to their beneficial influence.

THE RINDERPEST OR CATTLE PLAGUE.

A fatal, contagious disease, quite distinct from the Pleuro-Pneumonia, has recently appeared in England and is causing great alarm and serious loss. At the latest accounts it was rapidly spreading both in the crowded, ill-ventilated dairies near the large cities, and among the best treated herds in the kingdom. A very large proportion of the cattle die, and no remedial measures have proved effective. It originated on the steppes of Russia,—these steppes being very like our western prairies—and has spread thence mainly by contact. It is very doubtful whether it ever passes through the atmosphere from place to place, although such is the opinion of a few, but that it is most certainly conveyed by contact there can be no doubt. Hence, suitable measures, properly enforced, have ever been effective in keeping it out of any district where they have been adopted.

There is hope that this dreadful disease may never reach America. But if this hope is to be realized it will be through KNOWLEDGE and VIGILENCE. It seems my duty to aid in diffusing a knowledge of the most important facts in the case.

In 1856 the Rinderpest, through the exportation of Russian cattle into Austria, Prussia, and other German nations, had been introduced into countries contiguous to Russia, and the nations of Europe then investigated its character. The Royal Agricultural Societies of England, Scotland, and Ireland, acted together and secured the services of James Beart Simonds, Professor of Cattle Pathology in the Royal Veterinary College, to ascertain the character of the disease, and also regarding curative and preventive measures. Accordingly Prof. Simonds visited the continent and made a thorough investigation, being accompanied also by a German veterinary professor, and on his return made an elaborate report of upwards of seventy pages which lies before me in the Journal of the Royal Agricultural Society of 1857, and from which I make the following extracts, as better describing the nature of

the disease than any other statement which has fallen under my observation:

"*Incubation.* Like small pox and many other affections common to man and other animals, rinderpest lies dormant for a time after the infection has entered the organism. This period is found to vary in different diseases, and also in the same disease at different times, as well as with animals which belong to different zoological classes. It is influenced by many external circumstances, such as the manner in which the infection is received, the heat of the weather, temperament of the animal, freedom from other diseases, peculiarity of constitution, &c. None of these causes can be said, however, to prevent the outbreak of the malady, although some of them may retard and others facilitate its appearance. During the incubative period, the animal gives no indication of ill health, and only does so when the disease is about to declare itself.

The time that the poison of rinderpest lies dormant is also found to vary; many animals sickening on the seventh day after exposure, and others not until the thirteenth or fourteenth. Some are said even to pass to the twentieth day before giving evidence of the malady. Such cases are few and may possibly depend on secondary exposure to the infection, rather than on so great a variation in the periods of incubation. These secondary exposures are not unfrequently entirely overlooked, and especially with such an affection as the rinderpest, the infecting materials of which can be conveyed by indirect as well as by direct means.

It must not be forgotten, also, that it is a rule or law belonging to this class of maladies, that if an animal passes over the usual period of incubation it is secure against an attack, and in order to become the victim of the affection, it must be a second time exposed to the influence of the morbific matter. Direct and well considered experiments are wanting with regard to the incubation of the pest, and these we had no opportunity of making while on our mission. No doubt, however, should be allowed to remain on a point like this, as on it depends the security to be afforded to every country which is contiguous to the steppes of Russia. Austria, which suffers almost annually from this disease in some parts of her dominions, has an especial interest in the question, and should lose no time in affecting its complete and satisfactory solution. In our opinion Austria should appoint a commission of scientific men, and vest it with some of her absolute power to con-

duct experiments and take every necessary means of determining the point in a conclusive manner, for the benefit of other countries as well as herself, and she will then deserve and receive the thanks of the world.

Spontaneous origin. The steppes (prairies) of Russia are the home of the rinderpest, and here it may be said to hold almost undisputed sway, little being done by the imperial government to stay its ravages. Here also, as has been elsewhere stated, it is alone regarded as having a *spontaneous* origin, but with what amount of correctness we are unable to say. Doubtless every disease has had its place of origin, and in it there may exist persistent causes which keep alive, so to speak, the cause of sin. Such causes may possibly be found on these vast plains of Russia, and if so, here would be the natural habitation of the pest. Be this as it may, it is certain that in these countries which are contiguous to the steppes the malady has no such origin, and its appearance in them is invariably associated with the recent introduction of steppe cattle, and generally in the ordinary course of traffic.

General symptoms of the pest. When the animal sickens, the affection will be recognized by almost continuous spasmodic twitchings of the voluntary muscles of the body, more particularly those of the neck and shoulders, and of the hind quarters. These twitchings are accompanied by tremors which are more or less generally diffused, and which interrupt the regularity of the spasms, and give the animal an appearance of suffering from exposure to cold. The coat stares, and the patient stands with its back arched and its legs gathered together under the body, but does not seemingly suffer much acute pain. In the course of a few hours rumination is suspended, and the appetite fails, but water will generally be partaken of almost up to the end.

The temperature of the body is variable, a slightly increased warmth of the skin existing at the beginning of the illness, which soon, however, gives way to chilliness of the surface, and this again to a death-like coldness of the ears, legs, and horns, as the malady advances to a fatal termination. The pulse is scarcely disturbed at first, unless the attack is a severe one, when it quickly rises to 70 or more, but wants tone in its action. In all ordinary cases it becomes gradually more frequent in number, but less in force, and in the latter stages can only be felt at the heart.

The respiration is but very little altered at the commencement;

it rarely becomes difficult, and was never painful in any of the cases we witnessed. It sometimes rises to 30 on the second day. The contraction of the abdominal muscles are often interrupted in their rhythmical action by the spasmodic twitchings which give a singular motion to the animal's flanks, and has led some observers to speak of a difficulty of breathing as being invariably present. A discharge comes on early from the nostrils, which has many of the characters of ordinary mucus, but when carefully examined, will be found to contain flocculi of lymph, (flakes of a clear fluid among the thick and whitish mucus.) A slight cough is also present in some cases, but it cannot be heard except one is near to the patient, when it imparts a singular and almost indescribable sound to the ear.

The expression of the countenance does not denote much acute suffering and the eyes are without any dull appearance except in the advanced stages of the malady, when the lids are found to be drooping as in sleep, and the ears also to be a little lopped. The vessels of the conjunctival membrane (the outer and mucous skin or membrane of the eye, and of the inner surface of the lids) are almost without turgescence, (superabundance of the mucus,) but a discharge in most cases come from the eyes, which accumulates in a yellow jelly-like mass at the inner angle, and when examined it likewise is found to be composed principally of lymph.

The bowels are but little disturbed at the very beginning of the disease, but the feculent matter, (the dung,) almost unaltered at first in consistency, is soon passed in increased quantities, and in the course of the second day diarrhœa sets in. This diarrhæa is presently followed by dysentery, which continues to the end. (Diarrhœa is a general loose and profuse discharge from the bowels, and dysentery is an inflammation of the lower and straight portion of the larger intestine, accompanied by griping, and a constant desire to evacuation.) The evacuations are not particularly offensive, but they are remarkably fluid, of a dirty yellow color, and mixed with numerous small flocculi of lymph. Occasionally a little blood stains the evacuations, and tenesmus (the urgent desire to evacuate when it cannot be done) is also present in some cases. The abdomen becomes much pinched in, and the animal's strength quickly fails him. He now keeps mostly recumbent, and rises very reluctantly. If made to move he staggers, and often falls for want of strength. The spasmodic twitchings *now begin to diminish,* and for some hours before death they have entirely passed off.

A sickly smell attends the patient, but there are no disengagements of gaseous compounds into the areolar tissue, (the loose open tissue connecting the skin and flesh of cattle particularly,) nor any other indications of the decomposition of the tissues which have been spoken of by some writers. In short, the animal dies, apparently, and almost without convulsions, from pure prostration of the vital powers. In those cases which recover, no pustules (pimples) have been observed as forming on the skin, nor any desquamation (scaling) of the cuticle (the outer and insensible skin, that which thickens on the hands of the laborer) or fall of the hair. Nor have any ulcers of the eyes, nostrils, or muzzle been noticed in either extreme or protracted cases.

Duration. In all cases which tend to a fatal termination, the animals rarely live beyond the fourth day after the symptoms have shown themselves, while very many of them will sink as early as the second day. The greater number, however, die on the third day of the attack. In those which recover, some diminution in the severity of the symptoms usually takes place on the third or fourth day, and if the patient survives this time, even should the symptoms not abate, it is regarded as a favorable indication of ultimate recovery. The return to perfect health is rarely effected in less than three weeks, but much will depend on the age and constitution of the animal, as likewise on the amount of the structural disease in the mucous membranes of the alimentary canal, and not a little also on the care and attention which are bestowed upon the patient.

Percentage of deaths. If the pest be allowed to take its natural course for only a few days, it will be found that the deaths not unfrequently number 90 *per cent.* Fat animals and those which are well cared for are found to bear up very badly against the disease.

Pathology. It is difficult to speak with certainty of the true nature of the rinderpest, but it is evident that the morbific matter on which it depends, having entered the system through the medium of the organs of respiration, soon acts upon the blood, by converting some of the constituents of that fluid into its own elements; and that, while this process is going on, the animal gives no recognizable indications of being the subject of the malady. This period constitutes the incubative stage of the disease. The blood having thus become contaminated, its vitality impaired, and the poison augmented a thousand-fold within the organism, (organs essential

to life,) the brain and nervous systems, as the centres of sensation and motion, have their normal functions necessarily and quickly interfered with, and hence one of the earliest indications of the disease is a spasmodic twitching of the voluntary and other muscles of the body.

The malady has now arrived at a stage when nature makes a bold effort to rid the system of the poison, and in doing this the force of the morbific matter, so to speak, falls with more or less severity upon the mucous membranes throughout the entire body. Effusions of lymph, the fibrine of the blood, take place in the follicles (open places or little sacks or bags) of the mucous membranes, as an effort, perhaps, in part, of the overtaxing of these grand excretory organs, and partly because the fibrine itself is charged with the *meteries morbi*, (morbid matter or poison of the pest,) and has probably also lost some portion of its vitality, which renders it unfitted to remain in the vessels. Dark-colored blood, which remains *fluid* even after death from its defibrination, (the destroying the fibrine of the blood, which is the component part of the blood that produces coagulation,) now flows in vessels, and dysenteric purging also sets in, under which, as a rule, the animal quickly sinks.

If, on the contrary, the *vis vitæ* should be sufficiently powerful to withstand so great an exhausting process, then the poison being cast off, the patient rallies slowly, and the functions of the organism are gradually restored.

Treatment. We have very little to report of a satisfactory nature of the medical treatment of the rinderpest. Indeed, no attempts at curing the disease are now made in consequence of the inutility of all the means which have been tried, and the greater risk which is incurred of a still further extension of the malady by the keeping alive of animals which would otherwise be slaughtered at once."

Thus it will be seen that the sole aim, upon the introduction of this disease, should be *to eradicate it at once*, and thus to prevent its extension.

The removal of the prohibitory duties upon breadstuffs and provisions that existed in Great Britain prior to 1846 led to heavy importations of live cattle into that country from the nations of Europe nearest to it. This trade, in its ultimate effects, reached into Russia, by causing a demand for its cattle from the German nations, between it and Great Britain, to supply the place of the

cattle they had exported to the latter. The general movement thus induced, as well as the movement of Russian cattle from the steppes to supply the armies of Russia in the war against England and France, introduced the rinderpest among the German nations.

The following proceedings in the government district of Oppelin, in Silesia, (Austria,) will give to the reader a correct idea of the prompt and rigid action necessary upon the introduction of the plague:

"Twenty oxen were brought into the estate of Schwieben, in the circle of Tost-Gleiwitz, and on their arrival they were distributed to the different farms of the estate. The disease broke out among these animals, and as they sickened they were removed to a farm where sheep only were kept and here slaughtered. A military cordon was also drawn around the place. Notwithstanding this precaution the disease spread, thus:

In Schwieben one ox was attacked, and he, with another with which he was standing, was immediately killed. The further progress of the disease was at once arrested, although there were 120 head of other cattle on the estate, and in the village about a hundred cattle owners.

Farm Radun. An ox which showed premonitory symptoms was immediately killed, together with another that he was standing next to, and no other cases have occurred.

Farm Wischnitz. The appearance of the rinderpest at this station is very remarkable. It appears that either four or six of the Podolian oxen were sent here and remained for a few days. These animals gave no evidence of being affected, but *twenty* days after their departure one animal of a herd of nineteen that they had been placed with fell ill with the disease, and the whole were forthwith slaughtered.

Estate Ponischowitz. Twenty Podolian oxen came here on the same occasion, and they within a few days gave indications of being affected. Like the others, also, they had been put with other cattle, forty-nine in number. On the occurrence of the outbreak the whole were killed, so that no single head of cattle was left on the estate. The place was likewise surrounded by a military cordon; but while the disease was going on a carpenter's apprentice, employed on the estate, escaped the vigilance of the guards and went to his father's house, which was distant about two thousand paces. While there he repaired a manger in his father's cowshed,

and also changed the clothes he had worn at Ponischowitz. The rinderpest, in consequence of this, broke out among his father's cattle. The whole were thereupon killed, and a military *cordon* drawn around the premises."

Other cases of a like character are stated, in which the same prompt and vigorous measures were taken—the immediate slaughter and burial of all the animals affected, and all others they had come in contact with. It will be seen that the disease is propagated by contact only; but capable, as seen, of being communicated by the clothes of a person who had been where the disease was, by these clothes coming in contact with stalls into which cattle came afterwards.

As a consequence of this liability to receive the disease through the medium of dress, every portion of the animals slaughtered is destroyed, the hides being so cut as to render them worthless, that no person would surreptitiously take and sell them. In Bavaria, according to Prof. Nicklas, the following provisions are enforced:

"During the continuance of the disease no cattle, dead or alive, are allowed to be brought across the frontier. Flesh, hides, entrails, horns, hair, and tallow of cattle, and bones, whole or crushed, of any animal, with their hair, wool, or bristles, are also specially prevented crossing by the cordon; as are woollen cloths, scutchings of leather, feathers, farm-yard manure, hay, clover, straw, and all other descriptions of cattle fodder.

When the disease occurs on a farm the affected animals are not removed from the sheds, but the apparently healthy are taken to the quarantine station. Each commune is obliged to provide a station of this description, which is built of wood and divided into two parts, one for the doubtful cases and the other for the supposed healthy. The commissioners have the power of allowing medical treatment of the animals, but the veterinary surgeon must remain in quarantine and receive all that he requires at the end of a long pole. All churches, schools, and public houses of the district are closed, so as to prevent the congregating of people together, and remove those inducements which might cause persons to come from infected towns.

On the occurrence of illness among cattle from *other* causes, as well as the pest, the commissioners, as a rule, do not approach the animals, but standing at a distance, and within sight of them, they arrive at a decision as to the nature of the ailment, frequently

ordering some food to be offered as a test of their freedom or otherwise from the malady. In those instances where the commissioners enter the stable, they are compelled before leaving to wash their hands, &c., in vinegar, and have their clothes fumigated with chlorine gas. All dogs, cats, rabbits, domestic poultry, pigeons, &c., have to be kept in places of security and close confinement. If the disease exists in a village through which a high road runs, the course of the road is turned if possible; but when this is not practicable, then a guard accompanies the several travellers who arrive at the boundaries of the *cordon* to see that they do not go upon any of the infected premises. The *cordon* is frequently maintained by the peasants, but none are taken for this purpose from an infected village, the selection being made from contiguous villages or farms where the cattle are healthy.

As soon as a malady is observed in a commune, notices are sent to all the surrounding places, that precautionary measures may be immediately adopted by the owners of cattle. Each commune has to provide a place for the burial of the animals which die or are slaughtered, and also a wagon and horses to carry them upon; and on the disease passing away the wagon is burned and the horses are washed with a solution of chlorinated lime. The place of interment is likewise enclosed, and not allowed to be disturbed for several years."

The report of Prof. Simonds terminates with sixteen distinct propositions which embrace his conclusions. The first seven being simply historical are omitted. The others are as follows:

"8. That all the facts connected with the history of the outbreaks of the rinderpest concur in proving that the malady does not spread from country to country as an ordinary epizootic, and that if it were a disease exclusively belonging to this class, the sanitary measures which are had recourse to throughout Europe would be inefficient in preventing its extension, and consequently that in all probability we should long since have been both practically and painfully familiar with it in this country, as hundreds of our cattle would have succumbed to its destructive effects.

9. *That it is one of the most infectious maladies of which we have any experience*, and that it is capable of being conveyed from animal to animal by persons and various articles of clothing, &c., which have come in contact with diseased cattle.

10. That the ox tribe is alone susceptible to the disease; and

that the morbific matter on which it depends lies dormant in the system for a period not less than seven days, and occasionally, according to some continental authorities, *as long as twenty days*, before the symptoms declare themselves.

11. That an attack of the disease which has terminated favorably renders the animal insusceptible to a second action of the *materies morbi* which gives origin to the pest.

12. That the deaths often amount to 90 per cent.

13. That the malady is one in which the blood is early if not primarily affected; and that subsequently the mucous membranes throughout the entire body become the principal seat of the morbid changes.

14. That the symptoms in general are well marked and quite characteristic of the affection.

15. That all varieties of medical treatment which have as yet been tried have failed in curing the disease; the recoveries which take place having for the most part depended on the healing power of nature.

16. That no fear need be entertained that this destructive pest will reach our shores. Its present great distance from us would of itself afford a fair amount of security; but when we add to this that no cattle find their way from thence directly or indirectly to the English market, and also, in the event of the disease spreading from Galicia, it would have to break through hundreds of military cordons, one after the other, before it could possibly reach the *western side* of the German States, and, moreover, that for years past commerce has been unrestricted with regard to skins, hides, bones, &c., of cattle from Russia and elsewhere, all alarm, we believe, may cease with reference to its importation into the British Isles."

Subsequent experience seems to have corroborated the accuracy of most of the learned professor's conclusions; but with regard to two of them farther developments show that he labored under serious error; for the disease *has* appeared in England, whether it passed through the "hundreds of military cordons one after the other," or came direct by ship importations, as seems more likely, and it was reported early in November that no less than fourteen thousand cases had occurred, of which about thirteen thousand had proved fatal.

His tenth conclusion also appears to lack foundation, as now ap-

pears by the following letter of recent date, from the same gentleman, addressed to the clerk of the Privy Council:

VETERINARY DEPARTMENT,
23 New-st., Spring-gardens, Sept. 25, 1865.

To the Clerk of the Council—Sir: I beg to report that, acting on the instructions received from you, to investigate without loss of time the statement received at your office relative to an outbreak of the cattle plague in a remote part of the county of Norfolk, supposed to have arisen from cattle having been in contact *with some diseased sheep* recently brought to the premises, I have visited the district in question, and inquired into all the circumstances of the case.

It appears that as far back as the 17th of August Mr. C. Temple, farmer and merchant of Blakeney, received on his farm 120 lambs, which he had instructed a dealer to procure for him for feeding purposes. The lambs were bought at Thetford fair on the preceding day, and were immediately sent by rail to Fakenham, from which place they were driven to Blakeney, a distance of about ten miles. On their arrival they appeared to be fatigued to a greater extent than ordinary, which was, however, attributed to the heat of the weather, and the exertion the animals had undergone. In addition to this the shepherd observed that several of them seemed unwell, and he remarked to his master that they did not appear to be "a very healthy lot," and that he thought it would be better to return them to the dealer. Within a day or two of this time the symptoms of illness were more marked in all the original cases, and many more of the animals had been attacked. On the 24th two of the worst cases were removed from the field to the farm premises, and were placed in a shed for treatment, in which afterwards a cow was put. On the 25th two of the lambs died, and, in consequence of this and of the large number which were now affected, the whole were brought on the morning of the 27th into the same yard where the shed, previously alluded to, is situated. There is also another shed, separated from this yard only by some old furze faggots, into which the cows were driven night and morning for being milked. The lambs remained in the yard till the morning of the 28th, when, having had some medicine administered to them, they were returned to the field, and never came again near the cows. While in the yard three died, two on the

27th, and one on the 28th; and, on the following day, two others died in the field. From this time the disease went on, so that by Friday last, Sept. 22, the day of my visit, 46 had either died or been killed, and 27 were in a very precarious condition. On Sept. 7, ten days after the last exposure to the sheep, a cow gave evidence of being affected with the cattle plague, this animal being the one which had been put into the shed occupied by the diseased sheep on the 24th of August. A second cow was attacked on September 11, and a third shortly afterwards, which was followed by others, so that by the 16th all the cows—six in number—a heifer, and a calf, were all dead. My examination of the lambs showed that they were unmistakably the subjects of the plague. The symptoms agreed in almost every particular with those observed in cattle affected with the malady, and the post-mortem appearances were also identical.

With a view to ascertain the true nature of the changes produced in the system prior to death, I had four of the lambs killed, and from these I took some diseased parts, and forwarded them to the Royal Veterinary College without note or comment. These parts were examined by my colleague, Mr. Varnell, who at once recognized the special changes of structure which are caused by the cattle plague. The whole facts of the case leave not the least doubt of sheep being liable to the disease termed the cattle plague, and that when affected they can easily communicate the malady to the ox tribe; and, moreover, that when so conveyed it proves equally as destructive as when propagated from ox to ox in the ordinary manner.

The case is also more important from having occurred in a place no less than fourteen miles distant from any other where the cattle plague exists, thus placing beyond a doubt the fact of the malady being introduced among the cattle by the sheep alone. I regret to add that this is not a solitary case of sheep being affected by the cattle plague. I learned that some sheep were supposed to be similarly affected belonging to Mr. R. J. H. Harvey, M. P., on his his estate at Crown Point, near Norwich.

This place I also visited, and found a large flock of upwards of 2,000 lambs, among which the malady was prevailing. A large number had been separated from the diseased, and gave no evidence of the malady. Very many, however, had died; and the disease was making rapid progress. I also examined many of the dead,

and found the *post-mortem* appearances to be identical with those seen in the other cases spoken of in this report. In this instance the malady was brought in to the estate by the purchase of some cattle which afterwards died from the disease, and which were unfortunately pastured with the sheep at the time the disease manifested itself. The whole matter is one of the greatest importance, and which I lose no time in submitting to you, for the information of the lords of the council.

I have the honor to be, sir, your most obedient servant,

JAS. B. SIMONDS.

It is understood that the action of the Privy Council upon the receipt of this communication was very prompt, and that a new order was issued embracing the provisions of all earlier ones and applying the same to other animals, including sheep, lambs, goats and swine as well as horned cattle. The terms of this order are not at hand, but a copy of one issued shortly previous is as follows:

Action of the English Privy Council.

"Whereas a contagious or infectious disorder has lately appeared and now prevails among cattle within that part of the United Kingdom called Great Britain, which is generally designated as the "cattle plague;" and whereas it was expedient to take measures for preventing such disorder from extending to that part of the United Kingdom called Ireland; and whereas, for such purpose, an order was duly made, in pursuance of the authority of the said acts, by the lords of her Majesty's most honorable privy council, dated the 25th of August, 1865; and whereas, by such order, the removal to any port or place in that part of the United Kingdom called Ireland, from any port or place in that part of the United Kingdom called Great Britain, of any cow, heifer, bull, bullock, ox, or calf, was prohibited; and whereas it is apprehended that the said disease, termed "cattle plague," may be communicated otherwise than by the removal of the above-named animals:

Now, therefore, the lords of her Majesty's privy council do hereby, in the exercise of the powers given by the said recited act, and by the several acts continuing the same as aforesaid, order as follows: That, after the date of the publication of this order in the London Gazette, it shall not be lawful for any person to remove any skins, hides, horns, hoofs, or other parts of any of the above-

named animals from any port or place within that part of the United Kingdom called Great Britain to any port or place within that part of the United Kingdom called Ireland. And the lords of her Majesty's treasury are to give such directions herein as may be necessary to insure due obedience to this order."

Report of the French Minister of Agriculture.

SEPTEMBER 8. The Moniteur publishes a report from M. Béhic, minister of agriculture and commerce, on the subject of the cattle disease now prevalent in England and the countries of the north of Europe. He states that, as already announced, on the breaking out of the plague he despatched MM. Bouley and Reynal, professors at the veterinary school of Alfort, the former to England and the latter to Germany, to make inquiries into the nature of the malady and the manner in which it may have become introduced into England. He at the same time appointed a commission in France to study all questions relating to the epizootic and the measures to be adopted in case the malady should become menacing for the cattle of France. The result of those inquiries forms the subject of the present report, and may be summed up as follows:

"The disease in question—known in England as the cattle plague, in Germany as the *rinderpest*, and in France as the *typhus contagieux*—is indigenous to the steppes of eastern Europe, and is never developed spontaneously out of those regions, no matter how unfavorable are the hygeinic conditions to which the cattle may be exposed. The plague is, therefore, an exotic malady for western Europe. Its present invasion in England arises from the importation of Russian cattle, embarked at the port of Revel, in the Gulf of England, and landed on the wharfs of the Thames. If, however, the disease is originally of one single country, its contagious properties cause it to be essentially migratory, as is shown by its repeated extension to all the countries of western Europe, and even to England, notwithstanding her isolated situation. In most instances the irruption of the plague from what may be called its native country has been occasioned by the movements of armies from the north, and which have been naturally accompanied by large herds of cattle, required for the food of the soldiers. When, in consequence of scientific researches made in Germany and Russia, the fact was established that the disease is endemical to the

steppes of Russian Hungary, the governments of Prussia and Austria were able to take measures to preserve their own provinces, and consequently those of the other countries of western Europe, from the contagion. The result has been that a period of fifty years has passed without the plague having once appeared, while during the last century it showed itself in France almost every twenty years. Those preservative measures were, however, only applicable to the introduction of cattle by land. At the present moment, when the means of communication between different countries have become so rapid and so easy, the chances of the disease crossing or turning the barriers opposed by Germany to its invasion have greatly increased. For example, in the present instance the plague has been introduced into England by the direct importation of cattle from the Russian ports. Thus England, after a lapse of one hundred and twenty years, is again suffering from the plague which caused such devastation in 1745. The malady has now been communicated to Holland by a vessel laden with cattle for Great Britain, and which had returned with her cargo to a port of Holland in consequence of not having been able to land it in England, no doubt in consequence of the diseased state of the animals. In the same manner the plague might have been introduced into France, if the Dutch vessel, being driven from England, had put into one of the Channel ports of France with the hope of disposing of her cargo. There is thus an absolute urgency for forbidding the admission into the ports of the Channel, or of the North Sea, of all vessels laden with cattle, or of subordinating the importation of the cattle to measures of a nature to prevent the invasion of the disease. The same dispositions should also be put into practice on the northern and eastern frontier. The minister then adds that the laws already in vigor are sufficient to combat the plague in the interior of France, but that in the present system of foreign trade the administration has not sufficient power to prevent its introduction by sea or across the frontier."

The report is followed by an imperial decree declaring the importation of cattle into France to present a danger of contagion, and authorizing the minister of agriculture and commerce to determine what ports or portions of the frontier should be closed against the introduction of such animals. The above is also accompanied by an order from the minister absolutely prohibiting the importation of animals of the bovine race, as well as the skins or other fresh

portions of cattle, by any seaports between Nantes and Dunkirk, or by the frontier between the sea and the Rhine, and by the other ports of the empire only after inspection. Animals which should be suspected, or should have been in contact with those suffering from disease, M. Béhic orders to be kept isolated under surveillance for ten days. As an exception to those dispositions, the order prohibits in an absolute manner the introduction of cattle, their skins, or other fresh portions, from England, Holland, or Belgium, by any of the ports or the frontier of France.

We may not shut our eyes to the fact that imminent danger exists of the introduction of this plague to our American shores; nor can there be a reasonble doubt that stringent measures, vigilantly enforced, may avert such a dire calamity. We have *no need*, as the English have much, to import cattle for food, and we already have as good animals, of the most approved breeds, for the purposes of propagation, as exist in Europe. There is therefore no excuse whatever for *any* importations while any such danger may be incurred.

I know not what may be the legitimate powers of local, State, or general government in this matter, but be the power where it may it should be exercised, at once, and with a firm and steady hand. If there be no express delegation of sufficient authority to the powers that be for this specific purpose, it can hardly be deemed an unprecedented or unwarranted stretch of power for the Executive to assume that the public safety is the highest law, and to do what is needful.

It has long been my desire to make a detailed agricultural survey of the State, either by counties or by taking up successively certain districts defined by physical features more distinctive and less arbitrary than county lines; but hitherto other claims upon my time have prevented the accomplishment of the purpose by hindering that close and personal investigation which is necessary to make such a survey of much value to the farming interests of the State.

Having, however, secured the assistance of Mr. Boardman, in this matter, during the present year, I am happy to present the result of his investigations regarding the county in which he resides, and which is not only a very interesting section of the State, but one which has been, from the first, active and foremost in every movement seeking to advance the interests of practical agriculture throughout the State.

A GENERAL VIEW

OF

THE AGRICULTURE AND INDUSTRY

OF THE

COUNTY OF KENNEBEC,

WITH NOTES UPON ITS HISTORY AND NATURAL HISTORY.

BY SAMUEL L. BOARDMAN,
JUNIOR EDITOR OF THE MAINE FARMER.

PREFACE.

The following pages embody the results of several excursions through the county of Kennebec during the last season, undertaken both as a recreation from office labors and with a view of becoming better acquainted with the agricultural operations and other industrial pursuits of the people. In my tours I visited nearly every town in the county, passing through each in different directions in order to obtain a correct knowledge of its topography, the character of its soil, &c., and also examining in detail the best farms in the several towns, a description of which, with the owners' system of management is given in the second part of this report. In two or three instances where I have been unable to personally visit towns, I have received statements from reliable and well informed residents, which have been incorporated into my description of the general topography of the county. The report has been prepared during the brief intervals snatched from other duties, and although possessing many and obvious defects, is presented to the farmers of the county and State with the hope that they will find in it enough of interest and information to compensate for its perusal.

I desire in this place to express my hearty acknowledgments to all who have so readily aided me in gathering information for this report, and for the uniform kindness which I have personally received from those among whom my excursions have led me. I trust I shall be doing a mark of justice to those who have rendered me important and valuable assistance, and no injustice to others (to the large number of whom I am greatly indebted) who have aided me in a less degree, if I append the names of the former to the exclusion of the latter:

To Hon. James W. North of Augusta, for important historical information; to Rev. F. Gardiner of Gardiner, for valuable meteorological tables and other interesting statistics; to Hon. Sanford Howard, Secretary of the Michigan Board of Agriculture, for his sketch of the early importation of stock into the county by the Messrs. Vaughan; to Prof. Charles H. Hamlin of Waterville College, for his list of birds of the county; and to Rev. W. A. Drew, G. G. Stacy, Esq., State Librarian, and J. H. Cochrane, Esq., Assistant Secretary of State, Augusta; Hon. W. A. P. Dillingham, Daniel R. Wing, Esq., and E. Maxham, Esq., of Waterville; Col. Isaac W. Britton of Winslow; Horace Colburn of Windsor; John Berry, Esq., of Gardiner; David Cargill, Secretary of the old Kennebec Agricultural Society, of Winthrop; Mr. Calvin Spaulding of Hallowell; James M. Carpenter, President of the Kennebec Union Agricultural Society, of Pittston; S. N. Taber, Warren Percival, Esq., and Col. John D. Lang of Vassalborough; B. F. Lovejoy, Esq., of Fayette; Dr. N. T. True of Bethel, Nathan Foster of Gardiner, and James L. Cheeseman, Esq., of Farmingdale, for much assistance in the various divisions of my subject.

In preparing the historical portion of this paper I have drawn largely from Sullivan's and Williamson's Histories of Maine, the Collections of the Maine Historical Society, Greenleaf's Statistical View of Maine and Survey of Maine, Hanson's History of Gardiner and Pittston, together with numerous local histories, pamphlets, historical sketches in the county papers, &c. In treating of practical agriculture I have had the reference of my own collection of works upon this subject, and free access to the State Library, where are to be found many publications not often accessible to most farmers.

AUGUSTA, December 1, 1865.

KENNEBEC COUNTY, ME.

PART FIRST.

HISTORICAL AND DESCRIPTIVE.

CHAPTER I.

Historical Introduction.

The Abnaki—one of two powerful nations of Indians which occupied the present limits of Maine when European navigators visited our coast—were in possession of the territory from New Hampshire to the Penobscot. This great nation was divided into four smaller tribes, one of which, the Cannibas or Kennebecs, occupied the land on both sides of the Kennebec river from the mouth of the Androscoggin to Moose Head Lake. This tribe was subdivided into the Norridgewogs who dwelt at Norridgewock; the Taconnets at Waterville, and the Cushnocs at Augusta. They spoke the same tongue with slightly differing dialects, and were virtually one people.

The Kennebecs were a very numerous tribe, the different clans of which all paid homage to the head chief who resided on Swan Island, in Merry-Meeting Bay. This place, according to Williamson, seems to have been the head-quarters of the Abnakis.

Holding the soil in common, they did not understand how one person could own a certain tract himself, as each native possessed an undivided right to the entire territory of his tribe. When the land was purchased by the whites, they supposed they possessed a title in fee simple—on the other hand the Indians supposed they sold only what they themselves possessed—viz: the right to fish and hunt and hold possession with others. Thus the Indians were compelled to yield to what they regarded as injustice, which was a cause for serious trouble between them.

The mouths of the Cabbassa-contee and the Nahumkeag were

two of their favored localities at an early date—Captain Smith alludes to the latter as early as 1614—though the whites soon drove them further up the river. So recently as 1829,* large quantities of arrow-heads, bones, kettles, and other relics have been exhumed in Pittston and about the mouth of the Cabbassa, showing it to have been a favorite resort.

Williamson† says that for fifty years after the settlement by the whites, they had constant intercourse with the Indians, undisturbed by any open rupture. They traded freely with the whites until they began to know it was their design to claim occupancy of the soil in fee simple, and drive them away from their hunting grounds —when they began to resist with force the advances of the whites and commit acts of cruelty. The whites, as early as 1614, were guilty of wrong towards the Indians, which with the succession of cruel and inhuman deeds committed for several years following, served to exasperate them to renewed acts of hostility towards the whites, and these were kept up until about 1755. Williamson says that within a period of eighty-five years, between the war of Philip, A. D. 1675, and the capture of Quebec, the inhabitants of Maine have been extreme sufferers in six Indian wars. The power of the Kennebec tribe was broken by the destruction of Norridgewock, in 1724. In 1764, there were but thirty warriors of the tribe left, and in 1795 it contained but seven families.

The shores of Maine were visited by English navigators at an early day. Bartholomew Gosnold explored the coast in 1602, and Martin Prinn in 1603. The success of Prinn's voyage aroused the spirit of adventure in the French, who sought to obtain possession of territory in the new world, and they used all means in their power to establish their claims. Pierre de Mouts—having received a royal patent from Henry IV of France, to all the territory between 40° and 46° north latitude, embracing all the New England States, the Canadas, Nova Scotia and New Brunswick—reached his new possessions in 1604. He wintered on St. Croix Island in 1604–5, and the next spring explored the country westward to the Kennebec river, where he erected a cross, and took possession in the name of his king.

In 1605, George Weymouth explored the shores of Maine, and discovered the Penobscot river. To Weymouth's party belongs

* Hanson's History of Gardiner and Pitteton, p. 18.

† History of Maine, Vol. I, p. 498.

the credit of having made the first attempt at agriculture in Maine, they having planted some garden seeds upon an island on the 22d of May, 1605.

James I of England granted to the Plymouth Council, in 1606, a tract of land which included the southern half of Maine, and a settlement was commenced the next year on Stage Island, but it proved unsuccessful, and was abandoned in a few years. This charter was renewed by King James in 1620, with limits more clearly defined, and with privileges that would insure an extended settlement. So indefinite were the limits of lands granted by the Plymouth Council to Sir Ferdinando Gorges and John Mason, that many disputes resulted therefrom, in consequence of both claimants conveying the same places to different individuals.

The New Plymouth colonists began to trade with the natives about 1626, in which year a shallop loaded with corn passed up the Kennebec river and returned with "700 lbs. of beaver skins and some other furs."

In January, 1629, the Plymouth or Kennebec Patent, was granted to New Plymouth. It was from the old Plymouth Colony to William Bradford, and was intended as an express favor to her trade and fishery, and the propagation of religion. It extended fifteen miles in width on either side of the Kennebec, and contained 1,500,000 acres. Numberless disputes and much litigation were the causes of the indefinite manner in which the boundaries of this grant were stated, but it was finally decided in 1757, that the southern limit should be the northern line of Woolwich below Swan Island, and the northern boundary the southern line of Cornville. This decision by the Superior Court of Massachusetts put an end to the extravagant claims of the New Plymouth Company, which defined the sea as its southern limits. It also settled the fact that the colonists had an exclusive right to the trade of the Kennebec, and all who intruded were trespassers.

A trading house was erected at Fort Popham in 1634, and another at Cushnoc the same year, and in 1639 the charter of the PROVINCE OF MAINE was granted to Sir Ferdinando Gorges.

From a variety of causes—among which may be mentioned the nondescript character of the government, under which neither the laws nor the rulers were respected; the somewhat transient population, consisting of hunters and traders; the unobservance of the rules of the colonial government in regard to intercourse with the

natives; the remoteness of the parent colony, and her consequent inability to enforce proper laws; the diminution of furs and game, and the question of the territorial title and right of the colony—the interests and trade of the New Plymouth settlement at Kennebec began to decline about 1650, and in 1652, the colony made a lease of the trade for three years, to Gov. Bradford, at the expiration of which time it was leased seven years longer. During these years difficulties increased, and in 1661 the patent was sold for £400 sterling.* Williamson,† in remarking upon this event, says: "It is surely to be lamented that the laudable endeavors, made more than half a century before, to plant a colony within the limits of this territory, should never have been effectually revived; and that the patent itself, after the sale, was in fact permitted to sink so deep in oblivion as to exhibit only a few settlements, fewer surveys and a small number of owners' names, for the greater part of a hundred years."

The PROVINCE OF MAINE was purchased of Gorges by Massachusetts, May 6, 1677, for the sum of £1,250 sterling.

In 1682, the General Court ordered an annual tax of two shillings sterling to be assessed and collected on every one hundred acres of woodland lying without the limits of a corporate town. Previous to this, being unproductive to individual owners, they had not been taxed, but their gradual rise in value, and the appearance of speculation, led to this result.

Encouraged by the settlement of other sections, the proprietors of the Plymouth or Kennebec colony entered upon the occupancy and improvement of their territory in 1716. They offered to families who would become settlers one hundred acres of good land, their removal free of expense, and the promise of contributions towards the support of the gospel. For their protection against the attacks of the Indians in case a rupture should occur, Dr. Noyes, one of the Plymouth proprietors, erected a stone fort at Cushnoc, "at his own charge," which was undoubtedly the best fortification in the eastern country. A garrison was for some time maintained here at the public expense, and the encouragement given to the surrounding country by the establishment of this fort

* The purchasers were Antipas Boies, Edward Tyng, Thomas Brattle and John Winslow, and the descendants and assignees of these men associated and formed what was long known as the Kennebec Company, and the owners of all the land in the county now trace their titles back to that organization.

† History of Maine, Vol. I, p. 370.

was so great that inhabitants multiplied, mills and other buildings were erected, increased attention was paid to farming and the raising of cattle, the fishing business became of more importance, and large quantities of lumber—consisting of boards, planks, staves, &c.,—were annually sent to Boston and other places.*

The evidences of prosperity in the new settlements, especially the erection of mills and forts, excited the animosity of the Indians, whom the French missionaries endeavored to set against the English, by inducing them to believe their rights had been invaded. Rumors of a war between England and France were at the same time current, which also aided the fire of hatred against the English and love of warfare in the Indians. They became troublesome, and it was deemed expedient to abandon the settlement at Cushnoc. In 1726 the fort was destroyed by the Indian, the buildings in the neighborhood burned, and the place lay desolate for many years.

It is an evidence of the foresight and sagacity of the officers of government, that at so early a day such strict measures were adopted for the preservation of forest trees. One of the paragraphs of the Provincial Charter reserved all trees of 24 inches in diameter 12 inches from the ground, if growing upon land not previously granted to private persons, for the purpose of masting the royal navy ; and a penalty of £100 sterling was imposed for the felling or destroying of any such tree without a proper license. To also guard against their destruction the surveyor general sent out deputies who marked large numbers of them with a capital R. This was done in 1719.

Fort Richmond, on the west bank of the Kennebec, and within the present town of Richmond—which was formerly within the limits of Kennebec county—was built in 1719, but dismantled in 1754, its armament being removed to Fort Halifax. During the ravages of the Indian wars in Maine, from the commencement of Lovewell's war in 1722, to 1753—a period of thirty-two years, full of all the atrocities of savage warfare, and in which many settlements in other parts of Maine were laid waste—those within the limits of the present county of Kennebec were comparatively free from their depredations. The power of the Kennebec tribe had

* The settlement of the Kennebec country—after repeated failures in consequence of the Indian wars—is due in a great measure to the wealth, energy and public spirit of Dr. Sylvester Gardiner, for many years director of the affairs of the Kennebec Company, for an account of whom, as well as a History of the Patent, the reader is referred to the Maine Historical Collections, Vol. II, and to Hanson's History of Gardiner and Pittston.

been effectually subdued by the destruction of Norridgewock and death of Rale in 1724.

France had laid a deep plan for the purpose of gaining and holding possession of the territory in the New World westward to the Kennebec, from Acadia, and the forts erected by the English, extending in a line from Fort George northward to the great carrying place and so on to the northern lakes, were built, not so much for protection against the Indians—which was however an important object—as for the purpose of keeping back the French, and preventing their settlement upon the Kennebec, its branches, or upon the carrying places at its head.

In 1754 the government, becoming satisfied that it was useless to think of perpetuating the peace and friendship of savage men by presents—especially when in league with a malevolent adversary—ordered the enlistment or detailment from its militia of six companies to hold themselves in readiness for duty at the shortest notice; and also made provision for the erection of a new fort on the Kennebec. For the purpose of making a proper location for this fort, Gov. Shirley made a personal survey of the eastern country ascending the Kennebec as far as Norridgewock, and finally decided that the same should be situated near Taconnet Falls, eighteen miles above Cushnoc—which is in the present town of Winslow. The fort was quadrangular, about 100 feet long and 40 feet wide. It was constructed of hewn pine timber, was about 20 feet high and had flankers and blockhouses of the same material. The walls were thick enough to resist a musket ball, and the fort would afford accommodation for four hundred men. Upon an eminence back from the fort—now known as "Fort Hill"—was a strong redoubt, fortified by two small cannon and a swivel gun. In the main fortress were mounted several small cannon, and a garrison of 100 men was established. It was completed Sept. 2d, 1754, and the name, HALIFAX,* was conferred upon it with much ceremony.

* The fort was situated on the point of land between the Sebasticook and Kennebec rivers, which is a fine alluvial deposit. I believe there were originally four block houses, one in each corner of the stockade or enclosed yard. One of these, that near the western shore of the Sebasticook, is now standing and is an object of attraction to those at all interested in our early history. It is built of hewn pine timbers, most of them 16 inches square, and is itself about twenty feet square. The timbers are dove-tailed together at the corners, and the block house is two stories high, the upper story projecting over the lower story about one foot on each side. In the side next to the rivers there are now to be seen several two inch auger holes probably bored for the purpose of taking

Two other forts were built by the proprietors of the Kennebec purchase during the year 1754, viz: Fort Western at Augusta, and Fort Shirley at Frankfort, (now Dresden). The former was commanded by James Howard, the latter by Samuel Goodwin. During this year the Governor ordered a road suitable for the passage of wheel carriages, to be built from Fort Western to Fort Halifax, and large sums of money were also appropriated for the purpose of repairing the forts already built and procuring supplies for the garrison at Halifax.

An attack was made upon Fort Halifax Nov. 6th, 1754, during which one soldier was killed and four carried away prisoners. The garrison was at once reinforced, and six companies of minute men ordered to be ready for marching at the shortest notice.

' Previous to 1760 all the territory in the district of Maine was known as the county of York. By an act of the General Court of Massachusetts June 19th, 1760, the counties of Cumberland and Lincoln were established. York occupied the territory on the west, Cumberland the central portion, and Lincoln the eastern, extending to Nova Scotia. The several shire towns were York, Falmouth and Pownalboro'.

After the reduction of Quebec, through the efforts and influence of the Plymouth proprietors, the settlers along the Kennebec from the southerly limits of their patent to Teconnet Falls had increased in number beyond a parallel; and by the census of the State taken in 1764 the county of Lincoln contained 4347 white inhabitants, 580 families and 565 houses.

Fort Halifax was abandoned on the treaty of peace at Paris in 1763.

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aim, in discharging muskets from within. The block house now stands close to the western bank of the Sebasticook, but an old resident near the locality tells me that fifty years ago there was ample room to drive between the house and the river with a cart and oxen. This change has been effected by the action of the river upon the land. The fort was situated about 100 feet northeast of the block house, and the cellar wall or foundation was taken away in the summer of 1865,—the corner stone, which is now in the State House at Augusta, and bearing this inscription:—"THIS CORNER STONE LAID BY DIRECTION OF GOVERNOR SHIRLEY, 1754,"—having been removed several years ago. This old building has been used as a stable in recent years, and the roof shingled to protect it, but it is fast going to decay. Together with the land about it the block house was purchased some time since by Hon. Asa Redington, his object being to preserve it as a relic of the olden time; but unless more effectual measures are soon taken in that direction it will remain but a short time longer. A large building should be erected over it for its preservation, previous to which it should be purchased by the Maine Historical Society, who would be likely to take more careful means to keep it from decay, than any private individual, however much he might value the antiquity of the relic.

With the growth of the Kennebec country, the activity and importance of the village of Hallowell, which from 1766 to 1825 took the lead in business on the river, continued to increase, and in 1790—notwithstanding the long wars that had taken place since the erection of Fort Western, 1754—the town contained a population of over eleven hundred. It was made one of the shire towns of Lincoln county, and one term of the Court of Common Pleas was held here annually. Afterwards, one term of the Supreme Judicial Court was held here each year.

Up to about 1794 the ascendancy of the village at the Fort—the present site of Augusta—was strongly marked over the "Hook," or Hallowell, but a few years later, probably about 1796, the Vaughan family, who had settled at the latter place, became instrumental in its growth, and considerable competition began to exist between the two villages. A contest of some importancce occurred upon the location of a bridge across the Kennebec, but it was decided in 1797 by being built at Augusta.

The prosperity and progress of the Kennebec settlements, rendered it expedient for a new county to be formed, and accordingly in 1799 the northern half of Lincoln county was made into the county of Kennebec. At that time the northern limit of the county was the Canada line. The southerly line ran very nearly the same as at present, on the south sides of China and Pittston, thence to Purgatory stream, at its junction with the Cabbassacontee stream, along the south side of Monmouth and Green—the latter town now in Androscoggin county—to the Androscoggin river. Cumberland county then ran to the northern line of the State upon the west, and Hancock upon the East. To show how the present limits of Kennebec county compare with its limits sixty-five years ago, it may be stated that in 1809 the erection of Somerset county took more than four-fifths of its original territory; Waldo county, established in 1827, took four towns upon its east; Franklin county in 1838, took five towns upon the northwest; and Androscoggin, in 1854, four towns upon the west. So that at the present day, the county is, in the extent of its territory, but a tithe of its original extent.

The following figures show the increase of inhabitants in the county from 1790 to 1820, viz: in 1790, 9,105; 1800, 17,995; 1810, 31,565; 1820, 40,150.

In 1820, Maine obtained a separate constitution and was admitted into the Federal Union.

The Legislature of Maine held its sessions in Portland from 1821 to 1832. In 1827 an act fixing the seat of government at Augusta, and authorizing the Governor and Council to determine upon a site for the location of the State House, passed the Legislature. This having been decided and conveyed to the State, the work of building was commenced in 1828 and completed in 1831. It is constructed of granite, mostly from the Hallowell quarry, and is 150 feet long by 50 wide, with an arcade and colonnade projecting 15 feet in front and 80 feet in length. Its cost was $140,000, and it is one of the finest edifices in New England. It was first occupied by the Legislature in 1832.

The county of Kennebec is traversed by the Maine Central, Somerset and Kennebec, and Portland and Kennebec railroads, and the facilities for communication and transportation of products by river and rail, are not exceeded by any county in the State. Six newspapers are published within the county, and it has a population of nearly 56,000 inhabitants.

CHAPTER II.

Topographical outline of the County; with Historical and other Notes upon the several Towns.

The county of Kennebec is situated in the southern central part of Maine, between lat. 44° and 44° 31′, and long. 69° 20′ and 70° 10′, and contains an area of about one thousand square miles. According to the report of the Land Agent for 1839, the towns embracing the present county of Kennebec, contained an aggregate area of 490,259 acres. The legislative committee on the State valuation for 1844, made the following returns of the number of acres of unimproved and waste lands, viz: woodland, 83,832; unimproved land, 167,085; waste land, 80,078. The United States census of 1860, gives the number of acres of improved land in farms, as 285,393, and of unimproved land in farms, 164,960; making a total of 450,353. A part of the town of Fayette was granted by the Commonwealth of Massachusetts to Robert Page and others in 1785–92, and Vienna was granted by the Commonwealth of Massachusetts to Prescott Whittier and others in 1792. Aside from these, all lands in the county were granted by the Plymouth Council and Plymouth Proprietors (1629) and are a part of the Kennebec Purchase, confirmed to the claimants under the original

grant in 1787. The population of the county from 1820 to the present time may be gathered from the following statement:

In 1820, ...	40,150
1830, ...	52,484
1840, ...	55,804
1850, ...	58,021
1860, ...	55,655

It must, however, be borne in mind that in 1830, the towns of Pittsfield, Greene, Leeds, Chesterville, New Sharon, Dearborn, Farmington, Temple and Wilton; and in 1840, the towns of Dearborn, Greene, Leeds and Wales, were included in this county, and have since been set off upon others. The mean time of the closing of the Kennebec river by ice for forty-five successive years has been December 12th, and of opening April 3d, and since the year 1786, the river has not been closed by ice later than the 20th of April. The location of the county is highly favorable for the growth and maturing of all agricultural productions, and it has less waste and unimproved land than any other territory of equal extent in the State. In 1850, the county yielded a greater quantity of corn, hay and butter, and a greater value of orchard products than any county in the State. Of corn, the amount was 296,108 bushels; of butter, 1,124,721 lbs.; and of hay, 97,496 tons. A table showing the amount and value of the agricultural products from the census of 1860, is given another part of this report. The county is one of the best farmed sections of Maine, and the evidences of prosperity abound in fine farms, good buildings and fences, excellent roads and thriving villages.

I shall now give brief historical, descriptive and statistical sketches of the towns in the county, beginning with those upon the east side of the Kennebec river.

Pittston is the most southern town in the county. It extends along the river seven miles, and runs back from the river east, five miles, including an area of 21,300 acres. It was incorporated as early as 1779. The soil next to the river is a clayey loam, this part of the town, as well as the eastern and southeastern, being thickly settled, while the interior of the town contains a large amount of low land covered with wood, and is not so thickly settled. Nehumkeag Pond, situated very nearly in the centre of the town, with an outlet into the Kennebec, contains about 175 acres. The southeast part of the town is watered by the Eastern

river, which affords some water power, at the village of East Pittston, and running through the southeast part of the town, empties into the Kennebec at Swan Island. In the eastern part of the town is a high elevation of land known as Beech Hill, or ridge, which is the oldest portion of the town, the first settlement having been commenced there in 1761. The soil on the river is a clayey loam, in the east part of the town it is somewhat rocky, and the soil is more gravelly. Much of the original growth of wood in Pittston was white oak.

Proceeding north we reach Chelsea, a small town incorporated in 1850, previous to which it was a part of Hallowell. The town contains 11,228 acres, a very large proportion of which is woodland. On the river are some good farms—many of them having been settled at an early period—the land being chiefly a clayey loam. Proceeding back from the river the land grows poorer in quality, and much of it is little used for agricultural purposes. This town has become somewhat noted during the past few years as the location of "Beals' Hotel," a large and thoroughly-built summer boarding-house, with all the modern improvements and accompaniments. It is situated in the northeast corner of the town, near the celebrated "Togus Spring," which has given the place considerable repute, and was built in 1859. The hotel is located in the midst of uninteresting scenery, the land is low and boggy, much of it is a coarse white sand, and the growth—the original timber having been destroyed by fire—is small, scrubby and of little value, consisting chiefly of spruce, fir, poplar, white birch, alder, &c. About the house large amounts have been expended upon the land, in clearing it of stones and stumps, putting in drains, building wall, &c., which gives it a very good appearance, but for the surrounding character of the soil. All these improvements were the work of the late Horace Beals of New York, a gentleman of wealth, and an invalid, who conceived he had been greatly benefitted in health by the use of the water from the springs, and consequently built the hotel and improved the grounds. These improvements probably cost $100,000. The estate was offered as the location of the proposed State Industrial College, but it has been decided as unfavorable for the object. The hotel is open every summer, and is a popular resort for health seekers from the cities.

I believe an analysis of the water of this spring was made by the

late Professor Cleveland of Bowdoin College, but none has ever been published. It belongs to a class of mineral springs known as Sulphurous,* one of its main constituents being sulphydric acid, or as it is sometimes called sulphuretted hydrogen. The water commonly holds in solution certain salts of iron and alumina, but the medicinal efficacy depends entirely upon the sulphydric acid. It is said that according to the analysis of Prof. Cleveland, the water was also found to contain Carbonic Acid, Soda, Lime, Magnesia and Iron, but in what proportions I do not know.

The spring at Togus was discovered about 1810, at which time it was called "Gunpowder Spring;" though but little attention was directed to it as a summer resort until the hotel erected by Orren Emerson was built about 1850. This is known as the "Old Emerson House." Afterwards Mr. Emerson disposed of the property to Mr. Beals, who built the present "Togus House."

Leaving Augusta at the left, and proceeding north through the back range of towns in the county—east of the river—the pedestrian next enters Windsor. This town is six miles square (it is the only perfectly square town in the county,) and was settled in 1790. It had been called New Waterford previous to its incorporation, at which time, in 1809, it received the name of Malta. It was afterwards changed to Gerry, and in 1822 to its present name. The soil is chiefly a clayey loam, although near the Middle Corner there are ridges of sandy land, and also of deep yellow loam, alternating with ridges of clayey land. In the south part of the town near Bryant's corner there is considerable sandy and gravelly soil. The ridge of land extending in a northerly direction through the centre of the town contains many fine farms, and the soil is excellent for grass, grain crops, and potatoes, but is not so good for corn and orchards. On Windsor neck, a tract of land in the northeast part of the town, some two miles long and from one-half to three-fourths of a mile wide, are some excellent farms. The land is high and moist, and contains good orchards. The town is watered by the western branch of the Sheepscot river—which affords power for some machinery at Pope's and Maxy's mills—and by several small ponds and creeks. The town originally contained great quantities of pine trees, though but very few of the old trees are now standing.

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* Preliminary Report on the Natural History and Geology of Maine, 1861, p. 445.

China is the next town north of Windsor. It was settled in 1773, and incorporated as Harlem in 1796. About 1822 it received its present name. The town contains 11,550 acres, and its agricultural advantages and capabilities are second to no town in the State. China Lake, a beautiful sheet of water, is situated in the central and western part of the town, and consists of two ponds or lakes, connected by the "Narrows." The east pond is about ten miles long and two wide, and the west one is three long and two and one-half wide, and extends into Vassalboro'. In the southwest corner of the town is Three-Mile Pond, and in the northeast corner is an extensive marsh, in the middle of which is a boggy pond. There are other small ponds in town. The west branch of the Sheepscot river passes through the southeast part of China, giving sufficient power for local milling and manufacturing at Branch and Weeks' mills. The soil is somewhat diversified, consisting of clayey loam, and strong loamy soil from which the rocks have been cleared. The surface of the town is sufficiently uneven to present a pleasant variety in the landscape, but not such as to be unfavorable for farming purposes. The highest eminences are Deer Hill in the south, and Parmeter Ridge in the east part of the town. Upon the latter are some superior farms.

The town of Albion consists of a series of high ridges or swells of land, generally running northeast and southwest. In the valleys between these there is considerable wet, rocky, and cold land. The soil is generally a rocky loam. Upon Crosby Hill in the north part of the town there are good farms with excellent orchards, which have been cleared of stones. Fifteen-Mile Brook—a stream of considerable size which empties into the Sebasticook above the village of Clinton—passes directly through the town and gives a small water power. On the ridge east of Lovejoy's Pond, the land is slaty, and the ledge so near the surface as to interfere with plowing, but on the west side of the pond the soil is lighter, though on the clayey order. The town was first settled about 1780. It was organized a plantation in 1802 as Freetown, and has severally borne the names of Fairfax, Lygonia and Albion.

Lying to the east of Benton and Clinton, and bordering upon the county of Waldo, are two small and unimportant townships known as Unity Plantation and Clinton Gore. The latter contains about three thousand acres, and has the advantages afforded by the Sebasticook river, upon which are some excellent farms; but

the former, though much larger in extent, contains but little good land. Both are gores of land occasioned by the intersection or meeting of lines in running out town lots, and they have always maintained distinct town organizations, although I think it would be an advantage to have them connected with other towns.

The town of Clinton is the most northern town in the county, and is about six miles square. The Kennebec river forms its western boundary, and the Sebasticook passes through its extreme southeastern corner. The surface of the town is considerably level, and although not classed so high as an agricultural district, as some other towns in the county, it contains a large number of good farms and intelligent cultivators. It was first settled about 1775, and incorporated in 1795. At Hunter's Mills, on the Sebasticook, there is a small village.

Benton was originally a part of Clinton, and was incorporated in 1792. The town was called Sebasticook until 1850, when it received its present name. It is situated south of Clinton, bounded west by the Kennebec, and the Sebasticook runs in a south-southwest course through nearly the centre of the town. Upon the rivers is much good land, but the eastern part of the town is rocky, hard to cultivate, and not so productive as other parts of the town. The village is small, at which place the latter named river affords power for some small machinery, including a match factory, &c. Between the rivers is a tract of land favorably situated for farming purposes, but which was probably injured by the heavy fires that years ago swept over it, consuming the best part of the soil, so that it is but little cultivated.

Proceeding south, we next come to Winslow—a town which contains some land as good, and much as poor as will be found in any town of the same extent within the county. The Sebasticook enters its northwestern corner, proceeds about three miles in the town and unites with the Kennebec at the village of Winslow. The outlet stream of China Lake also passes through the southwest part of the town, and empties into the Sebasticook just above the village. This stream furnishes power for a peg mill and other light machinery. The land bordering upon this stream and the rivers is mostly a clayey loam, and here are to be found excellent farms; but in the eastern part of the town the land is broken and ledgy, and even where the ledge does not make its appearance above ground, the soil is so thin and light, as to be unproductive

and suffer much for want of rain in most seasons. The interval on the east side of the Sebasticook near the village, is an alluvial deposit, and highly productive. On the river above the village are intervals of some extent, which afford excellent crops of corn, grain and hay, when uninjured by freshets, which frequently occur to such an extent as to cause considerable damage. There was formerly a large amount of pine timber through this section, but it has long ago been cut off. A fine growth of young pine on the Sebasticook near its mouth now shows something of its former beauty and value in this respect.

The town of Winslow formerly embraced the territory of Waterville, and originally contained seventy-two square miles. Its early history is of more interest and importance than many towns in the county; hence, I have devoted considerable space to it in the introductory chapter. The first farming by the whites was made upon the point of interval lying between the two rivers by Morris Fling, in 1764, and the settlement was for a long time known as "Fling's field." The town was incorporated in 1771, receiving its name from Gen. John Winslow, who commanded the expedition employed in building Fort Halifax. A toll bridge crosses the Sebasticook near the site of the old fort, also the Portland & Kennebec Railroad bridge—the two being but a few feet apart.

Vassalboro' contains 28,000 acres, the surface of which is beautifully diversified with hill and valley, lake and river. The soil next to the river is a clayey loam, but in the east part of the town it is more rocky and gravelly, though the fields are cleared of rocks and are very productive. Excellent orchards are found in the east part of the town. A part of China Lake extends into the town at the village of East Vassalboro', and Webber Pond—a handsome sheet of water—is situated very nearly in the centre of the town. These are both somewhat noted resorts for pleasure and fishing parties. At North Vassalboro', on the outlet stream, is a smart village, where the manufacture of woolen goods is extensively carried on. On this stream, about midway between the north and east villages, is also a good water power, capable of driving considerable machinery, and at East Vassalboro' are the usual mills of a country village. At Getchell's Corner and Brown's Corner are small villages, near the former of which is located Oak Grove Seminary. From the hill north of the village, looking down the river and

across into Sidney, is to be obtained one of the finest agricultural views in the State. There is a stream of considerable size connecting Three-Mile and Webber ponds, which gives some water power at Seward's mills, in the southeast part of the town. Taber and Cross' hills are the only eminences of any amount. The town was settled* about 1760, and was incorporated in 1771, the town at that time including the present town of Sidney within its limits. A post-office was established in 1795-6.

The town of Augusta is the only one in the county which lies upon both sides of the Kennebec. It extends six miles along the river and is ten miles from its eastern to its western boundary. The land on the river is high, forming steep and elevated banks, and is generally a clayey loam. The soil in the west part of the town is somewhat rocky, and in the east part, after proceeding three miles from the river, (which is clayey,) the soil is low, rocky, and not so good for farming purposes as in other parts of the town. In this section is Bolton Hill, to the north of which is a chain of small ponds, connected with Webber Pond in Vassalboro', and emptying into Worromontogus Pond in the east part of the town. The soil in Augusta is generally undulating, formed of tertiary and diluvial deposits. To the northwest of Bolton Hill is a forest of heavy second growth hard wood timber which is becoming of more value each year. Worromontogus stream, being the outlet of the pond by the same name, extends through Augusta, Chelsea and Pittston, uniting with the Kennebec below the village of Pittston. This stream passes by the "Togus House" and spring, and its course is through a low, flat, boggy district, which is quite unsafe for the planting of corn, as it is subject to early and late frosts, fall and spring. Bond Brook, in the west part of the town, furnishes an excellent privilege for considerable machinery, and empties into the river at the city.

The city of Augusta, which is the shire town of the county, and capital of the State, is situated near the southern boundary of the town, the main business portion being upon the west side of the

* Williamson says (II, p. 391,) that John Getchell, who was one of the first settlers, was a mighty hunter, and dug an avenue underground from his house to a gulley, near the river, whence he might escape the Indians. Such were the perils and trials endured by the first inhabitants.

river.* A settlement was made here by the patentees of the Plymouth Colony, about 1635, and a trading house erected. It was incorporated in 1797, became the shire town of the county when it was set off from Lincoln County in 1799, the seat of government in 1831, and received its city charter in 1849. Its Indian name was Cushnoc, and it was called the "Fort," until separated from Hallowell in 1797. A bridge was erected across the Kennebec at this place, in 1797, at a cost of $28,000. It decayed, and was rebuilt in 1818. This one was destroyed by fire in 1827, but immediately rebuilt. The first dam across the river was built in 1836–7, but was carried away by a freshet in 1839. The work of rebuilding was commenced the next year (1840) and completed in the fall of 1840, or spring of 1841. It is about 600 feet in length, not including the stone abutments and lock, and the height is fifteen feet above ordinary high water mark. The first cost was about $300,000, and about $25,000 was expended upon the dam and canal during the winter of 1864–5, putting it in a greatly improved condition. The State House, United States Arsenal, South Parish Church, Insane Asylum, Jail, and Court House, are all built of native granite, and are elegant buildings. A bridge (crossing the river in a diagonal position) for the passing of the Somerset and Kennebec Railroad, was built in 1851, and is 1,000 feet in length, aside from the approaches—nearly 200 feet.

Near the bank of the river above the railroad bridge is a spring, which, some years ago, received attention from its supposed medicinal qualities. As there are indications of iron in the vicinity, it is possible the water may be largely charged with it, though I believe no analysis of it has ever been made.

This embraces an outline of all the towns east of the river, and I shall now briefly describe those on the west side—passing up through the river towns and down through those in the extreme western part of the county.

Gardiner contains an area of 10,448 acres. Between 1754 and 1764, the Plymouth Company granted the most of the township, originally called Cabbassa, to Dr. Sylvester Gardiner, and in 1760 he built a mill on the stream and began a settlement. As late as

* Two-thirds of the business part of this city was destroyed by fire, Sept. 17th, 1865, involving a loss of over half a million dollars. The conflagration was one of the most destructive ever known in Maine.

1775, it was the only mill on the Kennebec, and the settlers at Norridgewock and Canaan were obliged to come here to mill. Fishing and hunting seem to have been the chief pursuit of the inhabitants until 1794, when they began to be somewhat interested in the work of agriculture. The town was originally a part of Pittston, but was set off in 1803, at which time it received its present name as an honor to the Gardiner family, particularly to the late Hon. R. H. Gardiner. The city was incorporated in 1849.

The town is bounded on the east by the Kennebec, and on the west—with the exception of about two miles upon the west in the north part, which is bounded by West Gardiner—by the Cabbassa-contee. This is a river of considerable size, having its source in Winthrop Pond, and in other ponds in Wayne and Mt. Vernon, and empties into the Kennebec at the city of Gardiner. It is thirty-five miles long—its course from Winthrop Pond to its mouth being nearly a half circle—and is said to be fed by over twenty ponds. The banks along this river near its mouth are about 125 feet high, and the water never fails for manufacturing purposes. During the dry season of 1825, farmers for thirty-five miles around were obliged to resort to the grist-mill on the Cabbassa, in consequence of the failure of water upon other streams. This river has a fall of 127 feet in one and one-third miles, near its confluence with the Kennebec, within which distance there are eight stone dams, affording one of the very best water privileges in the State. The manufacture of lumber is carried on to great extent at this place. The city is beautifully located, and is situated at the true head of summer navigation on the Kennebec. The river is crossed by a bridge, in which is a draw for the passage of vessels, built in 1850. Along the Cabbassa and Kennebec the soil is clayey, in the west part of the town there is considerable ledge largely charged with iron pyrites.

The town of West Gardiner was set off from Gardiner in 1850, and comprises about 10,000 acres. It is bounded on the west by the Cabbassa-contee or Great Pond, and on the south and east by the Cabbassa-contee stream. The northern part of the town is broken and rocky, the south and central portions clayey and level. Along the Cabbassa is considerable interval land, which would be hard and dry but for the flowage of water caused by the dams at Gardiner. In consequence of this, much of the land bordering upon the stream is soft and miry, and produces an average yield

of aquatic grasses, which makes good forage for sheep and young stock. The stream is sluggish, and is flowed back to Collins' dam in West Gardiner, a distance of ten miles from the dams at its mouth. There were formerly large quantities of batting manufactured at Collins' dam, but the only machinery now located there is a saw mill.

Farmingdale was incorporated in 1852, having been formed from parts of Gardiner, Hallowell, and West Gardiner. The surface of the town is somewhat uneven, and the western part is considerably rocky. On the river are some excellent farms, among the best of which is that of Daniel Lancaster, Esq., one of the Trustees of the Kennebec Union Agricultural Society.

Hallowell, which was originally one of the largest towns in the county, is now the smallest municipality within its limits. It formerly embraced all of Augusta and Chelsea, and parts of Manchester and Farmingdale. The town was settled by permanent inhabitants a few years after the erection of Fort Western at Cushnoc in 1754. The place was inhabited by resident traders at least one hundred and twenty years previous to this date, but they had been unable to defend themselves against the repeated attacks of the Indians until the erection of this fort. The principal settlement was called the "Hook," which was very near the present city of Hallowell. The town was incorporated in 1771, and contained 60,000 acres.

The city of Hallowell is beautifully situated in a cove or bend of the river, and from the hills south and west of the city fine and extensive views of the surrounding country are obtained. The land west of the city attains a considerable elevation, and is chiefly a clayey loam. There is some light sandy soil, and also much strong deep loam in the west part of the town. The hill sides are springy and somewhat rocky, and I have noticed in this town, as well as in others, that the east slopes of the hills are generally rocky and moist, while the west slopes are clayey, dry, and more free from rocks.

Years ago, Hallowell took the lead in business on the Kennebec, and considerable was done each year at shipbuilding. It furnished a centre for the supply of a large back country, was the chief market for farm produce and a place of large domestic and foreign trade. The business that once centred here now goes into other avenues, and the town presents a quiet appearance.

The village of Manchester was formerly called "Hallowell X Roads," but the town was set off from Hallowell and incorporated in 1850. Settlement was commenced in what is now Manchester in 1775. The town is three miles wide, and eight long, and the village is situated upon a plain. Seven public roads meet at the settlement. There is no water power at the village, and it sprang up as a sort of country tavern stand, and gradually increased to its present extent. Farmers from the back country, in going to Hallowell to market, would stop at the "X roads" over night, go into town in the morning, dispose of their load, and return to the country tavern at night. Years ago, when marketing was done in a different way from what it is now, the travel for this purpose made considerable business at this village.

In the south part of the town the soil is clayey, and in the extreme northwestern part it is somewhat broken and rocky. In the northeastern part is a considerable tract of light land known as "Sanford plains," which produces good crops of potatoes, corn and grain. The Cabbassa-contee or Great Pond forms a part of its western boundary, and from a hill near the line between Manchester and Winthrop, furnishes one of the finest views of inland water scenery to be obtained in New England.

Sidney—which was originally a part of Vassalboro'—lies directly north of Augusta, and is bounded east by the Kennebec. The earliest settlements were made along the river, and upon the borders of Snow's Pond in 1774, and the town was incorporated in 1792. It contains about 20,000 acres, and as an agricultural town ranks among the best in the county. The soil along the river is a calcareous clay, the land in most cases sloping gradually to the river, the banks of which are cleared to the water's edge. The soil is excellent for grass and grain crops, but not so good for orchards as in other parts of the town. Through the centre of the town, or upon what is called the middle road from Augusta to West Waterville, are, perhaps, all things considered, some of the best farms in the county, and the prospect from Bacon's Corner and Fairview is one of the finest agricultural views—though less varied and picturesque than some—to be witnessed in the State. The finely cleared fields, substantial and in many instances elegant buildings, large barns, thrifty orchards, and durable fences, betoken a high state of cultivation, and a high degree of prosperity among the owners of the farms. The soil in this part of the town is a

strong rocky loam. In the extreme northern part of Sidney there is much land that is wet, low and cold, somewhat rocky, and inclined to be frosty. Along Snow's Pond, which forms part of the western boundary of the town, the soil is rocky. In the southern part of the town is a bog, containing about one thousand acres, which is partially covered by water, spring and fall, and has a dense growth of hardhack, blueberry, and other scrubby bushes. The growth along the bog is alder, larch, &c. A lady now about sixty years of age informs me that within her memory people have passed over the bog in boats. There are also extensive peat bogs in this town, and when dried it forms fuel of excellent quality, giving an intense heat. There are but few opportunities for mill sites in the town, and it is not so well watered as most others in the county.

Proceeding north through Sidney we reach Waterville, the uppermost river town on the west side. The Kennebec forms its eastern, Somerset County its northern, and Richmond Lake, McGrath and East ponds its western boundary. Snow's Pond extends into the town some two and a half miles, and the Messalonskee, which is the outlet of Snow's Pond, runs through nearly the centre of the town to its northern line, then turns and pursues a southeast course, emptying into the Kennebec about two miles below the village. This stream affords excellent water power, both at West Waterville and near its confluence with the Kennebec, and could give employment to treble the amount of machinery now driven. At the west village it falls one hundred feet in three-quarters of a mile, and within one-third of a mile there are now four dams. At one point it passes through a narrow gorge about forty feet wide, over slaty ledge, and makes a fall of nearly sixty feet. This is called the "Cascade," and attracts numerous visitors. Below the Cascade, and before reaching Marston's Bridge, there are other excellent mill sites now unemployed. Near the mouth of this stream there are also four dams within half a mile. The Kennebec at the village of Waterville makes a fall of twenty-one feet, the bed of the river being ledgy. A dam on the west side extends along the river about three hundred feet, and then half way across the river to one of the piers of the railroad bridge. This dam could be extended across, and it would afford a chance for mills on the east side of the river.

At the old steamboat landing below the village, on the west

side, is seen an instance of the change in the bank of the river effected by natural agency. A gentleman informs me that during the past eighteen years, the land on the west side has made on over one hundred feet, or in other words the edge of the water is now that distance further to the east than it was then; and yet this change has been wrought gradually and almost unobserved.

The town is traversed by the Somerset & Kennebec and Maine Central railroads, has two bridges across the Kennebec river—one a toll bridge—and is the seat of Waterville College, a literary institution under the patronage of the Baptists. The east village is noted for its beauty, the west for its business.

A wide diversity of soil occurs in Waterville. That on the river below the village is light and sandy; the highest land on the "Neck" is underlaid by a slaty ledge, which lies near the surface, in many places cropping out; the land bordering on the Messalonskee is clayey; in the west part of the town, and upon the "Ten lots" it is somewhat rocky—but a strong productive soil when cleared from rocks—while in some places on the Messalonskee and the main river are limited alluvial deposits. The slaty land is considered the best corn and wheat soil in the town. The roads through this town are good. Waterville was formerly a part of Winslow, but was set off and incorporated in 1802.

Going southwest from the village of West Waterville, and passing between the waters of Richmond Lake and Snow's Pond, which at the southwest corner of the town of Waterville approach within one mile of each other, we enter Belgrade. This town was settled in 1774, by Philip Snow, who came from New Hamsphire —and from whom Snow's Pond takes its name—and was formerly called Washington or Prescott's and Carr's plantation. It was incorporated in 1796. The town was originally owned by the Plymouth Company, and the original settlers obtained their titles from this company. It is nearly surrounded by ponds, Long Pond forming its western, Great Pond its northern, and Snow's Pond its eastern boundary. Great Pond covers an area of twenty-five square miles, in which are several islands. Upon one of them, "Hoyt's Island," is a large and productive farm of about two hundred acres. This island is about a mile from mainland, and is only reached by boat. These three ponds, as well as Richmond Lake and McGrath's Pond, all have their outlet in the Messalonskee. In the north part of the town, between Great Lake on the

west, and Richmond Lake and McGrath's Pond on the east, is a high ridge of land which is rather poor, and not well adapted for agricultural purposes; but in the southern part the land is more productive and better fitted for farming purposes. There are also some excellent peat and cranberry bogs, of which an account is given in another part of this work. There are in town a spool and shovel-handle factory, and other mills for local manufacturing.

To the northwest of Belgrade is the small, hilly, rocky town of Rome. This town, with the broken towns of Vienna, Mt. Vernon, Fayette and Readfield, lying to the west and south, form a dividing line between the waters of the Kennebec and the Androscoggin. It was settled in 1780, the titles to the land being obtained from Charles Vaughan, R. G. Shaw and Reuel Williams. It was formerly called *West Pond* plantation to designate it from East Pond, now Smithfield, in Somerset County. The town was incorporated in 1803, and has now a population of about 800 inhabitants. There is but little manufacturing carried on, and much of the land is too broken and rocky to admit of tillage, though there are some good farms and fine orchards in the town. Notwithstanding the fact that this town is very mountainous, there are no elevations of land so prominent as to have received names, although in most other towns in the county, high hills are designated by names that have acquired a more than local distinction.

Vienna is situated directly west of Rome, and is the most northwestern town in the county. Its plantation name was Goshen or Wyman's plantation, and the original tract was first surveyed for settlement by Jedediah Prescott in 1792. It was incorporated in 1802. This town is the most broken and uneven in its surface of any town in the county, and the soil although hard and rocky produces excellent crops of hay and grain. In the eastern part of Vienna is a high ridge of land which extends into Rome, known as Thomas' or Gilman mountain. Vienna village is pleasantly situated at the head of Flying Pond—a beautiful and irregular sheet of water lying between this town and Mt. Vernon.

Passing south from Vienna we enter Mt. Vernon—a town, that in being incorporated in 1792 received its name from the estate of General Washington. Settlements were made in this town as early as 1774. The surface of Mt. Vernon, though less hilly than Vienna, is somewhat broken, particularly in its northern portion.

The main village in this town is situated in a valley between hills and ponds, and is a place of considerable local trade. There are five or six ponds in this town, which afford good water power—the largest of which is Parker's Pond, and forms part of the boundary between Mt. Vernon and Chesterville in Franklin county. The road from Vienna to Mt. Vernon village runs along the eastern side of Flying Pond, and the ride between the two villages is over one of the pleasantest and most picturesques portions of the county. The town embraces an area of 15,000 acres.

Seven thousand acres in the present town of Fayette were granted to Robert Page and his associates by the State of Massachusetts, and it was settled soon after the Revolutionary war. The plantation name was Sterling, but it received its present name at the time of its incorporation in 1794. "The surface of Fayette is somewhat more hilly or broken than many of her sister towns, which gives her fine grazing land, from whose pastures some of the finest cattle of Maine are raised. The soil is generally a rocky loam, well adapted to grass, corn, oats, barley, potatoes, &c. The farmers are in a prosperous condition, with farms well cared for and generally well fenced, a large part of which is of stone. The old orchards are fast decaying in some localities, but there is some interest given to planting young ones. The buildings are on an average with those of other towns." * The principal elevations are Oak Hill and Berry Hill, both situated near together and in the southern part of the town. Fayette Mills —the principal village in the town—is in the easterly part, near the Readfield line, and between Crotched Lake and Lane's or Lovejoy's Pond. Crotched Lake, exactly the form of an inverted V, thus Λ, is situated in Fayette and Mt. Vernon, and is about three miles long at the foot or base of which the village of Fayette Mills is located. At this place are the works of the Dunn Edge Tool Company—who manufacture scythes and axes, and of whose shops at this place, and also at West Waterville, a detailed account will be given in the second part of this work—a tannery, stores, &c.

Readfield was originally a part of Winthrop, and was incorporated in 1791. That part of ancient Pondtown—the early name of Winthrop—embraced within the present limits of Readfield, was

* George Underwood, Esq., of Fayette.

settled about 1760. It is situated to the north of Winthrop, is more hilly and not so well watered as the latter town. The hills or ridges of high land run in a northeast to southwest course, and the soil in the town is generally a strong rocky loam. There are many places on the hills where ledge crops out, and the boulders throughout the town are angular, instead of being rounded as they are to the east of the Kennebec and west of the Androscoggin rivers. At East Readfield is the oil cloth manufactory of the Messrs. Sanborn, and at Readfield Depot is a small village. The Readfield Woolen Manufacturing Company have their works at this place, and in a quiet and beautiful valley. This company has a capital of about $20,000, and employs from twenty-five to thirty operatives. In the extreme western part of the town is Kent's Hill, the seat of the Maine Wesleyan Seminary and Female College. This town has excellent grazing lands, and produces some of the best neat stock in the State. At Readfield Corner are the show grounds of the old Kennebec Agricultural Society.

Winthrop is bounded east by the Cabbassa-contee or Great Pond, south by Monmouth, west by Wayne and north by Readfield, and contains 25,540 acres. It was settled in 1764 or '65, was originally called Pondtown and incorporated in 1771. The North and South ponds divide the town about equally into two parts, the ponds lying in a northeast and southwest direction. There is a small stream connecting these two ponds, which passes through the village and in a distance of less than a fourth of a mile makes a fall of about forty feet, furnishing a superior water power which is well improved. Winthrop South Pond has become a somewhat noted and popular resort for fishing and pleasure parties, the pond being well stocked with perch and pickerel. In the east part of the town is Narrows Pond, a beautiful sheet of water, and near it is Kezar Pond, containing about 125 acres. The Cabbassa-contee or Great Pond, which lies between this town and Manchester, is twelve miles long and about two wide, in which are numerous islands. When looking at this pond from a hill near East Winthrop village, and taking in the varied and delightful character of the surrounding scenery, the beholder witnesses one of the finest views in New England. It is said that the distinguished Dr. Benjamin Vaughan, who resided at Hallowell, was fond of taking his visitors from New York, Philadelphia, and other places, to Winthrop by the old road and returning by way of

the Narrow's Pond. He thought the scenery along these two roads the most interesting in New England.

The surface of Winthrop is rather uneven. Mt. Pisgah, in the western part, extends nearly across that portion of the town, and is the highest point of land within its limits. Monk's Hill lies east of the North Pond, and is a ledgy and somewhat barren eminence, from whose top an extensive and beautiful view is had of the towns to the west and south, interspersed by ponds, hills and forests. The soil of the town is generally a rocky loam, highly productive, and forming excellent grazing, orcharding and tillage land. It is well wooded, and has extensive orchards of superior fruit. The roads throughout the town are good, and along many farms are lined by noble elm, maple and other trees; evincing a high degree of culture, and an appreciation of the beautiful in nature on the part of the residents. The manufacture of oil cloths is carried on to a considerable extent, and employs a large capital. While this town will be long remembered as the residence of the late Dr. Ezekiel Holmes—a man who in his life time did more to improve and elevate the working classes of the State than any man of his time—it will also be to the lasting disgrace of the inhabitants that they suffered him to live and die in such an uninhabitable tenement.

Wayne has an area of about 9,400 acres. It is six miles square, and is bounded south by Monmouth, east by Winthrop, north by Fayette, and west by Leeds in Androscoggin County. The first settlement in the town was made in 1773, and before its incorporation it had been called Pochasset and New Sandwich. The town was incorporated in 1798, and received its name from General Anthony Wayne, of Revolutionary fame. There are numerous lakes or ponds in Wayne, the largest being Androscoggin Pond, in which, says Williamson, "is an island upon which there is a burying ground of the natives." The outlet of this pond is in the Androscoggin River. The next in size is Wing's Pond, situated in the north part of the town, and emptying into the Androscoggin Pond at Wayne village. It is two miles long and three-fourths of a mile wide. Northwesterly from this is a sheet of water known as Pickerel Pond. A chain of small ponds, viz: May or Berry, Dexter, and Wilson, are all situated in the easterly portion of the town. The water power in Wayne is excellent, there being a chain of four ponds, connecting with Flying Pond in the south

part of Vienna, all flowing into Wing's Pond at Wayne village. At North Wayne, the outlet of Lovejoy's Pond, are the extensive works of the North Wayne Scythe Company, which in former years was one of the largest establishments of its kind in the country. The south village of Wayne is a place of some business, and besides the usual mills of a country village has a sash and blind and shovel-handle factory.

The soil in Wayne is for the most part a strong loam, with some portions of sandy soil, and the surface of the town, particularly in the southern part, is uneven and broken. In the northwesterly part* is a "ridge of land called Beech Hill, upon which are quite a number of places where the sand blows,† and there are acres where not a single green thing is visible. On the south part of this ridge, on the farm of Mr. Richard Berry, are some four or five acres, upon which not a green thing is seen growing, and there are other farms, more northerly, that are about the same." There are some excellent orchards in Wayne, and the farmers in general have good buildings and good fences; though if farmers were to bestow the same care upon rear and division fences that they do upon road fences, the benefit to the agriculture and social condition of neighborhoods would be greatly increased.

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* B. Sylvester, Esq., of Wayne.

† I copy the following, concerning the origin and state of these sand blows, by Dr. E. HOLMES, from the *Maine Farmer*, of July 11th, 1861:

"The most striking geological characteristic on the road from Winthrop to the Androscoggin River, are the sand hills, or "blowing sands" of Wayne and South Livermore. These are made up of fine sand, that do not contain sufficient of clay or aluminous particles to give them any cohesion. Hence they are drifted about by the winds, and have thus covered up many acres of pretty good soil many feet in depth. There is something peculiar in these sand-hills. They were covered, we are told, with wood when the country was first settled, and were cultivated and had a pretty good soil upon them for several years after being cleared. But in time, the soil would grow thin and weak, a little sand patch would appear, the winds would begin to scatter it daily larger, until it would cover the adjoining field around it for many rods with a light pulverulent coating, into which you will sometimes sink ankle-deep in passing over it.

We recollect a case of this kind on the west side of "Beech Hill," in Wayne, on the road from Wayne Village to Fullar's Ferry. When we first knew it, thirty years ago, it was a pretty good field, sloping to the west. There was a tree—a maple, we believe—in the midst. One year the field was broken up and corn planted, and a good crop raised. We had occasion, at that period, to pass that way three or four times a year. We noticed soon after the harvesting of the corn, that drift-sand began to appear on the crest, or highest part of the field, on the east side. It spread gradually west, and began to cover the surface of the field like a light fall of snow. It grew deeper and deeper,

Monmouth, settled in 1776, was first called Freetown, afterwards Bloomingboro', and incorporated under its present name in 1792. It early took important measures for the benefit of the inhabitants, appropriating liberal sums of money for schools, preaching, and the repair of highways. In two years after its incorporation, a contract was made for carrying the mail through this town, it being the first mail route that was established, to Hallowell and Augusta, east of Portland. The first Methodist Society in Maine was formed here in 1794.

The town is well watered. Wilson, Cabbassa-contee, and Winthrop South Pond, all extend into Monmouth, and at the village of Monmouth Centre is situated the lovely Coughnewagan Lake. The village of North Monmouth is situated at the outlet of Wilson Pond, and on a stream connecting this and Winthrop South and Cabbassa-contee ponds. A dam at the foot of Wilson Pond raises the water nearly twelve feet, and flows the pond back more than six miles. At this village are four falls in succession, in all, making a descent of about fifty feet. Here are a peg mill, shovel and hoe factory, a heel-plate factory, a hoe and shovel handle factory, and two tape and webbing factories. Not more than one-half the water power at this place is employed. At East Monmouth is a small village. Between North Monmouth and Monmouth village are some of the best farms in the town.

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and wider and wider. The tree formed a sand measure for us, and we noticed from time to time, it was gathering around it and climbing by little and little, higher and higher, until the tree, which was 15 or 20 feet high, has been buried and hidden by it for several years, and the whole field is as sandy and dry and cheerless as the Desert of Sahara.

These sands are undoubtedly a deposit from the waters of the Androscoggin River, where, for aught we know, a million of years ago it broke through the gorges of the granite mountains north of these sands, and covering what are now the hills of the country, deposited in the eddies the fine silicious particles which had been absorbed by its rushing violence from the opposing rocks, there, at first, formed shoals and sand bars. As the waters receded, they became sand islands, and pebbles and boulders were deposited on their slopes by the waves and floating ice. In time, as the waters receded still more, they became sand hills, moistened by aid of the capillary or sponge-like attraction, drawing up the adjoining waters. Vegetation began to clothe them and wood to spring up on them. As the waters still receded, they became higher hills and also drier, the vegetation and trees defended their surfaces, and the sands were bound down fast by them. At length the white man came, cut down the forest, sowed the grasses, cultivated them for a time, until the little clay and vegetable mould left upon them became exhausted, and the sands were left in a condition to blow about in every breeze, and spread barrenness wherever they rest."

Litchfield is the most southern town in the county west of the river, and was settled as early as 1775 or '76, though Williamson places it two or three years later. It was formerly called Smithtown or Smithfield, for two brothers by the name of Smith who were among the most prominent of the early settlers. It was incorporated in 1795.

The surface of the town is rather uneven, and in the northern part quite rough and rocky. Oak Hill extends across the south half of the western boundary of the town, and although a strong soil, contains some excellent farms. Near Batchelder's Corner are, perhaps, all things considered, some of the best farms in town. In the south and southeast part of Litchfield, and bordering on the little Cabbassa-contee or Pleasant Pond, is considerable plain land, the soil being a light loam, and not so well adapted for orcharding as in other parts of the town. At North Litchfield are the works of E. Plimpton & Sons, manufacturers of hoes and forks, whose works are situated on Purgatory Stream, the outlet of Purgatory Pond, which empties into the Cabbassa-contee stream. The shoe business is carried on to considerable extent at the village of Litchfield Corner.

CHAPTER III.

RIVERS, LAKES AND PONDS;—FACILITIES FOR FISH CULTURE.

The Kennebec River enters the county near its northeastern corner, forming the boundary between the town of Clinton in this county and Fairfield in Somerset County. Its course through the county is a little to the west of south, dividing it nearly in the centre. There are twelve towns upon the east, and seventeen upon the west side, Augusta being the only town divided by the river. At Augusta is a dam provided with a lock for the passage of boats and rafts of logs, which forms a great head of water that is now used to a large extent in propelling machinery. Here the tide rises nearly three feet, and the river is navigable to this place for vessels of 150 tons. Previous to the building of the Somerset & Kennebec Railroad in 1850, all the traffic between Waterville and Augusta was carried on by boats, and small steamers also ran regularly between the two places. Considerable hay is now

brought down the river in flat boats, which is almost the only commodity thus transported to market. A dam at Waterville extends nearly across the river, which with that at Augusta are the only ones across the Kennebec within the county. Four toll bridges cross this river in the county, viz: one at Gardiner and Hallowell, each with a draw, and one each at Augusta and Waterville; and two railroad bridges, viz: one at Waterville and one at Augusta. The distance from the north line of Clinton to the southern limits of the county, is about thirty-eight miles, which is the length of that portion of the river running through Kennebec County. The whole ascent of the river from the tide at Hallowell to the north line of Waterville is 228 feet, which is an average ascent per mile of seven and two-thirds feet. There is but very little interval land on the Kennebec in this county, the hills in general press close upon the river. There is a small tract of interval in the town of Chelsea, comprising a few hundred acres, and again about the confluence of the Sebasticook at Winslow, but we look in vain for the broad extensive intervals found in the County of Somerset upon the same river. The Somerset & Kennebec Railroad traverses the entire length of the county, being on the west side to Waterville, crossing there, and running on the east side to Augusta, and again crossing to the west side for the remainder of the distance. The track is laid close by the river side, in many places there being but just room enough for it between the river and the high bank.

Upon the Kennebec are many historical places of note. It was the original habitation of the Canibas, a numerous and powerful Indian tribe, and the river itself is said to derive its name from an Indian Sagamore, Kennebis, who flourished about 1660. At "Old Point," Norridgewock, is the site of the ancient village of the Canibas, and the scene of the labors of Father Rale, the French Jesuit missionary, who was killed at the destruction of the village by the English in 1724. A monument now marks the spot. Teconnet Falls, now Waterville, was the location of the old fort of the Indians, and afterwards of Fort Halifax of the English. Fort Western, built in 1754, was situated at Cushnoc, now Augusta, and James Howard, the commandant at the fort, built what always went by the name of the "great house," about a mile above the bridge, which was for a short time in 1775 the headquarters of Gen. Benedict Arnold when on his expedition against Quebec, by

way of the Kennebec and the Chaudière. Below was Fort Frankfort, built by the Plymouth Company in 1754, Fort Richmond, the ancient settlement of Sagadahock, and Popham's Fort.

The scenery upon the river is in many places very beautiful; such for instance as that obtained from near Oak Grove in Vassalboro', looking down the river—from the hill west of the city of Hallowell, looking both up and down the river, and especially from the grounds of the old Dr. Vaughan mansion in Hallowell. A fine view is also obtained from the deck of a steamer in approaching Hallowell.

The next river in size is the Sebasticook. It rises in Newport Pond in Newport, its west branch being the outlet of Moose Pond in Hartland. Both branches unite between Detroit and Pittsfield in Somerset County, and the river enters Kennebec County at its extreme northeastern corner, between Unity Plantation and Clinton Gore. In its course it passes through the southeast corner of Clinton, nearly the centre of the town of Benton, and the northwest part of Winslow, to its junction with the Kennebec at Winslow Village. Its entire length in this county is about eighteen miles, its running course southwest, and its fall about ninety feet. On the point of interval above the confluence of the two rivers, was situated Fort Halifax, one of the block-houses of which is now standing. The Sebasticook flows through a valley upon each side of which are intervals of considerable extent, and above the intervals are higher banks of table land, and back from them still higher elevations. The interval land is liable to overflow, the next series is generally clayey, and forms good tillage and pasture land, and upon that still higher—especially on the east side of the river—the surface is ledgy, and of little value for purposes of cultivation. Between the Sebasticook and the Kennebec, the second range above the interval does not attain that height that it does on the east side.

There are other streams of considerable size and importance in the county, the largest of which is the Cabbassa-contee. It issues from Winthrop Pond, northwest from its mouth, and running in the form of a semi-ellipsis, receiving in its course the waters of the Cabbassa-contee Pond, almost encircling the town of West Gardiner, and dividing it from Litchfield and Gardiner, empties into the Kennebec seven miles below Augusta bridge. Its name is of Indian origin, signifying "Sturgeon River," and it forms one of the most valuable water powers in the State.

Among the smaller streams which give facilities for local manufacturing and milling establishments may be mentioned Belgrade Stream, which connects Long Pond and Snow's Pond; Fifteen-Mile Brook, running through Albion and Benton, and uniting with the Sebasticook; the west branch of the Sheepscot River in the east part of China and Windsor, which furnishes the water power at Branch, Weeks' and Pope's mills; and the Eastern River in the east part of Pittston. Other streams of less importance are mentioned in the preceding chapter.

If any one will carefully study a correct map of the State, he will see that there is no part of it, of equal extent, having so large a number of lakes, ponds and streams, as the county of Kennebec. It is in fact one of the best watered regions of Maine. Besides its important rivers and large streams, there are in the county forty-nine ponds, nine of them being large enough to be denominated lakes. These are China Lake and Webber Pond on the east side of the Kennebec River, and Snow's Pond between Waterville and Belgrade, Great Pond in the north part of Belgrade, Winthrop North and South ponds, Parker's Pond between Mt. Vernon and Fayette, Androscoggin Pond in Wayne, and Cabbassa-contee or Great Pond, between Gardiner and Winthrop, on the west side. Of the remaining forty, scattered through the different towns in the county, many are of considerable extent. The Cabbassa-contee Stream is fed by a chain of twenty ponds, all of them being situated in the western part of the county, while in the north-western part all the large ponds have their outlet in the Messalon-skee. It is but two miles from the Kennebec to Webber Pond, and but two from Webber Pond to China Lake. West of the river, it is but four miles to Snow's Pond, and all the other ponds in that portion of the county are situated but a few miles apart. Being connected as they are by streams of considerable size, and chiefly fed by living springs, it is at once seen how important a part of the natural advantages of the county they constitute, whether viewed in an agricultural, manufacturing or æsthetic point of view. They assist in furnishing moisture to the soil and purity to the atmosphere, afford numerous sites for mills, and contribute in a great degree to the beauty of the landscape—a consideration of no small weight with those who are attached to the county, and have a love for the beauties of nature. The instances are numerous in this county, where farms that have a water privi-

lege upon them—I mean a small stream or brook, or those bordering upon a pond—are held by their owners at a much higher figure, and when sold realize a greater sum than those that have not this advantage, but are in all other respects equally as desirable. To have an outlook upon a placid lake, or to have a fresh, pure brook running through one's pasture, are objects to be desired by every one owning a farm, although all cannot possess them. To those who do, they have a value higher than that estimated by "national currency."

In nearly all the large ponds just named, are found considerable numbers of the more common varieties of fish, such as pickerel, white and yellow perch, trout, &c., and many of them have become somewhat noted as resorts for pleasure and fishing parties. Of these, Webber Pond, China Lake, the Cabbassa-contee (at East Winthrop), and the Winthrop South Pond are the most celebrated.

It is well known that our rivers, streams and lakes formerly abounded in many kinds of migratory fish, and salmon, shad, alewives, &c., were plenty and cheap. Williamson, in his History of Maine, (Vol. II, p. 468,) says that in former times alewives crowded together in such shoals in Worromontogus Stream in Pittston, that bears, and even swine, have been known to devour them from the water side. They were also formerly taken in abundance in the Sebasticook River at Winslow, and salmon were to be had in great numbers in the Kennebec. But times have changed. The obstructions placed in our rivers and streams, such as dams and mills, have completely broken up the habits of these fish, and they no longer seek the fresh water therein for the purposes of spawning. Dr. E. Holmes, in his very valuable treatise on "Aquæculture," contributed to the Report of the Secretary of the Maine Board of Agriculture for 1864, says: "No doubt it is a consequence of these obstructions that fish have left our waters, but it need not be a *necessary* consequence. I hold that dams and mills might be constructed, and continued, and yet by a little concession on the part of dam and mill proprietors, and a more general diffusion of the knowledge of the natural history of fishes, more intimate acquaintance with their peculiar habits, instincts, and wants of life, the mills might remain and the fish continue to perform their annual pilgrimage to and from their breeding haunts, if not in so great numbers as in former times, yet in such numbers as to afford a vast amount of provisions and even luxury to the communities which are now wholly deprived of them."

The subject of protection to migratory fish and the construction of fish-passages in dams, has been many times introduced into the Legislature, and acts passed requiring fish-ways to be built in dams for the passage of fish; but from the imperfect manner in which these were made, or ignorance in regard to the habits of fish and their wants in this particular, they have in nearly all instances proved worthless. The charter granted to the Augusta Dam Company required that suitable provisions should be made for the passage of fish. When the dam was built, it was thought by the engineer and others, that a long inclined plane extending from the pitch or brow of the dam to the bottom of the river below, over which the water could flow with a steady, uniform current, would not only allow fish to ascend, but also render a better passage of logs, and make the dam more firm and secure. The results did not meet these expectations. The fish could not go up so long an interrupted sheet of water. The logs often in low stages of water grounded and stopped by the way, and the water at the foot of the dam, by its revulsion or suddenly checked momentum, dug under and began to undermine, and it was found necessary to remove the apron and allow the water to pitch over perpendicularly. This saved the dam, but no fish-way was provided, and the fish for years kept back, until the matter was again presented to the Legislature, and after much debate, a law was passed requiring the opening of a fish-way near the bottom of the dam. This was built at the west end near the mills, but when the dam was repaired in the winter of 1864, it was torn away.

Attention to the habits of fish show their wants in the matter of passing dams or falls. Dr. Holmes, in the treatise just referred to, says he has often watched the movements of salmon when ascending the Ticonic Falls on the Kennebec, at Waterville, in the spring of the year. They invariably selected those places on the falls that were most interrupted by breaks or steps of the ledge forming little basins at different stages in the fall. They would fetch a spring and go up a pitch of water almost perpendicular for four or five feet, and then rest themselves some time in the basins preparatory for another spring, and so continued their operations until the last pitch was sealed and they reached the smooth water above the falls. This fact indicates that if a direct passage could not be made in a dam, a series of short falls or steps would meet the requirements of the migratory fishes. By this means they might

pass up the steepest falls. In some remarks before the committee of the Massachusetts Legislature, a few years since, to consider the subject of migratory fish in the Merrimack and Connecticut rivers, Prof. Agassiz stated that fish ways, having cross bars to check the speed of the water and allow an opportunity for the fish running up stream to rest themselves, were common upon rivers in the old country. He stated that in 1859 he visited a friend on the northwest coast of Ireland who had a fish way so constructed. The fall was about twenty feet high, and he stood by it for half an hour and saw salmon rush up in such rapid succession that two men with hand nets threw them out of the trough in great quantities, some of them weighing twenty-five and thirty pounds. He said he had seen salmon repeatedly resting on these ways, and starting the moment they were disturbed. In his remarks at this time Prof. Agassiz further stated that fish ways were formidable only to those who knew nothing about them, and that the difficulties of fish in ascending rivers could be easily overcome. Only a few hundred dollars for building wooden steps were needed, and they should be so made that if carried away by freshets the loss would not be one of much magnitude—even if two or three were carried away in a year. He believed that migratory fish could be restored to the waters of our rivers and ponds, by fish ways constructed as mentioned, and that, too, without much difficulty, and at a nominal cost. In regard to steam navigation on rivers being one cause for the disappearance of fish, he said that the passage of a river by steamboats constituted no obstacle to them. The Rhine was constantly navigated by steamers, but salmon were not less numerous in this river than they were a century ago.

The transferring of fish from one locality to another is a branch of aquæculture that has often been practiced with good results, but the science of fish culture has now attained so much perfection that better modes are adopted for stocking waters with the various kinds of fish. But the efforts of those who formerly engaged in this method of multiplying fish in ponds and lakes not native to them, ought not to be overlooked. The late Dr. Holmes in his treatise, to which I have before alluded, says: "I was, many years ago, told by some of the old settlers on the Kennebec, that there were no pickerel ever seen in the tributaries on the west side of that river, in the vicinity of Augusta, until they were transferred there from Togus lake, which is on the east side, by the late

Robert H. Gardiner. They were put into the Cobbossee-contee stream above the mills in Gardiner. The few put in at that time have multiplied and spread into all the connecting waters, and are now, with the exception of the perch, the most abundant of any species of fish found there."

I am glad, in this connection, to present a statement from R. H. Gardiner, Esq.,—youngest son of the late Hon. R. H. Gardiner—in reference to this subject. While being an interesting record of itself, it also corrects a slight error in the above statement of Dr. Holmes. Writing to me under date of June 19th, 1865, Mr. Gardiner says:

"I think it was in the year 1823 or 1824, that my father engaged a boy to bring him some live pickerel. There were *six*, rather under size, brought from Naumkeag Pond. Up to this time there were no pickerel to be found in any of the waters west of the Kennebec, while all the ponds on the east side were full of them. I remember going with my father, with those six pickerel in a pail of water, to the upper mills on the Cobbossee-contee. The fish were put into the mill pond; two or three immediately swam off, and after some time the others recovered and disappeared. At that time the Cobbossee was swarming with small fish anglins, suckers, white and red perch, so that the pickerel had a grand opportunity to increase and multiply, and none of their own species to prey upon them. It was but fifteen months after those small pickerel were put in the stream that one was caught near the spot where they were first deposited that contained a fish that weighed three-fourths of a pound. I did not see this large fish, but the story was reported and generally believed. Within a year or two of this time pickerel were caught at Chandler's Mills, but whether they originated from those put in at Gardiner, or whether another lot was put in above, I do not know."

About the same time as the above, Mr. Gardiner also planted smelts in the Cabbassa-contee, which have only been observed in quantity in its waters, within the last few years.

Mr. Abijah Crosby, of Benton,—who was killed at the battle of Gettysburgh, July, 1863—was quite an enthusiast upon the subject of fish culture, and spent considerable time in transporting pickerel and other fish from the ponds in the south part of this county to the Sebasticook River and ponds in the vicinity of Benton and Clinton,

in the northeast part of the county. The Portland & Kennebec Railroad gave him a free pass, with his hogsheads of water and boats, over their lines, and although he received little, or no compensation for his work, yet he deserves to be remembered as one who endeavored to be useful to his fellow men. What success attended his efforts, I have not been able to learn, but in all probability the fish transported thither have increased, and will, before many years, not only become quite numerous in the places where introduced, but extend into other waters, and perhaps be a means of stocking the numerous rivers and ponds in that section of the State.

Fish breeding is comparatively a new science in this country, but it is one that has made rapid advancement among us during the past few years. It is a matter entirely practicable, and one which, in the hands of an intelligent man, presents few obstacles to complete success. We have numerous examples to prove its entire practicability, and are sure it can be engaged in by others with equal advantage. Dr. T. Garlick and Prof. H. A. Ackley, of Cleveland, Ohio; Mr. Stephen H. Ainsworth of W. Bloomfield, N. Y.; Mr. Seth Greene of Rochester, N. Y.; J. C. Comstock of Hartford, Conn.; and many others, have demonstrated the fact that the artificial propagation of fish, as first practiced by Remy and Gehin, in France, is not only practicable, but within the means of every person who has a good share of observation and intelligence, with a running brook and artificial pond in which to conduct his operations. Information upon this subject has been widely disseminated among us of late years, not only in the form of numerous treatises,* and reports, but in more brief articles in the agricultural and scientific journals, many being from the pens of those practically engaged in aquæculture: so that it is unnecessary for me to enter into the details of the subject in this place.

Doubtless fish passages over dams and falls, constructed like those previously mentioned, could be erected by private individuals without great expense, and with a pretty sure prospect of returning a good profit for the investment; but my own belief is that

* The best are Garlick's Treatise on the Artificial Propagation of Fish; Francis on Fish Culture, (an English work); Dr. HOLMES' Report on Aquæculture, in Agriculture of Maine for 1864; and articles on Fish Breeding, by J. C. Comstock, in the United States Patent Office Report for 1860, and Reports Connecticut State Agricultural Society.

the plan of artificial breeding would be a much surer method of restocking ponds and streams with fish, and at the same time attended with less expense, while it would also form a pleasant and profitable study and recreation for those engaged in it. At the same time the fish in our lakes and ponds could be preserved and kept on the increase, if proper laws regarding their capture were made and executed. I am told that a lawless person has been known for years to place a weir seventy-five feet in length at the mouth of one of the small streams running into the Cabbassacontee Pond, and by this means taking large quantities of pickerel when they are passing up to spawn. In other ponds in the county pickerel and perch are also taken in all ways, and during nearly all seasons of the year; many pickerel being speared at night. Until some judicious laws can be made and enforced for the protection of fish, those now inhabiting our ponds will be growing more scanty each year, while it will be wholly useless for parties to engage in their artificial propagation.

Look at the facilities for the propagation and culture of fish in this county! The Kennebec running through the centre of it, and by its tributary streams connecting the numerous ponds on both sides of the river, affords opportunities that but few sections of this extent are possessed of. Now these ponds and lakes yield but a small number of a few varieties of fish—with a little capital and energy they might be made to produce an almost unlimited amount of the choicest sorts of edible fish, and return a profit far greater than that of any one branch of husbandry carried on by our farmers. Shall such opportunities for industry and wealth remain much longer unimproved?

CHAPTER IV.

Geology and Mineralogy.

Dr. Charles T. Jackson, in making his geological survey of this State, during the years 1836, '37 and '38, and Dr. Holmes and Prof. Hitchcock in 1861 and '62, carefully examined the geology of this county, and in their reports are to be found full and accurate description of all the interesting and important localities—including the general geological features and mineral deposits. As their reports, particularly those of Dr. Holmes and Prof. Hitchcock, are

to be found in every neighborhood in the county, I have deemed it unnecessary, in this work, to go over, in detail, the subjects so fully treated by them, especially as what I should say would be, mainly, but a republication of their own words. I simply content myself with a few notes upon the more prominent geological characteristics of the county, referring the reader to the works above mentioned for extended information.

Granite.—This is abundant in Kennebec County, but occurs to greater extent in Hallowell, Augusta, Mt. Vernon, Wayne, Winthrop, Belgrade, and Gardiner. Indeed, the soil of the county may be said to be granitic. The underlying rocks are primary. From the eastern line of Winthrop to the hill back of the State House, in Augusta, granite may be seen at every exposure of the ledges. That in Augusta and Hallowell is more or less tabular, of very good texture and rift, and some portions of it very tough, in consequence of being hornblendic. The Hallowell granite is universally known. It is taken from a ridge running northeast and southwest, elevated about four hundred feet above the Kennebec River, and is composed of white feldspar, silvery grey mica, and but little quartz, the former elements predominating. The rock is really gneiss. It is as white as the whitest granite, and appears, at a distance, when smoothed, almost like white marble. Blocks of granite have been split out which weigh more than a hundred tons, containing 1,200 cubic feet. It is said that in one of the Hallowell quarries there are twenty-six different sheets of granite that can be worked, and that these sheets are arranged like strata. These sheets vary from eight inches to four feet in thickness. The poorer qualities of the stone contain pyrites in small quantity. Dr. Jackson says that the granite at the Hallowell quarries shows many long fissures or cracks, all with the same direction of north 70 degrees east. He thinks that they were produced by an earthquake at some unknown period. About 1830, the quarries owned by the "Hallowell Granite Company," were worked to great extent, much of the material being shipped to New York. Dr. Jackson, in his second report, says that from 1827 to 1837, a period of ten years, no less than $500,000 value of granite was sold by this company, and that the net profits during the year 1836, were $13,400. During the past few years but little has been done at working them, and I believe the company is not now in existence. There are two or three quarries in Augusta that are now worked

to some extent; and in most towns in the county, boulders or ledges occur of sufficient size to be used in obtaining stone for underpinning and other building purposes. There are several dwellings in the county built of this material.

Limestone.—The limestones of this county are found in Clinton and Winslow, on the east side, and in Waterville, Belgrade, Vienna, Mt. Vernon, Sidney, Winthrop and Hallowell on the west side of the river. The bed in Clinton is of good quality, and contains 76.8 per cent. of carbonate of lime. Near Mr. J. D. Burrill's there is a bluish gray limestone, of which 47.2 per cent. is pure carbonate of lime. At Brown's Corner, in Clinton, quarries of a blue argillo-ferruginous limestone have been opened, in which occur abundant crystals of pyrites. The amount of carbonate of lime present is 54 per cent. There are several beds of limestone in Winslow, concerning which I copy the following from the Report on the Scientific Survey of the State for 1861, p. 167: "That upon James Wall's land is of a light bluish gray color, traversed by small veins of calcite, and contains 73.8 per cent. of carbonate of lime. That upon S. Simpson's land is of a dull light gray color, mixed with slate, and contains 68.4 per cent. of carbonate of lime. That upon Mr. Drummond's land is better than the rest. It is blue, and contains 81.8 per cent. of carbonate of lime. On Mr. Furbur's land a limestone containing 77.8 per cent. of carbonate of lime is found. It is of a dark blue color." Narrow beds of siliceous limestone are found in the clay slate near the railroad bridge in Waterville, but are of little value. In the west part of the town, however, upon the farm of the late Baxter Crowell, there is an important bed of limestone in argillo-micaceous slate, sixty-six feet wide, which contains 89.8 per cent. of carbonate of lime. At the falls in West Waterville there is more limestone of the same general quality, containing 73.8 per cent. of carbonate of lime. Still other localities of limestone are found in the west part of the town, but none as good as the ones just mentioned. In the southwest part of Vienna, near the Chesterville line, and on the south side of McGurdy River are two beds of limestone in mica schist. One is nine, and the other fifteen feet in width, and both dip to the northwest. A large ledge of crystalized limestone also occurs on the farm of Orren Brown, which was first burnt for lime about thirty years ago, although nothing has been done at the business for ten years. The lime manufactured has beed used for agricul-

tural purposes, and the supply is inexhaustible. One kiln is now upon the site; there is wood in abundance in the vicinity, and the location is one which, if worked, would give good return for labor and capital invested. About three-fourths of a mile northeast of Mt. Vernon village, near Mr. James Chapman's, is a bed of limestone, grayish white and granular, in mica schist, dipping northwest. It contains 48.8 per cent. of carbonate of lime. In Sidney, large specimens of limestone have been found, which are susceptible of a high polish, and would form a very durable marble. Specimens of the rock are in the Cabinet at the State House. The limestone of Winthrop belongs to the calciferous mica schist, and is of the same color with the interstratified. It is found to contain 78.8 per cent. of carbonate of lime. In Hallowell the limestone is contained in strata of gneiss.

The purest limestone can afford but little more than fifty per cent. of lime; as it is composed of 43.7 per cent. of carbonic acid and 56.3 per cent. of lime. The following table gives the per cent. of quick lime manufactured from 100 parts of the rocks found in different portions of the county:

West Waterville,	41.40
West Waterville, (Crowell's)	50.40
Winslow, (Wall)	41.40
Winslow, (Drummond)	45.90
Winslow, (Furber)	43.70
Winthrop,	44.30

Lime from the above localities will be found good for the ordinary purposes of the mason; and from the other places mentioned the lime obtained would be of poorer quality, but suitable for purposes of agriculture. Considering the value of lime for uses as a manure, and the excellent facilities for its manufacture in this county, I am led to believe that its production will yet take rank among the important industrial pursuits of our people.

In Sidney, there is a bed of upper silurian limestone which forms an excellent quality of water lime, or hydraulic cement. It has been sufficiently tried to test its qualities, and it is found to resist the dissolving action of water. If the deposit is of much extent, it will pay well to work it, as water lime commands a higher price than the ordinary lime of the best quality. A deposit of water lime also occurs in Waterville.

There is a belt of land running through the towns of Monmouth

and Litchfield, in which limestone boulders occur to a considerable extent. In some places they are so numerous as to affect the soil. The phosphate of lime is also quite abundant in rocks associated with hornblende.

Mica schist.—There is an immense deposit of mica schist in Androscoggin, Kennebec and Waldo counties, extending easterly to Penobscot River, where it is succeeded by clay slate. Large patches of granite are frequently found in it, which were protruded subsequently to the deposition of the schist. From Danville—in Androscoggin County—to Belgrade, it has been seen to occur, and this line is supposed to be near the western limits of the basin. In Winthrop the deposit is very distinctly crystalline. From South Gardiner to the north part of Vassalboro' is another section, and the dark-colored rocks found in Augusta are of this deposit. East of the river the mica schist is found in China, and in adjoining towns in Waldo County.

Slate.—In the Report of the Scientific Survey of the State for 1861, page 228, is given a quotation from Prof. Emmons, making statements concerning the Taconic rocks in Maine, from which the following in regard to the slates at Waterville is condensed. They are of a fine greenish color, nearly as even bedded and as fissile as roofing slate, and very little liable to decomposition. They are, however, in some instances stained brown by the decomposition of pyrites which is disseminated in microscopic crystals through much of the rock. The slates upon the banks of the river near the village are nearly vertical, with only a slight dip to the east; their trend is north ten degrees east, varying, however, from this direction to northeast and southwest. At West Waterville, the same thin beds of slate appear, interlaminated also with silico-calcareous layers. The intervening country is moderately ridged with low hills, and the rock only appears occasionally, but enough of it may be seen to convince the most sceptical that it is but one continuous rock. One or two miles west of West Waterville, the taconic slate is succeeded by the primary schists with granitic veins, as in the country between Waterville and Portland. In the direction of their strike, they pass onwards to the Piscataquis River, where the fine roofing slates abound.

In Prof. Hitchcock's first report (1861, pages 281–2,) is given a list of all the curious fossil forms which have been found and described from the slates obtained at Waterville. This description

is far too lengthy to be given here, and the reader is consequently referred to that report for more extended information. Through the exertions of Prof. Hamlin of Waterville College, who is one of the most laborious and painstaking students of nature, a perfect set of these fossils has been placed in the cabinet of the college. For a list of the microscopic forms observed in the Messalonskee at Waterville, by the late Prof. J. W. Bailey of West Point, see Report of the Scientific Survey for 1863, page 401.

Peat.—In peat we have an example of the imperfect formation of coal. It is formed by the partial decomposition, under water, of vegetable matter, chiefly the roots of mosses of the genus *Sphagnum*. It accumulates in low swampy places, and I believe if we had not an ample supply of wood for fuel, and should be driven to other resources for the same, an abundance of peat, or muck that could be condensed for the purpose, could be found in this county in a sufficient amount for all our needs. A deposit of peat occurs in Sidney, on the farm of Mr. D. E. Manter, which is upon a meadow that has been mowed sixty or seventy years. It was discovered when setting out cranberries, and is found at the depth of one and one-half feet from the surface. Under this peat, at a distance of about four feet from the surface is a deposit of clay in which are impressions of small shells. This might prove a valuable fertilizer. When dried the peat gives an intense heat, and has been used to some extent in forges for the purpose of testing its value. Other localities in the county would doubtless furnish peat. For much interesting matter, the reader is referred to a valuable work recently published.*

Through the western part of Winthrop and extending into Monmouth is a belt of mica slate filled with crystals of staurotide. The decomposition of this rock makes a good warm soil.

A large bed of rock similar to steatite occurs in North Vassalboro'.

Iron pyrites is quite common in the county, and is found to considerable extent in Gardiner and other towns.

Bog iron ore occurs in Winslow.

Syenite, which is a variety of granite where hornblende is present in place of mica, has been found in Wayne.

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* "Facts about Peat as an article of Fuel." By T. H. Leavitt. Boston: Leavitt & Hunnewill. 1865. Pp. 120.

Occasional boulders of Cancrinite and Elæolite are found in Litchfield. The latter mineral, containing crystals of zircon, is frequently found in Monmouth. These minerals have never been found elsewhere in Maine.* Delicate crystals of muriate of copper were obtained in a large boulder of amethystine quartz near Oak Hill in Litchfield some years since.

In Gardiner there is a deposit of tertiary clay filled with remains of marine shells, which were evidently the inhabitants of the clay when it was covered with the waters of the sea. The whole mass is 60 or 70 feet above the sea level, and has doultless been elevated by subterranean power to its present position. The rocks in the vicinity are gneiss, charged with so large a proportion of sulphuret of iron, as to decompose with great rapidity. It is rather barren, as the sulphuret of iron is destructive to vegetation. Lime would prove a valuable application to such soils.

A train of boulders of sienite extends from near Wayne Village through Monmouth. They are large, split well, and are extensively used for underpinning.

Speaking of the geological characteristics of the region about Augusta, Dr. Jackson (First Report, 1836, page 83,) says; "There is no spot in Maine where the rolling form of the country and the general direction of the valleys, indicate more clearly the passage of a diluvial current over its surface; and we find the rounded masses of stone, which exist mingled in confusion with the clay and sand among the hills, are not of the nature of the rocks below, and in the immediate vicinity. They are mostly pieces of slate rocks, such as occur in places on the north at Waterville, Vassalboro', and the vicinity. I have not traced them all to their parent rocks, but have no doubt that it can easily be done. In many places, the valleys have been cut down to the tertiary beds of clay, to the depth of 200 feet, and any one who looks upon the general direction of these valleys will feel satisfied that they were excavated by a current of water."

On the farm of Mr. Rufus Smith, in Litchfield, are found cancrinite, blue sodalite and zircon.

The western part of the county consists of swells of land with intervening valleys, running parallel with the Kennebec River. The soil in much of the western part is deep, and rather heavy

* Dr. N. T. True of Bethel.

from a preponderance of clay—but makes excellent land for hay and pasturage. The superiority of the heavy cattle in this part of the State is largely attributable to this fact. The soil also seems to be generally well adapted to orcharding. The boulders in this part of the State are not genrally rounded as west of the Androscoggin River, but are angular as when taken out of the parent ledge, and are well suited for building wall upon the farms.

Catalogue of the Minerals of Kennebec County.

I give below a list of the minerals of the county, for which I am mainly indebted to the reports of Dr. Jackson and Prof. Hitchcock. Many of them have been found of great purity, and beautiful specimens have been secured. It shows that the county is very rich in mineral deposits.

Litchfield.—Cancrinite, sodalite, zircon, nepheline, spodumene, fibrolite, mica crystals, carbonate of copper, amethystine quartz, pyrrhotine (in boulders), labradorite (in boulders).

Monmouth.—Fibrous actinolite, apatite in six-sided yellow crystals, hornblende, beryl, oxide of titanium, elæolite, zircon, staurotide, andalusite, plumose mica, jasper—containing crystals of silicate of iron, copperas, chlorite.

Winthrop.—Argillaceous iron, native copperas, pyrites, hornblend, staurotide, fibrolite, garnet, oxide of manganese.

Hallowell.—Black tourmaline, garnet, stilbite.

Augusta.—Pyrites, magnetite.

Waterville.—Cristallized pyrites.

China.—Petalite?

Clinton.—Pyrites.

Gardiner.—Magnetite.

Mt. Vernon.—Gold.

Sidney.—Staurotide.

Winslow.—Pyrites (iron).

Readfield.—Gold.

The following specimens, illustrating the mineralogy and geology of Kennebec County, are to be found in the Cabinet at the State House, viz:

Gneiss, clouded marble (polished), granite, mica slate, limestone and feldspar from Hallowell; mica slate, staurotide in mica slate, and limestone from Winthrop; granite from Mt. Vernon; grauwacke slate, impressions of fern, argillaceous slate, limestone, and

crystals of iron pyrites from Waterville; impressions of fuci, slate, protogene, bog iron ore, slate with iron pyrites, and limestone from Winslow; and limestone from Vienna and Belgrade.

CHAPTER V.

The Birds of Kennebec County.

Through the kindness of Prof. Charles E. Hamlin of Waterville College—a zealous and thorough student of nature, and an accomplished scholar—I am able to present a very correct catalogue of the birds of the county; more complete than that which appeared in the report on the Scientific Survey of the State, and free from the errors too obvious in that list. Prof. Hamlin has made a thorough examination of the natural history of his locality, and to his investigations we are indebted for the discovery and identification of several rare birds and mammals that would otherwise have remained unknown. His activity is deserving the thanks of every student of Natural History in the State.

Catalogue of Birds found in the vicinity of Waterville, Kennebec County. By Charles E. Hamlin.

The following is presented, not as a complete list of all the birds that may be found here, but as the result of my own investigations, made since April 1st, 1862, at occasional hours snatched from the routine of engrossing daily duties. Of the one hundred and thirty-five species here enumerated, all but about a dozen have been identified as occurring here, by actual study of specimens *in hand.* The rest have been observed under such circumstances as to leave no reasonable doubt of their identity.

Further examination will undoubtedly add some twenty-five more species, at least, most of them birds of passage that do not breed, but merely stop on their way to and from more northern regions. A few more, however, will be found that breed here in small numbers. This will probably prove true, for example, of several hawks not included in the list, as Falco columbarius, the *true Pigeon Hawk* (a rare bird in New England), and several water birds, as Gambetta flavipes, *Yellow Legs.* The completed catalogue for this vicinity will represent well the birds of Kennebec County

and central Maine. No attempt at such a catalogue has hitherto been made, so far as I know.

In nomenclature and classification I have followed Prof. Baird of the Smithsonian Institution; and in beginning every specific name with a small letter, I have been guided by the recent practice of the same authority, as will be seen by consulting his "Review of American Birds," now in course of publication. This mode of writing specific names has the merit of being consistent, uniform and agreeable to the eye.

WATERVILLE, July 20, 1865.

Falco candicans, *Gmelin.*	White Hawk; Jer Falcon of authors.
Falco sparaverius, *Linnæus.*	Sparrow Hawk.
Astur atricapillus, *Bonaparte.*	Blue Hawk; Goshawk of authors.
Accipiter fuscus, *Bonap.*	Sharp-shinned Hawk.*
Buteo borealis, *Vieillot.*	Red-tailed Hawk; Hen Hawk.
Buteo lineatus, *Jardine.*	Red-shouldered Hawk.
Buteo pennsylvanicus, *Bonap.*	Broad-winged Hawk.
Circus hudsonius, *Vieill.*	Marsh Hawk.
Haliætus leucocephalus, *Savigny.*	White-headed Eagle.
Pandion carolinensis, *Bonap.*	Fish Hawk; Osprey.
Bubo virginianus, *Bonap.*	Great Horned Owl; Cat Owl.
Scops asio, *Bonap.*	Mottled Owl; Screech Owl.
Otus wilsonianus, *Lesson.*	Long-eared Owl.
Syrnium nebulosum, *Gray.*	Barred Owl.
Nyctale acadica, *Bonap.*	Little Owl; Saw-whet Owl.
Nyctea nivea, *Gray.*	Snowy Owl.
Surnia ulula, *Bonap.*	Hawk Owl.
Coccygus erythrophthalmus, *Bonap.*	Black-billed Cuckoo.
Picus villosus, *Linn.*	Hairy Woodpecker.
Picus pubescens, *Linn.*	Downy Woodpecker.
Picoides arcticus, *Gray.*	Arctic Woodpecker; Three-toed Woodpecker.
Sphyrapicus varius, *Baird.*	Yellow-bellied Woodpecker; Sap-sucker.
Hylatomus pileatus, *Baird.*	Pileated Woodpecker; Log Cock.
Colaptes auratus, *Swainson.*	Yellow Hammer.

* Incorrectly called "Pigeon-Hawk."

Trochilus colubris, *Linn.*	Humming Bird.
Chaetura pelasgia, *Stephens.*	Chimney Swallow.
Antrostomus vociferus, *Bonap.*	Whip-poor-will.
Chordeiles popetue, *Baird.*	Night Hawk.
Ceryle alcyon, *Böie.*	Belted Kingfisher.
Tyrannus carolinensis, *Baird.*	Kingbird.
Myiarchus crinitus, *Cabanis.*	Great Crested Flycatcher.
Sayornis fuscus, *Baird.*	Pewee.
Contopus borealis, *Baird.*	Olive-sided Flycatcher.
Contopus virens, *Cab.*	Wood Pewee.
Empidonax traillii, *Baird.*	Traill's Flycatcher.
Empidonax flaviventris, *Baird.*	Yellow-bellied Flycatcher.
Empidonax minimus, *Baird.*	Least Flycatcher.
Turdus pallasii, *Cab.*	Hermit Thrush.
Turdus fuscescens, *Steph.*	Wilson's Thrush.
Turdus swainsonii, *Cab.*	Olive-backed Thrush.
Turdus migratorius, *Linn.*	Robin.
Sialia sialis, *Baird.*	Bluebird.
Regulus calendula, *Lichtenstein.*	Ruby-crowned Wren.
Regulus satrapa, *Licht.*	Golden-crested Wren.
Mniotilta varia, *Vieill.*	Black and White Creeper.
Parula americana, *Bonap.*	Blue Yellow-backed Warbler.
Geothlypis trichas, *Cab.*	Maryland Yellow-throat.
Geothlypis philadelphia, *Baird.*	Mourning Warbler.*
Helminthophaga peregrina, *Cab.*	Tennessee Warbler.
Helminthophaga ruficapilla, *Baird.*	Nashville Warbler.
Seiurus aurocapillus, *Swain.*	Golden-crowned Thrush; Oven-bird.
Seiurus noveboracensis, *Nuttall.*	Water Thrush.
Seiurus ludovicianus, *Bonap.*	Large-billed Water Thrush.
Dendroica virens, *Baird.*	Black-throated Green Warbler.
Dendroica canadensis, *Baird.*	Black-throated Blue Warbler.
Dendroica coronata, *Gray.*	Yellow-rumped Warbler.
Dendroica blackburniæ, *Baird.*	Blackburnian Warbler.
Dendroica pennsylvanica, *Baird.*	Chestnut-sided Warbler.
Dendroica striata, *Baird.*	Black-poll Warbler.

* One pair—the only ones yet found in Maine.

Dendroica aestiva, *Baird.*	Yellow Warbler; Summer Yellow Bird.
Dendroica maculosa, *Baird.*	Magnolia Warbler; Spotted Warbler.
Dendroica palmarum, *Baird.*	Yellow Red-poll Warbler.
Myiodioctes pusillus, *Bonap.*	Black-cap Fly-catching Warbler.
Myiodioctes canadensis, *Aud.*	Canada Fly-catching Warbler.
Setophaga ruticilla, *Swain.*	Red Start.
Pyranga rubra, *Vieill.*	Scarlet Tanager.
Hirundo horreorum, *Barton.*	Barn Swallow.
Hirundo lunifrons, *Say.*	Eave Swallow.
Hirundo bicolor, *Vieill.*	White-bellied Swallow; Tree Swallow.
Cotyle riparia, *Böie.*	Bank Swallow.
Progne purpurea, *Böie.*	Martin.
Ampelis cedrorum, *Baird.*	Cherry Bird; Cedar Bird.
Ampelis garrulus, *Linn.*	Bohemian Waxwing.
Collyrio borealis, *Baird.*	Shrike; Butcher-bird.*
Vireo olivaceus, *Vieill.*	Red-eyed Flycatcher.
Vireo gilvus, *Bonap.*	Warbling Flycatcher.
Vireo solitarius, *Vieill.*	Solitary Vireo.
Vireo flavifrons, *Vieill.*	Yellow-throated Vireo.
Vireo philadelphicus,* *Cassin.*	
Mimus carolinensis, *Gray.*	Cat Bird.
Harporhynchus rufus, *Cab.*	Brown Thrasher.
Troglodytes aedon, *Vieill.*	House Wren.
Troglodytes hyemalis, *Vieill.*	Winter Wren.
Certhia americana, *Bonap.*	American Brown Creeper.
Sitta carolinensis, *Gm.*	White-bellied Nuthatch.
Sitta canadensis, *Linn.*	Red-bellied Nuthatch.
Parus atricapillus, *Linn.*	Chickadee; Black-cap Titmouse.
Carpodacus purpureus, *Gray.*	Purple Finch.
Chrysomitris tristis, *Bonap.*	Yellow Bird; Black-winged Yellow Bird.
Chrysomitris pinus, *Bonap.*	Pine Finch.
Curvirostra americana, *Wilson.*	Red Crossbill.
Ægiothus linaria, *Cab.*	Red-poll Linnet.
Plectrophanes nivalis, *Meyer.*	Snow Bunting; White Snow Bird.

* No English name. One specimen—the only one yet found in New England.

Passerculus savanna, *Bonap.*	Savannah Sparrow.
Poocaetes gramineus, *Baird.*	Grass Finch.
Zonotrichia leucophrys, *Swain.*	White-crowned Sparrow.
Zonotrichia albicollis, *Bonap.*	White-throated Sparrow; Whistler.
Junco hyemalis, *Sclater.*	Blue Snow Bird.
Spizella monticola, *Baird.*	Tree Sparrow.
Spizella socialis, *Bonap.*	Chipping Sparrow; Chip Bird.
Melospiza melodia, *Baird.*	Song Sparrow.
Melospiza palustris, *Baird.*	Swamp Sparrow.
Passerella iliaca, *Swain.*	Fox-colored Sparrow.
Guiraca ludoviciana, *Swain.*	Rose-breasted Grosbeak.
Cyanospiza cyanea, *Baird.*	Indigo Bird.
Dolichonyx, oryzivorus, *Swain.*	Boblink.
Molothrus pecoris, *Swain.*	Cow Blackbird.
Agelaius phœniceus, *Vieill.*	Red-winged Blackbird; Swamp Blackbird.
Sturnella magna, *Swain.*	Meadow Lark.
Icterus baltimore, *Daudin.*	Baltimore Oriole; Golden Robin.
Scolecophagus ferrugineus, *Swain.*	Rusty Grakle; Rusty Blackbird.
Quiscalus versicolor, *Vieill.*	Purple Grakle; Crow Blackbird.
Corvus americanus, *Aud.*	Common Crow.
Cyanura cristata, *Swain.*	Blue Jay.
Ectopistes migratoria, *Swain.*	Wild Pigeon.
Bonasa umbellus, *Steph.*	Partridge; Ruffed Grouse.
Ardea herodias, *Linn.*	Great Blue Heron.
Botaurus lentiginosus, *Steph.*	Bittern; Stake Driver.
Butorides virescens, *Bonap.*	Green Heron.
Nyctiardea gardeni, *Baird.*	Night Heron; Squawk.
Charadrius virginicus, *Borck.*	Golden Plover.
Philohela minor, *Gray.*	Woodcock.
Gallinago wilsonii, *Bonap.*	Wilson's Snipe.
Rhyacophilus solitarius, *Wils.*	Solitary Sandpiper.
Tringoides macularius, *Gray.*	Spotted Sandpiper.
Actiturus bartramius, *Bonap.*	Field Plover.
Bernicla canadensis, *Böie.*	Wild Goose; Canada Goose.
Bernicla brenta, *Steph.*	Brant.
Anas obscura, *Gm.*	Black Duck.
Nettion carolinensis, *Baird.*	Green-winged Teal.

Querquedula discors, *Steph.*	Blue-winged Teal.
Aix sponsa, *Böie.*	Wood Duck; Summer Duck.
Mergus americanus, *Cass.*	Sheldrake.
Sula bassana, *Brisson.*	Gannet; Solan Goose.*
Colymbus torquatus, *Brünnich.*	Loon; Great Northern Diver.

CHAPTER VI.

Climate and Seasons;—Meteorological Tables.

For the following interesting remarks on the climate and seasons of Kennebec County, I am indebted to Rev. William A. Drew of this city, long a resident of the County, and well known as the former editor of the "*Gospel Banner*" and "*Drew's Rural Intelligencer.*" They will be read with interest as coming from a gentleman of close observation, and well qualified to write upon the subject:

"Were a southern gentleman, of refined and delicate habits, obliged, from any cause, to sojourn in the central County of Maine during one of our severest winters,—arriving here, perhaps, on a day when the mercury stood at 24° below zero,—and should he remain till the spring equinox, the thermometer, meanwhile, indicating a steady average temperature of 18°, doubtless he would often shrug up his sensitive shoulders, like any Frenchman, and condemn our climate as too intolerable for any reasonable man to endure. So, too, should business or pleasure induce a northern party to spend a summer in a southern latitude, where the heat for months averaged 100° Fahrenheit, by night as well as by day, doubtless he in turn would condemn a southern climate as *feelingly* as the first named gentleman had abjured a northern one. The judgment of both these parties would be precipitate and unjust. Each region has its discomforts, and both sections have their excellences. In the wise system of compensation ordained by Divine Providence, the peculiar benefits and evils of different latitudes are more equally balanced than partial observers are inclined to believe. The excellence of any climate consists in its capacity to produce the necessaries of life, and in its influence upon the health

* Single specimen—accidental.

of a people. Judged by this rule, the climate of Kennebec County is as desirable as that of any other region. Here, by "the sweat of the face," all the necessaries of life, as far as climate has any influence upon their production, may be raised and secured; and as for health,—if timely toil, salubrious air and pure water are in sympathy with the laws thereof, it may be safely affirmed that no region is more favored in this respect.

The people of the Kennebec Valley, and of the State at large, need but to weigh fairly the comparative advantages and disadvantages of the different climates of our country, to make them contented with home. True, our winters are long and cold, but not so intolerable or protracted as the sickly heat of the southern summers. It is not the steady weather of our winter months that breeds consumptive diseases, but the variable changes of spring and autumn, such as they have all winter long in more southern latitudes, combined with the pernicious fashions and habits of the age; and medical men of the first authority now advise invalids of this description to seek the pure and steady air of the north, rather than the fitful winters of the south, for safety in this respect. Our climate has been unfairly represented as the prolific cause of consumption. This flattering, but fatal, disease is not so much induced by our climatic laws, as by the modern styles of dress and living. The Pilgrim Fathers of Plymouth, and the hardy sons and daughters of New England, before the Revolution, seldom or never suffered from that disease. And why not? Was not the climate as rigorous then as now? Certainly it was. But they lived and dressed in less fashionable and costly, and more reasonable and healthful, styles. The men worked less with the yard-stick and green bag, and more with the goad-stick and hoe handle; and the women (aye, there were more women than ladies then,) toiled at the distaff, spinning wheel and loom, more than at the pianoforte and nocturnal waltzing. Thick shoes, loose and substantial garments, plain wholesome diet, and industrious habits,—these were the causes of a freedom from disease, which a disregard of them in modern times has brought in fearful fatality upon our people. Fashion and luxurious living, rather than climate, are to be deplored as the cause of this evil.

Diseases, indeed, there are amongst us; so there are in all regions. As Socrates said, "men cannot go where men do not die." But I am not aware of any disease *peculiar* to this climate. In

the year 1814 the spotted fever prevailed alarmingly in this County, carrying off, very suddenly, many of our people. In 1825 dysentery was very fatal in certain parts of this and the adjacent County of Waldo; and within the last few years, a new disease, or an old one with a new name, diphtheria, has made sad inroads upon the families of many in this, and all parts of the State. But spotted, typhoid, and bilious fevers, dysentery, and diphtheria prevail south and west as fatally as in the north and east; so that these are no drawbacks upon the comparative healthfulness of the Kennebec climate. The yellow fever, so prevalent in the south, hardly ever found a victim in Maine; and the Asiatic Cholera, which once so terrified and depopulated other parts of the United States, I believe, has been definitely known but in a very few cases in this Commonwealth, and once only in Kennebec County. An original case of fever and ague, so common in all the west and south, was never known here; our people suffer not from that disease till they go abroad and encounter the malarias that engender it.

An impression prevails amongst people in other parts of the United States, that the coldness of a Maine winter is more hyperborean than in any other State, Vermont, perhaps, excepted. This is a mistake. The cold may be more steady, and its reign a little longer, than at the west; but even in the garden States of Illinois and Missouri, the mercury sometimes touches a lower degree than we have ever known it reach in Kennebec. The coldest day we ever marked in this County was January 24th, 1857, when the mercury sunk to 30° below zero. Before this, the lowest our record shows was January 31st, 1818, when it stood at 27° below. But Mr. BRADFORD, in his excellent book descriptive of the western country, says that during all his residence in Quincy, Ill., on the Mississippi, he has never known a winter when the thermometer did not indicate 40° below zero! The wintry winds which sweep unobstructed down the open prairies of the Mississippi Valley from the innumerable lakelets at the sources of the Missouri and Mississippi rivers, are vastly more intolerable and destructive even to the lives of men and animals, than the severest weather of this seaboard State, sheltered especially, as we are, by the powerful barriers of our friendly hill-sides. When the late Hon. THOMAS H. BENTON, (for thirty years a Senator in Congress from Missouri,) visited the Maine Capital, and delivered a lecture

before the Augusta Lyceum, in the winter of 1856–7, he frankly assured the writer of this article, that in riding over prairie lands in the neighborhood of St. Louis, he had not unfrequently encountered an atmosphere so dense and congealed, with the mercury at 40° below zero, that his horse actually made plunges against the frozen air as if to break a passage-way through the atmospheric ice! and he demanded of us to say if we had ever experienced any thing like it in Maine? Of course we had not.

The County of Kennebec is situated very near the centre of the cultivable area of Maine. Its fields lie upon the extensive slope that looks out from the mountainous range in the northwest to the ocean coast-line in the southeast—distant perhaps on an average fifty miles from the former and thirty from the latter. Thus situated, it is too far from the sea to have its vegetation retarded by the saline fogs and winds of an ocean atmosphere, and distant enough from the mountain ranges to prevent suffering from their frigid summits. In speaking, therefore, of the climate of this County, we may be supposed to represent also the general climatic character of the State.

Its harmony with the natural conditions of health has already been incidentally affirmed. But its influence upon the seasons and their productions, deserves a more particular consideration.

There are those who believe that the climate has changed perceptibly, and that the warm seasons have increased in length, within the last half century. In the early settlement of the country, as long ago as when the traitor Arnold led his army up the Kennebec to Canada, the seasons were too short for the maturity of corn, and this necessary article of food had to be transported hither from more southern latitudes. For years, too, the inhabitants believed that apples could not be raised in this region, and these, with cider, were brought to the consumers from Essex Co., Mass. Now, everybody knows that nowhere is corn a surer crop than in Kennebec County; and as for apples and cider, this County is the chosen home of these productions. But these facts may not justify the opinion that the *climate* has essentially changed. They may be more safely accounted for on the well known experience of all new countries, that, as the forests are cleared and the lands are laid open to the light and heat of the sun, the earth becomes warmer and the air milder, by which means plants, which could not before come to maturity, in process of a few years can be cul-

tivated with success. Corn cannot now be planted to advantage in Aroostook; very possibly fifty years hence it may be a sure crop there. Twenty-five years ago we hardly ever saw a ripe cluster of grapes grown in Kennebec County; now grapes are common in almost any garden or door-yard. This improvement, however, is not to be attributed to a change in climate, but to the introduction of earlier ripening varieties.

But there is one fact, which has seemed to authorize the belief of a change in climate, less doubtfully than the foregoing. It is this: For some years past—fifteen, perhaps, or more—we have noticed every autumn, that killing frosts and deep snows have fallen upon lands in Pennsylvania, Virginia, Ohio, Illinois, and Indiana, earlier than in Maine. In 1863, corn was killed in most of the fields in Illinois the latter part of August, when it ripened well here with no frost till the first of October. If the fact of earlier frosts and snows in the States above named, occurring regularly for years, indicates any change of climate, that change pertains to those States *adversely*, and not to us *favorably*. Since the country was opened and settled, we have seldom had biting frosts before the autumn equinox—Sept. 20—and this is about the average. In 1860, our first frost was Oct. 16. But we should hesitate to report any change in the isothermal lines, on the authority of what may be mere eccentricities in nature. Those lines are of very slow movement. The record kept by the writer of this, goes no farther back than 1817. The previous summer (1816) will long be known as "the cold season." There was frost in this County every month in that year. Corn did not come to maturity. The crop was a failure, and the coldness of that memorable summer produced both the "cold or spotted fever," which carried a great many people to the "Better Land" beyond Jordan, and brought on the "Ohio fever," which carried vast numbers of New England farmers to the better land and milder clime beyond the river of that name. Probably to the cold weather of 1816 is Ohio indebted for the stock which gave the present New England character to her population.

But in 1817, "Saturnian times returned again." The summer of that year proved quite a compensation for the failure of the past one. The record shows that robins came March 21; that our field corn was planted May 15; that apple trees were in blossom May 25; that corn silked out July 20; that the grain crops,

of wheat, barley, oats, &c., which were never heavier, though damaged some by smut, were harvested during beautiful weather in August; that the first frost, which was very slight, occurred Sept. 22; and that not even squash vines were killed till Oct. 2. That summer, every storm after the spring equinox cleared off warm. This makes a marked difference in the character of any season. Such, according to our record, were the facts of 1817—nearly half a century (48 years) ago. Our average record for the last decade of years shows no visible improvement on that. For the last 48 years, we make the average appearance of robins April 3; planting of peas and other early vegetables, about April 10; planting of field corn, May 23; ice breaking on the Kennebec, from March 23 to April 11, average April 10; apple trees in blossom June 3; green peas gathered June 24; corn for the table, July 21, and field corn ripe Sept. 10. The season between planting peas and harvesting potatoes in Kennebec County will average about six months and nine days.

I have spoken of the averages; the variations are considerable. In 1846, ice left the Kennebec March 23; in 1854, not till April 21. In 1846 and 1860, peas were planted March 31; in 1863, not till April 25. In 1820, July 20, green corn was gathered by C. Belcher, Esq., in Farmington—then a part of Kennebec County. In 1840, apple trees were in full blossom May 24. Some other eccentricities may be noticed: In the winter of 1851, there was constant sleighing for 115 days. Nov. 15, 16, 17, 1863, rain fell in such quantities as to raise the Kennebec, Sandy, and Androscoggin rivers to a height unprecedented for 43 years. The drought of the summer of 1865 was severer than had been since 1840. Jan. 1, 1865, was so warm in Kennebec County, that people sat comfortably at open windows; whilst at the same time the mercury in New Orleans was reported at within 12° of zero, and in Illinois at 40° below!

The prevalent diseases of our climate have been mentioned. They are not peculiar to this region. The "cattle plague," which has been so fatal in Europe, and in some parts of the United States, has not troubled us. Some diseases and plagues have afflicted the vegetable kingdom. The smut in wheat, which greatly polluted the harvest years in the teens of the present century, put a stop for a time to the cultivation of that grain. Before that, wheat was the staple crop of the County. We have known vessels loaded

with it in Hallowell for a western market. Ultimately that disease disappeared, and our farmers began to raise wheat again with success; but it was not long before the midge or weevil visited our wheat fields, and destroyed the hopes of our farmers again in that direction. Within the past two or three years, however, that evil seems to be abating, and we may hope that the wheat crop may again return to us as of yore. It is said and believed, that if the ground is prepared in the Fall all ready for sowing the grain, and left in that situation till early spring, the seed may be sown as soon as the snow disappears and the top of the ground begins to thaw, and the grain will settle into the soft soil to the necessary depth, and thus gain in time to forestall the weevil and the rust, and attain a healthy growth and maturity before those evils can afflict it. This process, it is said, almost makes a winter wheat of it.

The potato disease showed itself some fifteen years ago. For several years it was very ruinous to that important crop; but that, like other evils, which are temporary in their reign, appears to be passing away. For the last two years little complaint has been heard of its ravages. Two hundred bushels, which may be easily raised on an acre in Kennebec County, are worth more, in their market value, to the producer, than four hundred bushels of corn, which will require the tillage of eight acres in the West, are to the farmers of Illinois.

In no part of the United States do farmers live better, or enjoy more of the comforts and luxuries of life, or rear their families amidst better social privileges, than in the County whose climate and seasons have constituted the subject of the foregoing paper."

The following meteorological tables were kindly furnished me by Rev. F. GARDINER of Gardiner, with the exception of Table No. II, which was furnished me some years ago by a gentleman connected with Waterville College and was inserted in a little agricultural tract published by me in 1860. While I regret that it does not extend over a greater number of years, I regard it as worthy a place in this connexion.

TABLE I. *Temperature of winters from* 1836 *to* 1864, *from observations made at Gardiner, Kennebec County, latitude* 44 *deg.* 12 *min. north, longitude* 69 *deg.* 46 *min. west, by Hon.* R. H. GARDINER *and Rev.* F. GARDINER.

Years.	Mean heat, four winter months.	Nights below zero.	Greatest cold.	Amount snow during winter.	Days good sleighing.
				ft. in.	
1836–7.	20.933	30	—27		
1837–8.	23.075	11	—23 1-2	2 6 2-3	91
1838–9.	21.442	31	—23 1-2	5 11 1-2	51
1839–40.	25.300	19	—23	5 2 1-10	16
1840–1.	24.273	18	—19	10 3 1-10	76
1841–2.	27.760	10	—18	4 8	16
1842–3.	21.108	19	—20	12 1 3-4	114
1843–4.	20.008	26	—30 1-2	8 3 1-2	92
1844–5.	22.598	17	—12	9 8 1-3	80
1845–6.	21.569	24	—14	5 2 1-2	109
1846–7.	23.677	14	—19	6 7 3-4	100
1847–8.	24.851	15	—15	6 3	38
1848–9.	22.151	33	—25	5 11 3-8	77
1849–50.	24.582	14	—25	8	91
1850–1.	23.424	18	—14	7 2	111
1851–2.	21.836	28	—18	9 2	126
1852–3.	25.480	9	—22	6 9 1-4	81
1853–4.	19.675	27	—25	10 2 1-4	110
1854–5.	22.123	24	—27	4 5 1-3	60
1855–6.	19.698	59	—26	5 2	112
1856–7.	22.535	27	—40	6 10 1-4	68
1857–8.	22.360	9	—24	4 7 1-2	47
1858–9.	20.2835	31	—32	10 1	111
1859–60.	21.4730	22	—29	8	95
1860–1.	21.2960	23	—28	7 10 1-4	108
1861–2.	22.2268	17	—14	6 5 1-3	108
1862–3.	23.3555	17	—16	9 10 1-2	68
1863–4.	24.4754	14	—22	8 9	69
1864–5.	23.9938	21	—23	6 7 1-2	94
Means,	22.7090	21 18-29	—22 6-29	6 11 1-2	82 3-4

NOTE.—March is usually called a spring month, but in Kennebec it has no pretensions to be such; and in this table is included in the four winter months.

TABLE II. *Amount of rain, registered at Waterville College, Waterville, Maine, for each month, from* 1850 *to* 1853, *inclusive.*

NOTE.—It will be seen from the following table, that the mean annual values for 1850, 1851 and 1853, are very nearly alike, and differ materially from that of 1852; but the likeness is accidental. It is not true in regard to the *moisture*, as it is in regard to the *temperature* of a place—and all accurate published observations will show it—that the mean value for any *one* year, differs, by a very small quantity, from the mean value of a series of years, great or small in number.

Months.	1850.	1851.	1852.	1853.
January,	2.44	2.53	1.76	1.31
February,	2.48	3.30	2.23	6.38
March,	1.54	1.08	2.85	2.07
April,	1.33	4.60	4.52	1.97
May,	9.60	2.41	0.00	4.77
June,	5.20	1.50	3.32	2.20
July,	3.84	7.27	3.57	4.40
August,	5.68	2.20	5.87	3.01
September,	3.05	2.41	2.49	4.48
October,	4.97	8.41	3.45	4.77
November,	1.58	5.46	4.73	5.47
December,	2.53	2.87	4.36	3.39
	44.24	44.04	39.15	44.22

Mean moisture for four years, 42.91.

TABLE III. *Opening and Closing of the Kennebec River, at Gardiner, Maine, from* 1785 *to* 1865*; according to the records of Gen.* HENRY DEARBORN, *Major* WILLIAM SWAN, *Hon.* R. H. GARDINER *and Rev.* F. GARDINER.

Year.	Opening.	Closing.	Remarks.
1785.	April 24.		
1786.	March 21.	November 18.	
1787.	April 7.		
1789.	" 4.	January 5.	
1790.	" 18.		
1791.	" 3.	December 10.	
1792.	" 3.	Nov'r 23, Dec'r 10.	Opened after first closing.
1793.	" 1.		
1794.	" 6.	January 4, 1795.	River opened to within two miles of Nehumkeag.
1796.	"	November 28.	
1797.	" 4.	" 22.	
1798.	" 12.	" 23.	
1799.	" 13.	" 24.	
1800.	" 10.	Nov. 28, & Jan. 2, 1801.	Opened Dec. 13; plowing at Christmas.
1801.	March 28.	December 10.	
1802.	April 9.	" 16.	
1803.	March 22.	Nov'r 16, Dec'r 22.	Vessels come up to Gardiner, Dec. 2;
1804.	April 12.	November 19.	whole river opened Dec. 13, and closed
1805.	" 2.	January 1806.	Dec. 22.
1806.	March 15.		
1807.	April 7.	December 18.	
1808.	March 29.	" 6.	Vessels come up to Gardiner March 27.
1809.	April 17.	November 23.	
1810.	" 9.	December 9.	
1811.	March 24.	" 14.	
1812.	April 18.	" 10.	
1813.	" 11.	" 13 and 21.	Vessels come up to Gardiner Dec. 15.
1814.	" 6.	" 4.	
1815.	" 18.	" 2.	
1816.	" 20.	November 29.	Vessels come up to Gardiner April 17.
1817.	" 17.	Nov'r 25 and Dec'r 7.	River broke up from Gardiner, Nov. 30. Vessels come up to Gardiner Dec. 3. Whole river broke up Dec. 7, and closed same day.
1818.	" 12.	December 4 and 10.	River broke up Dec. 6, and closed Dec. 10.
1819.	" 14.	" 5.	
1820.	" 15.	November 16 and 29.	River opened Nov. 17, from Gardiner.
1821.	" 11.	December 1.	November 20, whole river opened.
1822.	March 29.	" 6.	
1823.	April 11.	November 16.	
1824.	March 28.	December 1 and 9.	Opened December 3.
1825.	April 5.	Nov'r 23 and Dec'r 12.	" November 28.
1826.	" 2.	December 4 and 20.	" December 10.
1827.	March 29.	Nov'r 24 and Dec'r 6.	" November 30.
1828.	" 25.	December 3.	Vessels come up to Gardiner March 23.
1829.	April 12.	" 3.	
1830.	" 1.	Dec. 13, 19, Jan. 11, '31.	Opened Dec. 25 and 27. Two vessels
1831.	March 30.	December 2.	arrived from Boston, Jan. 1.
1832.	April 14.	" 2.	
1833.	" 5.	" 14.	
1834.	" 3.	" 8.	
1835.		November 23.	
1836.	" 9.	" 27.	
1837.	" 14.	" 27.	
1838.	" 3.	" 24.	
1839.	" 6.	December 18.	Very great winter freshet, Jan. 28.
1840.	March 31.	November 28.	
1841.	April 5.	December 1, 7 and 17.	Opened Dec. 4 and 11. Vessels come
1842.	March 20.	November 28.	up to Gardiner March 18.
1843.	April 19.	" 30.	
1844.	" 9.	" 27.	

Table of Opening and Closing of Kennebec River, (Continued.)

Year.	Opening.	Closing.	Remarks.
1845.	March 31.	December 7.	
1846.	" 28.	" 2.	
1847.	April 20.	" 21.	
1848.	" 1.	" 22.	
1849.	March 30.	" 8.	
1850.	April 3.	" 8.	
1851.	" 6.	" 1.	
1852.	" 12.	" 16.	
1853.	March 29.	Nov'r 27 and Dec'r 4.	River opened November 30.
1854.	April 21.	December 3.	
1855.	" 9.	Nov'r 23, and Dec'r 11.	Opened December 10, and vessels come up.
1856.	" 9.	December 1.	
1857.	" 5.	" 5.	
1858.	" 3.	November 30.	
1859.	March 30.	December 4.	
1860.	March 31.	" 6.	
1861.	April 7.	" 12.	
1862.	" 18.	" 3.	
1863.	" 13.	" 3 and 6.	River opened December 5.
1864.	March 29.	" 12.	
1865.	" 22.		

The river has opened twenty-one years in March and fifty-five years in April. The first closing was 27 years in November and 42 years in December. The mean opening is April 6th, and the mean first closing December 3d. The earliest closing is November 16th and the earliest opening March 15th. The latest opening was April 24th, 1785, and the next latest April 21st, 1854.

TABLE IV. *Mean temperature of each month and each year, from* 1837 *to* 1865, *from records kept at Gardiner by Hon.* R. H. GARDINER *and Rev.* F. GARDINER.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Whole Year.
1837.	14.250	18.260	27.880	41.355	49.420	61.281	65.880	63.430	56.012	43.824	31.939	21.944	41.2896
1838.	23.741	13.270	33.347	37.653	53.138	66.663	70.586	68.870	69.522	45.752	31.714	16.331	43.3822
1839.	16.431	20.660	32.346	43.836	51.759	60.800	70.170	67.961	60.067	48.086	34.493	27.905	44.5429
1840.	12.761	28.672	31.661	45.285	54.591	65.320	71.958	71.487	59.390	49.074	35.657	20.829	45.5571
1841.	26.427	19.682	30.155	41.135	54.488	66.947	70.424	70.856	64.215	45.535	36.273	27.198	46.1113
1842.	20.618	28.244	34.981	43.535	50.934	61.619	70.416	68.131	56.440	45.790	33.927	18.471	44.4254
1843.	25.500	13.925	26.218	40.712	54.932	64.097	67.557	68.626	58.913	44.016	30.185	22.572	43.1129
1844.	7.080	17.962	29.406	44.193	52.600	62.260	65.416	63.813	56.663	43.506	30.040	20.939	41.1562
1845.	19.277	21.316	28.330	39.442	51.865	63.900	65.879	65.632	53.330	43.706	38.405	17.601	42.3928
1846.	19.594	18.478	30.606	44.134	54.526	65.131	70.218	69.390	62.603	44.609	39.147	22.552	45.0825
1847.	18.493	24.067	27.599	38.847	54.068	63.250	71.880	69.593	58.743	44.779	38.539	28.655	44.8763
1848.	23.264	23.252	28.823	42.700	54.982	62.732	67.761	67.555	55.142	46.626	33.137	27.261	44.4361
1849.	15.282	14.219	31.845	40.273	51.653	65.777	71.226	68.477	57.537	49.944	41.897	21.032	44.0908
1850.	20.483	24.172	32.644	42.613	51.372	64.829	69.987	66.170	59.253	49.832	37.996	18.710	44.8122
1851.	17.977	24.207	32.801	42 683	55.309	64.633	68.726	67.019	60.979	51.058	32.504	17.289	44.5980
1852.	17.827	21.482	30.745	41.613	55.941	62.916	72.471	67.222	59.993	49.996	35.555	28.087	45.3280
1853.	20.505	21.178	32.550	39.467	57.285	67.100	71.670	66.836	61.703	48.095	34.828	22.914	45.3440
1854.	12.776	15.321	27.689	35.883	57.580	65.788	74.220	68.209	59.754	49.613	39.416	19.881	43 8440
1855.	25.139	16.299	28.910	42.255	54.400	66,350	71.987	65.633	58.058	50.854	35.812	25.564	45.1050
1856.	12.745	16.828	25.207	43 822	50.061	70.969	71.896	66.380	59.876	49.389	38.690	21.032	43.9080
1857.	12.655	26.821	30.161	41.644	56.569	61.462	71.342	66.580	59.511	48.048	37.306	24.609	44.7263
1858.	21.923	15.217	27.692	40.073	50.992	64.069	65.900	63.930	58.992	47.780	31.213	16.429	42.0182
1859.	13.823	18.850	31.927	38.524	55.167	60.990	66.235	65.501	55.484	42.780	34.816	13.935	41.5027
1860.	19.693	18,954	33.312	39.583	53.404	63.588	65.763	66.573	55.388	46.605	40.179	21.265	43 6922
1861.	12.151	23.471	28.277	40.854	51.383	61.282	67.870	65.298	57.601	49.812	33.176	24.362	42.9364
1862.	15.794	17.425	31.322	39.276	54.390	61.667	66.167	65.579	58.836	48.971	36.655	21.213	43.1082
1863.	25.793	22.425	23.924	42.266	51.931	61.000	67.619	69.822	56.378	48.509	39.751	21.068	44.4572
1864.	20.453	24.517	31.919	41.336	55.090	63.716	67.907	67.449	55.862	46.271	37.804	24.440	44.7303
1865.	14.671	22.487	34.699	44.837	54.671	–	–	–	–	–	–	–	–
Means,	14.6595	20.4024	30.2440	41.3734	53.7069	63.9338	69.2542	67.3151	58.4373	47.2451	35.7516	21.9804	43.9488

TABLE V. *Showing the extremes and range of temperature of each month and year from* 1837 *to* 1865, *as registered at Gardiner.*

Year.	January.			February.			March.			April.			May.			June.			July.			August.			September.			October.			November.			December.			Year.		
	Heat.	Cold.	Range	Heat.	Cold.	Range	Heat.	Cold.	Range	Heat.	Cold.	Range	Heat.	Cold.	Range	Heat.	Cold.	Range	Heat.	Cold.	Range	Heat.	Cold.	Range	Heat.	Cold.	Range	Heat.	Cold.	Range	Heat	Cold.	Range	Heat.	Cold.	Range	Heat.	Cold.	Range
1837.	40	−27	67	41	−15½	56½	52	−17	69	65	26	39	75	27½	47½	81½	39	42½	85	46	39	85	46	39	80	37½	42½	68	21	47	50	3	47	40	−7	47	85	−27	112
1838.	40	−3	43	32	−13	45	62	9	53	63	24	39	78	29	49	92	42	50	93	51	42	91	51	40	86	42	44	77	29	48	55	½	54½	40	−23½	63½	93	−23½	116⅜
1839.	40	−23½	63½	49	−22	71	59	−9	68	72	15	57	72	15	57	82	33	49	89	49	40	90½	46	44½	83	38	45	72	28	44	53	11	42	48	−7	55	90½	−23½	114
1840.	43	−23	66	47	−19	66	54	−4	58	82	15	67	80	33	56	90	39	51	92	52	40	85	52	37	79	38	41	72	26	46	55	7	48	49	−18	67	92	−23	115
1841.	52	−19	71	52	−15	67	69	−14	74	66	18	48	82	35	47	93	45	48	96	52	44	94	50	44	83	48	35	71	25	46	72	16	56	46	−7	53	96	−19	115
1842.	48	−18	66	52	−2	54	60	10	60	82	14	68	75	31	44	78	36	42	86⅜	46	40½	82	47	35	81	35	46	67	23	44	52	12	40	43	−6	49	86½	−18	104⅛
1843.	49	−20	69	40	−19	59	41	4	37	61	17	44	79	34	45	91	35	56	90	44½	45⅜	83	53	30	85	33	52	64	29⅜	34½	50	4½	45⅜	38	−3	41	91	−20	119
1844.	41	−30½	71½	41	−16	57	49	6	43	78	6	72	78	32	46	83	43	40	82	44	38	80	44	36	77	28	49	62	21	41	48	4	44	40	−10	50	83	−30½	113⅜
1845.	45	−12	57	46	−11½	57½	52	−2	54	70	16	54	84	27	57	83½	44	39½	86	50	36	88	42	46	73	34	39	65	18	47	58⅓	12	46⅔	36	−9	45	88½	−12	100½
1846.	46	−6	52	55	−14	69	51	−8	59	70	22	48	76	28	48	86	42	44	92⅔	47	45½	90	49	41	89	39½	49½	67	22	45	55	19½	39½	39	−2	41	92½	−14	106½
1847.	44	−10	54	49	−19	68	59	3	47	61	5	56	76	31½	44½	88	44	44	93	48½	44½	83½	52	31½	79	42	37	66	23	43	68	7	61	58	−1	59	93	−19	114
1848.	46	−15	61	47	−13	60	55	−7	62	62	26	36	82	31	51	82	38	44	88⅜	51	37⅜	85	47	38	73	31	42	70	26	44	52	14	38	53	−5	58	85	−15	100
1849.	36	−15	51	55	−25	80	60	−4	64	68	11	57	74	27	47	94	45	49	93	48½	44½	83	48	35	76	36	40	60	28	42	60	24	36	45	−6	51	94	−25	119
1850.	40	−14	54	48	−25	73	55	−8	63	86	19	67	80	30	50	91	40	51	87	50	37	84	48	36	83	38	45	65	26	39	62	23	39	44	−12	56	91	−25	116
1851.	43	−13	56	46	−14	60	67	1	66	61	18	43	77	33	44	89	46	43	84	55	29	83	50	33	86	33	53	74	39	44	52	16	36	43	−14	57	89	−14	103
1852.	43	−17	60	48	−18	66	54	−½	54½	60	20	40	80	34	46	92	38	54	91	50	41	84	50	34	85	32	52	67	25	42	52	17	35	60	−½	60½	92	−18	110
1853.	41	−22	63	47	−9	56	50	2	48	66	18	48	83	40	43	85	54	31	90	38	52	94	48	46	87	43	44	65	28	37	54	10	44	48	−2	50	94	−22	116
1854.	41	−25	66	44	−24	68	47	−½	47½	60	18	42	78	30	48	84	54	30	91	63	28	85	51	34	80	37	52	71	35	36	67	16	51	44	−12	56	89	−25	114
1855.	57	−10	67	35	−27	62	57	−3	60	75	12	63	84	22	62	95	35	60	95	43	52	89	32	57	80	24	65	67	23	44	57	½	56½	48	−18	66	95	−27	122
1856.	37	−26	63	46	−16	62	47	−16	63	68	26	42	80	23	57	98	37	61	99	49	50	86	44	42	87	39	48	85	26	59	66	15	51	42	−10	52	99	−26	125
1857.	35	−40	75	56	−18	64	52	−15	67	55	19	36	81	40	41	82	52	30	90	57	33	87	52	35	86	32	54	73	23	50	57	13	44	58	4	54	90	−40	130
1858.	45	−24	69	46	−13	59	55	−10	65	65	26	39	70	31	39	88	42	46	88	43	45	77	45	32	84⅓	34	50⅓	71	26	45	60	3	57	39	−13	52	88	−23⅓	111½
1859.	43	−32	75	43½	−11	54½	50	−9	59	64	22	42	81	33	48	87	34	53	87	43	44	83	41	42	73	30	43	75	16	59	57	17	40	44	−29	73	87	−32	109
1860.	42	−22	64	44	−24	68	57	11	46	65	13	52	78	32	46	87	43	44	81	42	39	87	46	41	79	28	51	64	28	36	66	18	48	44	−10	54	87	−24	111
1861.	36	−25	61	49	−28	77	48	−4	52	61	14	47	76	24	52	77	40	37	87	40	38	86	43	43	80	37	43	75	28	47	54	21	33	47	−9	56	87	−28	115
1862.	17	−7	24	38	−14	52	46	3	43	58	26	32	80	33	47	82	38	44	87	44	43	84	43	41	79	40	39	83	24	59	65	18	47	58	−11	69	87	−14	101
1863.	50	−4	54	54	−23	77	51	−16	67	72	12	60	90	36	54	86	39	47	85	50	35	89	44	45	84	37	47	70	16	54	63	16	47	50	−6	56	90	−27	117

1864.	45	-15	60	46	-22	68	53	10	43	60	23	37	84	32	52	88½	40	48½	88½	50	38½	87	53	34	72	40	32	67	27	40	57	12	45	50	-15	65	88½	-22	110½
1865.	36	-23	59	45	-17	62	54	7	47	73	28	45	87	35	52	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			60.76			63.40			56.52			48.96			48.96			45.66			40.77			39.00			44.30			45.09			45.41			55.57			112.87
Maximum R.			75			80			69			72			62			56			52			57			65			59			61			73			130
Minimum R.			24			45			37			32			39			30			28			30			32			34½			33			41			100

NOTE.—It appears from the above that the average range of the thermometer is greatest in February, and least in August; that the maximum range in any one year is 130°, the minimum 100°, while the average range for the year is 112.87°. The extreme range of the whole 28 years is 139°. The thermometer has never failed to fall below zero in the months of December, (except once,) January and February; and has always risen above 80° in July, and generally also in June and August.

TABLE VI. *Total moisture from rain and melted snow, for each month and year, from* 1839 *to* 1865, *from the records of Hon.* R. H. GARDINER *and Rev.* F. GARDINER.

	January.	February.	March.	April.	May.	June.	July.	August.	September	October.	November	December	YEAR.
1839.	2.451	2.097	2.659	3.868	5.045	4.445	5.264	5.210	2.271	0.410	4.222	3.100	41.0418
1840.	1.771	2.292	4.135	4.143	4.224	4.200	1.722	3.716	1.543	6.015	3.884	3.518	41.1627
1841.	5.722	1.116	3.236	5.285	3.581	3.174	1.580	1.084	3.833	1.458	3.373	5.087	38.5284
1842.	2.882	4.489	3.260	2.510	1.825	3.050	3.078	2.348	3.062	1.615	3.333	5.667	37.1200
1843.	2.542	5.674	5.500	5.521	3.496	3.958	1.757	4.805	1.167	5.281	3.567	2.708	45.9857
1844.	3.947	1 680	4.820	0.653	3.007	1.792	1.472	3.031	2 358	5.717	3.930	5.913	38.3208
1845.	5.847	2.243	2.958	2.592	2.674	1.951	6.552	2.403	3.197	2.887	10.555	4.820	48.6792
1846.	2.660	1.294	6.267	1.595	4.831	2.772	2.616	3.830	1.001	2.086	3.415	2.953	35.3204
1847.	5.107	3.667	1.617	2.903	2.692	6.317	3.342	3.954	3.318	4.065	3.643	4.275	44.8996
1848.	3.839	2 525	2.840	1.216	8.642	1.880	6.290	4.321	5.763	4.595	2.377	4.562	48.8505
1849.	0.920	1.500	2.804	3.471	5.176	2.588	1.695	6.108	2.816	5.848	2.668	3.966	39.5609
1850.	3.094	2.964	2.290	2.976	11.756	5.444	3.035	4.306	3.704	5.290	2.412	4.101	51.3720
1851.	4.659	4.452	1.878	3.744	3.155	3.420	5.551	2.362	2.760	8.434	6.300	4.053	50.7730
1852.	2.359	3.891	2.218	6.128	0.360	3.894	2.796	5.876	3.510	4.380	6.330	4.924	46.6660
1853.	1.488	9.467	1.935	1.144	7.164	0.952	4.104	3.343	5.172	4.446	6.470	4.454	50.1390
1854.	2.781	4.350	4.733	5.620	5.281	5.052	4.952	1.404	5 026	3.248	8.124	3 164	53.7350
1855.	7.167	1.800	1.103	4.570	1.932	5.986	2.416	3.096	1.760	13.150	3.178	5.008	51.1660
1856.	2.254	1.947	0.900	2.460	4.520	2.062	2.490	7.494	3.820	3.198	2.148	4.702	37.9750
1857.	4.220	2.464	4.032	5.304	4.740	3.588	2.334	5.508	1.244	4.970	3.629	4.184	46.2170
1858.	3.110	2.332	3.162	4.440	3.020	2.510	6.431	7.253	3.740	5.060	2.907	2.870	46.8350
1859.	4.418	2.156	10.062	2.508	3.002	6.350	1.769	2.790	2.477	1.080	4.748	6.542	47.9020
1860.	1.041	3.297	2.141	1.319	0.872	2.360	1.972	4.703	3.628	3.809	5.362	3.256	33.7600
1861.	2.945	3.258	5.469	4.348	4.404	1.272	4.140	1.366	1.848	5.472	3.158	2.168	39.8480
1862.	4.200	3.600	3.491	2.751	1.920	3.808	2.412	1.944	3.178	5.208	4.333	2.558	39.4030
1863.	4.416	3.750	4.321	3.974	2.564	1.728	6.454	4.380	4.334	4.786	7.301	4.344	52.2610
1864.	3.515	2.070	4.578	2.460	3.936	0.900	0.588	6.120	4.320	2.760	5.772	4.028	41.2030
1865.	3.097	2.852	5.388	4.428	5.052	–	–	–	–	–	–	–	–
	3.4241	3.0325	3.6180	3.4048	4.032	3.2867	3.9525	3.9478	3.1096	4.4334	4.3997	4.1125	44.1817

Maximum for the year, 53.735. Minimum for the year, 33.760.

NOTE. The above table shows that on the average the wettest month is November, then October, then May. February is the driest month, and next to that August. The records for 1837 and 1838 in those from which the above table is prepared, are not entirely reliable, and hence are omitted.

CHAPTER VII.

EARLY AGRICULTURISTS; AGRICULTURAL SOCIETIES, AND THE IMPORTATION OF STOCK.

The county of Kennebec has, from the earliest times, been active and foremost in every measure for the advancement of agriculture; and if we look carefully into its agricultural history we shall find that the efforts of educated and public spirited men, the establishment of agricultural societies, and the diffusion among the people of practical information upon subjects relating to husbandry—are the prime causes which have from the first, been operating to bring about the present prosperity of the county, and its high rank as an agricultural district.

DR. SILVESTER GARDINER, one of the new proprietors of the Kennebec Purchase at the reorganization of the Company about 1755, was very active in his efforts to aid the settlement of the Kennebec valley. Almost the entire management of the affairs of the company was committed to him,* and he discharged the trust with great energy and judgment. At his own personal expense he built houses and cleared farms, which he well stocked, at Merrymeeting Bay, Lynd's Island, Pittston, Winslow, and at Pownalborough, at the latter of which places he built mills. Mr. Bartlett says: "The tract of land near the Cobbosee-contee River was obtained by him of his associates, and he labored and expended much to bring it forward. He built houses, dams and mills, at this place, near the city of Gardiner; introduced many settlers and advanced them means necessary to their establishment, amounting in the aggregate to a large sum, most of which was never repaid him." He died at Newport, R. I., in 1786, in the 80th year of his age.

BENJAMIN VAUGHAN, D. D., L. L. D.,—to whom and to his brother CHARLES VAUGHAN, the county and State are largely indebted for their distinguished labors for the advancement of agricultural improvement—came to Hallowell in 1796, and settled upon a family property derived from his maternal grandfather, after whom the town was named. Dr. Vaughan studied medicine and received his degree of M. D., at Edinburg, Scotland. His medical library which now belongs to the Insane Asylum in Augusta, consisted of

*The Frontier Missionary: A Memoir of the life of the Rev. Jacob Bailey, A. M. By William S. Bartlett. Boston: 1853. An interesting and curious picture of early times.

about five hundred volumes. He practiced considerably in his neighborhood, and among those engaged upon his farm, was often called to consult in difficult cases, and always rendered his services gratuitously. He was a diligent student and passed most of his time among his books—nearly all of which give evidence that they were carefully read, many of them being full of MS. notes, made with pen and pencil. A portion of his agricultural and miscellaneous books, now form a part of the Hallowell Social Library, and among them are many rare and valuable English works on agriculture and rural economy, not often met with in public libraries of this country. Dr. Vaughan's residence was situated just below the village of Hallowell, upon an eminence overlooking the river and commanding a fine view of the surrounding country. Speaking of his life here, Hon. R. H. Gardiner says: * "Here he occupied himself in study, in an extensive correspondence with distinguished persons on both sides the Atlantic, and in promoting the welfare of the place, and of the people among whom he had fixed his residence. A gentleman who was acquainted with Dr. Vaughan, and from whom I have obtained some incidents of his life, says it was his custom in fair weather to walk a certain number of miles, each day, for exercise; and when the weather would not admit of his being out of doors, he would walk upon his piazza as many hours as would be equivalent to the distance walked.

It is chiefly for his interest in the improvement of the agriculture of this county, and of the State, that Dr. Vaughan is best known. He was a distinguished member of the "Massachusetts Society for the Improvement of Agriculture," established in 1792, and the second society of the kind formed in this country. He wrote largely upon Agricultural topics, and upon whatever subject engaged, treated it at considerable length and in a style learned, systematic and elaborate. Many of his articles were published in the "Papers upon Agriculture" issued by this Society, and also in their "Quarterly Journal and Repository" of a more recent date—(1815–22). In several instances he contributed articles which formed the entire number of "Transactions," some of them being written under the name of a "Kennebec Farmer." Dr. Vaughan imported stock—for the particulars of which, see the very interesting communication at the close of this—seeds, plants, books and implements from England; and the whole country

*Collections of the Maine Historical Society; Vol. VI, p. 90.

around had the benefits of them and always without charge. Mr. Gardiner says: "His fortune was considerably diminished by the large sums expended upon his farm and nursery."

The land belonging to the Messrs. Vaughan extended along the river one mile, and ran back to Winthrop Pond (Cabbassa-contee or Great Pond) a distance of five miles. As a natural consequence, in a tract of land of this extent, there existed a wide diversity of soil, although the chief portion of it is of a clayey texture. A creek of considerable size, at one place forming a pond of several acres in extent, with numerous smaller streams, are found on this tract. The land on these creeks now constitutes the best portion for grass to be found on the entire original tract. The homestead of Mr. Charles Vaughan was situated about one mile west of the vilage of Hallowell—now owned by Capt. Henry Cooper—and the farm of Dr. Vaughan, which was some two miles from the village, is owned by Mr. Samuel Currier. This farm was managed by Dr. Vaughan's oldest son, Col. William O. Vaughan. There was upon this farm an extensive garden, a large orchard and a nursery of fruit trees. The garden contained about four acres, and was situated upon the eminence where the dwelling house of Mr. Currier now stands. Some ten or twelve men were constantly employed in it during the season of growth, and besides containing all the more common varieties of vegetables, the new sorts imported from Europe were here tested and if they proved valuable, disseminated throughout the State. The garden was, in the days of Dr. Vaughan, enclosed by a high board fence—which has since been taken away—was kept very neat and in a high state of cultivation, and attracted large numbers of visitors. Although plants, seeds and cuttings were freely given to all who wished them and were unable to pay, yet I am told that trees and plants to the value of eight hundred dollars were sold from the nursery in one year. The orchard was kept in good order, but the quality of fruit was not so good as later years have produced. It was chiefly made into cider of which large quantities were manufactured. There is now standing upon the old Vaughan farm, a large cider mill and press built by them, which is without doubt the most perfect building of its kind ever erected in New England. The building is about 35 by 40 feet large, the basement or cellar of which is built of split stone, lined inside with cedar timbers or thick plank hewn out of logs, the space between being filled with

saw-dust. This was used for the storage of apples and cider. The next floor was used for the machinery of the mill—the main horizontal wheel for driving the cogs, having cost $300, and for the construction of which a mechanic was obtained from England. The apples were put into the mill from the third floor, upon which are also apartments for the storage of apples as they were harvested, and until ready for being manufactured. The nuts or cogs for crushing the apples were imported from England and are a "patent." In the garden and upon the farm were many varieties of fruit, nut bearing and ornamental trees, but few of which are now standing. Among them were numerous varieties of apples, pears, peaches, cherries, chestnuts, walnuts &c. These were propagated to a considerable extent, and upon many farms in the neighborhood are old trees of the mazzard, black-heart, morello, red and other varieties of cherries which now bear well every year, all of which came from the Vaughan nursery.

An immense amount of labor was performed upon this tract of land during the time it was owned by the Messrs. Vaughan, and I doubt not that $50,000 were spent upon it by them, in improvements. They built a road from Hallowell to the Cabbassa-contee Pond, at their own expense, which was afterward given to the town if they would keep it in repair, and by the town accepted. There is also upon the present farm owned by Mr. Currier, more than four miles of stone wall, much of it being trench and face wall, and a large portion of it constructed of boulders of the largest size, which was built by them. They also erected many barns and dwellings for their workmen, some of which are now standing. They also cut large crops of hay, and grew roots, such as beets and turnips—very extensively. These they fed out to their neat cattle and sheep.

Although Dr. Vaughan was thoroughly acquainted with all the best methods of husbandry, yet I judge he was not a practical man. An incident related to me by Nathan Foster, Esq., of Gardiner, confirms this belief. His father formerly worked for Dr. Vaughan, and upon one occasion the Dr. wanted him to perform some grafting for him. He had just received some scions from England, the ends of which had been inserted in blue clay which had dried on. On being told that he knew nothing about grafting, Dr. Vaughan answered that he had some plates showing how to perform the operation. These he gave to Mr. Foster who went to

work and was very successful, although he had never grafted any previous to this.

I have mentioned that Dr. Vaughan was one of the early members of the old "Massachusetts Society for Promoting Agriculture." He, with his brother Charles, were also foremost in establishing the "Kennebec Agricultural Society," a social organization which held no exhibitions for many years after its establishment, but had frequent meetings for the reading of papers contributed by its members, and for consultation and discussion. In 1818, through the earnest efforts of the Messrs. Vaughan, Messrs. Wood of Winthrop, and other friends of Agriculture the "Maine Agricultural tural Society" was formed. This association received no aid from the State, and its only funds were obtained from the enterance fees of its members. This society held one or two exhibitions at Hallowell, but not receiving money enough by the above named means to pay their premiums it ceased its operations. The "Winthrop Agricultural Society" was chartered by the Legislature of Massachusetts February 20, 1818, and was the first incorporated society of the kind in the State. It has held exhibitions each year since its organization, and in 1832 was merged into the Kennebec County Society. This society has numbered among its active working members the names of many of the most prominent men of the county, while its immediate managers have been such men as the Vaughans, Woods, William Richardson, Nehemiah Pierce, Dr. Ezekiel Holmes, Dr. Amos Nourse, the Bensons and a host of energetic men of a more recent day. Very early in the organization of this society it voted that it was the duty of the members to sustain the public journal published in Boston, called the "New England Farmer," and two of the members were selected, and the society voted that they should subscribe therefor. The plan of publishing the *Kennebec Farmer*, afterwards the "Maine Farmer," was also originally proposed to this society and received its hearty approval and support. Dr. Vaughan very clearly saw the great benefit to the cause of improved agriculture that would come of individual association for its encouragement, and he was therefore an energetic and earnest member of the first societies for this object, which were so early established in this county. They may justly be proud of their ancient and honorable record, and of the distinguished names that have been enrolled among their officers and members. Dr. Vaughan died at Hallowell, December 8, 1835, aged 85 years.

Prominent among the members of the old "Winthrop Agricultural Society" were SAMUEL and ELIJAH WOOD, two brothers, sons of Henry Wood of Middleboro', Mass., who were among the first settlers of Winthrop and who were always actively engaged in carrying forward the cause of an improved system of husbandry. Samuel came to Winthrop in 1784, and Elijah came a few years afterwards. The former, immediately after his arrival, began to clear him a farm, while the latter went into the business of manufacturing nails. Samuel Wood was a man of good judgment, and possessed a strong mind, and was almost constantly in the public service in some capacity. He held various important local offices, and represented Winthrop at the General Court in Boston, for many years. "He was," writes JOHN MAY, Esq., of Winthrop, to whom I am under obligations for data from which this sketch of the Woods is chiefly condensed, "what we now term an illiterate man; I think I have heard him make the remark that he never attended a town or any other school three weeks in his life, yet he was largely engaged in business that required considerable scholarship." Being engaged in practical farming he was always interested in whatever tended to improve the farmer's profession, and when the *Maine Farmer* was established, at once made use of the medium of its columns to present his views and experiencies to his brother farmers. His articles were always practical, suggestive and useful, and were continued for many years in that excellent journal. For one volume he contributed fifty-two articles—equal to one in each number of the paper. The brothers Wood—Samuel and Elijah—were among the founders and supporters of the "Winthrop Agricultural Society"—which existed as a social organization for several years previous to its incorporation in 1818. Its object was to "improve the art of husbandry, and to elevate the calling of the husbandman." They were also among the incorporators of the society at the time its charter was granted, and Samuel Wood was its first President. Writes Mr. May: "Maj. Elijah Wood was engaged largely in farming the latter part of his life, and amassed a large fortune. Both had a legal turn of mind and their opinions were sought after and adopted nearly as readily as those of the mass of our lawyers. Both were self-made men, and while they looked closely after their own interests, they contributed largely towards bettering the condition of their brother man, in law and morality as well as in agriculture." Samuel

Wood died September 10, 1848, aged 89; and his brother Elijah died July 27, 1848, aged 79.

I have not the material at command, neither does it come within the scope of this paper to present a full account of one who, not less distinguished than Dr. Vaughan, spent a lifetime in promoting the cause of agricultural improvement and the elevation of the working classes of the State, and whose memory will, by them, ever be held in grateful remembrance—Dr. EZEKIEL HOLMES,—and yet I cannot pass by this name without some reference to his distinguished labors for the good of "his country and his brother man." Coming to this State in 1821, from Brown University, he received his medical diploma at Bowdoin College in 1824, but his health not proving sufficient for the duties of his profession, he became a teacher in the Gardiner Lyceum—an institution founded through the liberality of the late Hon. R. H. Gardiner, its object being to unite practical and literary education—in the fall of 1824. His particular department in this Institution was Natural History, and his connection with it continued for some years. In 1828 he edited at Gardiner the "*New England Farmers' and Mechanics' Journal,*" a monthly magazine, which was continued one year. In January, 1833, the publication of the "*Kennebec Farmer,*" was commenced at Winthrop under his editorial management. The name of this journal was changed in March of the same year to the *Maine Farmer,* and Dr. Holmes continued its senior editor for over thirty years. The good which his writings through this paper have done for the agriculture of this State is beyond estimation. In 1834 he filled the chair of professor of Natural Science in Waterville College; was for five years successively, elected a representative to the Legislature from the town of Winthrop, and served several terms in the State Senate; in 1852–53 he was the Liberty party candidate for Governor of the State; he was the first Secretary of the Board of Agriculture, and the first Secretary of the State Agricultural Society, which latter office he held until his death. During the year 1838 he made an exploration and survey of the Aroostook territory, under the authority of the Board of Internal Improvements, and in 1861–62 was chief of the Natural History survey of the State. His reports, giving the results of his observations are of exceeding interest and value. Dr. Holmes also prepared numerous other reports, papers, public lectures &c., of great value, for publication and delivery, and during the thirty

years covering his connection with the *Maine Farmer*, his pen or voice was ever at work for the good of an improved and enlightened agriculture. Simple in his habits, unselfish in all his motives, an earnest and devoted student of Nature, and the friend of all; he spent his life in doing good. He was without doubt the best informed man upon all branches of agriculture and the Natural Sciences, that we have ever had in the State. Thousands have reaped and will continue to reap the rewards of his life-long services, and I trust that a generous and appreciative husbandry—whose wealth has been the result of his suggestions and labors—will do for his memory what they failed to do for him when living among us. He died at Winthrop February 9, 1865, in the 64th year of his age.

I think it can be safely said that the labors of these faithful pioneers in the cause of agricultural improvement in the county of Kennebec, the formation of Agricultural Societies, and the establishment and circulation of journals devoted to the special interests and education of farmers, have been the causes that have resulted in the present high condition of the agriculture of the county, and the intelligence and elevated position of our farmers. Many improvements of great importance in agricultural implements have been made by residents of this county, and our farmers have, from the time of the Messrs. Vaughan been among the very first in the State to import and breed choice stock, to take advantage of the labors and investigations of others who were contributing to the elevation of the husbandman, to grow better fruit and better crops, to make use of labor saving implements and machinery in carrying on their farms, and to adopt the best practices and modes of cultivation and management. Some interesting facts in regard to these improvements will be found under their appropriate head in the second part of this work.

Sanford Howard, Esq., at one time a resident upon the Vaughan farm in Hallowell, formerly editor of the *Boston Cultivator* and now Secretary of the Michigan State Board of Agriculture and Agricultural College—a gentleman whose knowledge of stock raising and practical agriculture, obtained from extensive personal observation both in the old world and the new, is second to that of no agricultural writer in the country—has favored me with an interesting sketch of his personal reminiscences concerning the Messrs. Vaughan, their importation of stock and agricultural operations, which it gives me great pleasure to publish in this connection:—

LANSING, MICH., July 17, 1865.

DEAR SIR:—My residence in Maine, commenced on the Vaughan Farm, Hallowell, in the spring of 1830. There was then no State Agricultural Society in the State, and very few County or District Societies. The *old* Kennebec Agricultural Society had, I think, ceased to exist—at any rate, it had suspended active operations. The Winthrop Agricultural Society, organized as a town association, but admitting, I think, members without regard to residence, was the only Agricultural Society in that part of the State, so far as I remember, that held exhibitions or regular meetings. You have doubtless ascertained when this Society was organized. My impression is that it existed many years before it was merged in the Kennebec County Agricultural Society, and I think it was of great advantage to the section in keeping up a spirit of agricultural enterprise during the unfavorable seasons and periods of great depression in business, which followed the war of 1812–15. I think this Society held its first exhibition as a County Society, at Winthrop, in 1832. There stood at this time on the field of agricultural improvement, and more or less actively engaged, Dr. Benjamin Vaughan and his brother Charles, of Hallowell, and Samuel and Elijah Wood of Winthrop. I mention these as being, in regard to age, rather in the advanced class of agricultural improvers.

I think the agriculture of Maine owes much to the Vaughans. They came to this country from England, towards the close of the last century, and being gentlemen of education and high social standing, and having been engaged in rural pursuits in that country, were possessed of knowledge in regard to those pursuits, according to the highest standard then existing. It may, perhaps, be said that the general system of agriculture to which they had been accustomed, was too refined for a country where the destruction of the primeval forest was the first step to cultivation. But whatever force there may be in this objection, there can be no question that the Messrs. Vaughan laid the farmers and other citizens of Maine under great and lasting obligations. It was through them that the first improvements in cattle, sheep and swine were introduced.

In 1792, Mr. Charles Vaughan imported from England, two bulls and two cows. The facts in regard to this importation, as noted by me from the statement of Mr. Vaughan, are substantially as follows:

The cows were selected for him from the London dairies. As the Holderness or Yorkshire breed was then, as it has since been, that from which the milking-stables of the metropolis were mainly supplied, the cows of Mr. Vaughan were probably of this variety. The bulls were selected in Smithfield market, according to points laid down in Mr. V.'s order. From the descriptions given of them by Mr. V. and others whose recollection appeared to have been accurate, it seems probable they were of the Long-horn breed, though not, perhaps, of that particular family which Bakewell bred with great care.

On the passage of the ship which brought these cattle to this country, one of the cows dropped a bull calf, which was presented by Mr. Vaughan to Hon. Christopher Gore, afterwards Governor of Massachusetts. This animal was the progenitor of the cattle which became so much talked of for years, in Massachusetts, as "the Gore breed." What the sire of the Gore bull, so called, was, I never knew; but from the prominent marks of the Long-horn in his descendants, and their resemblance to stock produced by Mr. Vaughan's Long-horn bulls and Yorkshire cows, it is probable that he was either got by one of Mr. V.'s bulls or one of similar character.

I am aware that the attempt has been made to show that Governor Gore *imported* the so-called Gore bull; but no evidence has been elicited that would stand a moment in opposition to the statement of Mr. Vaughan, as given above. In fact Governor Gore himself, in one of the early volumes of the New England Farmer, stated that the animal in question was presented him by Mr. V., and there is no evidence that he ever gave the least intimation of having *imported* a bull.

Mr. Vaughan's bulls were used in a way to benefit the settlers of Maine as much as possible. Mr. V. told me that it was the custom to keep one of them at Hallowell, and the other in the valley of the Sandy River—changing them accordingly. By this course their progeny soon became numerous and quite widely spread. I have no doubt that these bulls constituted the root or source from which spring the fine, strong oxen so opportunely raised up for service in the "lumber swamps" of Maine. The bulls were broken to the yoke, and were sometimes worked together. I have listened with great interest to accounts from various eye witnesses of their performances. I well recollect hearing

from the late Payne Wingate of Hallowell, a "plain unvarnished tale" of what he saw done by these bulls on a certain occasion, that made a stronger impression on my mind than any account of any horse race I ever read or heard.

He said a very heavy load which had been drawn on a sled by three yokes of cattle, to a wharf in Hallowell, was to be drawn into a warehouse. To do this the sled would have to be dragged over a bare floor. There was not room for more than one yoke of cattle to pull to advantage. It was proposed to carry in by hand a portion of the load; but night was coming on, and some one suggested that the bulls, then forming part of the team, could draw the load into the house. The other cattle were taken away, and the bulls, which had just been "sharp shod," put to the sled. At a motion and word from the teamster, they sprang as though they would go through their bows—took the great load up an inclined plane of plank and on to the floor at a single pull—the splinters flying from every foot, and two lines of fire streaming from the sled-shoes!

The Long-horn cattle are very long-lived—probably excelling in this respect all other British breeds. This characteristic was strikingly manifested in the descendants of Mr. Vaughan's bulls. The cows were generally good milkers, and on account of their vigorous constitutions were frequently kept till very old. There were several such at the Vaughan Farm when I went there, some of which continued to breed till eighteen years old; and Mr. Hurd of Hallowell, had one which he obtained when young of Mr. B. Vaughan, that produced a calf at the age of nineteen or twenty years. As before intimated, the oxen of this stock were noted for their vigor, strength and hardihood.

Proceeding somewhat in the order of time, mention may here be made of an animal called "the Prize bull," said to have been found on board an English vessel bound for Bermuda, captured by an American privateer, and taken to Portland, during the war of 1812–15. I never saw this bull and do not know of what breed he was. I have been informed by various persons who had seen him, that he was called a "Bakewell bull," and that his points corresponded to the Bakewell variety of Long-horns. I remember to have seen several animals that were said to have been got by him, which would pass very well for half-blood Long-horns. It has been stated that this "Prize bull" did considerable towards estab-

lishing the high reputation which the "Saccarappa oxen" had in former days.

It seems that a little previous to this time there were some large cattle, apparently a coarse kind of Short-horns, in the neighborhood of Portland. The "Westbrook heifer," figured in one of the early volumes of the Massachusetts Repository and Journal, was of this variety.

The Messrs. Vaughan continued to breed their stock, without crossing, till after the importation into Massachusetts of the Short-horn bull Young Denton, (963 of the English Short-horn Herd-Book,) in 1819. About the year 1822, Mr. Charles Vaughan and Col. Wm. O. Vaughan sent each two cows to Young Denton, then kept by Stephen Williams, at his farm, Northborough, Mass. The stock at the Vaughan Farm when I went there consisted to a considerable extent of a cross of the bulls bred from Young Denton with the stock previously kept on the farm. I introduced at different times, four bulls and three cows, which I obtained of the late Hon. John Welles of Boston. One of the cows was got by imported Holderness (or Fortunatus) and from a cow of the Long-horn family which was imported by Gilbert Stewart, the celebrated portrait-painter—said to have been obtained from Bakewell, or some of his friends. The stock finally passed into the hands of Mr. Welles. The cows were noted as good milkers. The late Rev. Lemuel Capen of South Boston, and others, frequently received prizes for milch cows of this family, at shows of the Massachusetts Society for Promoting Agriculture. Another of my cows was got by imported Young Denton, and another by imported Cœlebs, dam by imported Holderness, grandam of the Stewart Long-horn family. One of my bulls was got by imported Admiral (1608) sent with other stock as a present to the Massachusetts Society for Promoting Agriculture, by Admiral Sir Isaac Coffin, of the British Navy, a native of Nantucket. This bull's dam was got by the Hereford bull Sir Isaac—also presented to the Massachusetts Society by Admiral Coffin—his grandson being the Holderness and Long-horn cow above mentioned. The other bulls were bred by Mr. Welles, and were of similar blood to the cow. Besides this stock, I bought of the late Doctor Holmes, the Short-horn cow, Europa, bred by the late Col. Jaques of the Ten-Hills Farm, Somerville, Mass., from imported Cœlebs and Flora. I sold her, with other stock, to J. W. Haines of Hallowell, in 1836.

Perhaps I may as well mention here, that Mr. Williams presented to Dr. Holmes, imported Young Denton, about the year 1828. Dr. H took him, I think, to his farm near the junction of the Sandy with the Kennebec river.* About this time, perhaps a little before, John Vassal Davis had purchased of Col. Jaques the bull Jupiter and cows Daisy and Europa,—all offspring or descendants of imported Cœlebs and Flora,—and placed them on the farm where Mr. D. then resided, in Wayne. From him I think Doctor Holmes obtained Europa.

It may be well to mention in this connection, that from about 1822 to 1830, several bulls got by Young Denton and Cœlebs were taken into Maine. Among the former were the "King bull," so called, sent by Governor King of Bath, to Kingfield; and among the latter were the "Kezer bull" of Winthrop, "Fillebrown's brindle bull" of Readfield, and a bull whose owner's name I do not recollect,† kept at Pittston, opposite Gardiner.

About this period, Israel Thorndike sent to the "Thorndike Farm" in Waldo County, a very valuable Short-horn bull,—whose pedigree I do not remember,—imported by George W. Lyman of Boston. He died of a cancer on the jaw, after having been kept in Maine one or two seasons.

A little later, Col. Green came to Winslow, and brought from New York several Short-horn cattle, some of which were imported. Still later he received others, among which was the bull Fitz Favorite, an animal of considerable reputation. He afterwards introduced the bull Fairfield, purchased of E. P. Prentice of Albany, New York.

I presume it is not necessary that I should notice the various animals of the kind subsequently introduced into Maine. Neither is it necessary that I should make any remarks in regard to the

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* I may be allowed, perhaps, to add a note in this place. Young Denton arrived in Gardiner—where Dr. Holmes then resided—in November, 1827, and was the first thorough-bred Durham Short-horn brought into this State. He stood a part of the following season at Gardiner, was then removed to Livermore, where he remained two seasons, and from thence to Starks, in Somerset County, where he died of old age in April, 1830. He was bred by Mr. Wetherell of Kirkly, Leicestershire, England, and his pedigree can be traced back to "Hubback" who was calved in 1777. S. L. B.

† It was probably Gen. Jesse Robinson, who afterwards removed to Waterville, where he died. Concerning this animal, Mr. Howard writes me under date of August 18, 1865: "I well remember having seen this bull, and that he was a better animal as to points than several other bulls of the same or similar stock then kept in Maine." S. L. B.

relative merits of the cattle to which I have alluded. Many persons now living in your section had more or less knowledge in regard to all of them, and they can tell how the different stocks answered the purposes and objects to which they were applied.

In regard to sheep, the efforts of the Vaughans were chiefly directed to the introduction of English varieties. Benj. Vaughan obtained from General Washington a Bakewell or New Leicester ram—"Dishley" the breed was then generally called. It was said that Gen. W. obtained the stock direct from Bakewell. It was this stock which constituted the foundation, more or less, of the once noted Arlington long-wooled sheep, and the Smith's Island sheep. I have often heard from the Wingates of Hallowell, descriptions of the sheep derived from Mr. Vaughan's Bakewell ram. The Vaughan farm, proper, was not very well adapted to sheep, and I think but few were kept there. My impression is that Benj. Vaughan placed in the hands of the Wingates, the long-wooled sheep which he first introduced.

Mr. Charles Vaughan afterwards introduced the New Leicester, (or Leicester, as the prefix was dropped), but I cannot state the precise period. I think, however, that it was after the war of 1812–15. About 1834 or '35, he purchased some fine specimens of the breed of Enoch Silsbee, of Massachusetts. He imported some South Down sheep about 1832 or '33.

Mr. Vaughan devoted his attention for several years to a cross-bred stock between the Leicester and Merino, on a similar plan to that pursued by the late Lord Weston with his "Anglo Merinoes." Some other persons, particularly the late Payne Wingate, had small flocks bred on a similar plan, except that Mr. Wingate had less of the Leicester and more of the Merino blood in his sheep—about a quarter to an eighth of the former. The object was to produce the Merino fleece—or wool approximating thereto, on a carcass of the Bakewell mould. The experiments were attended with such a degree of success as to induce me to believe that the Merino might receive a degree of Leicester blood that would result in the production of valuable peculiarities of fleece and carcass, and that these peculiarities might be perpetuated. At the time these experiments were made, there was no special demand for wool of the character produced by the cross-bred stock; it was chiefly worked up in household manufacture for home use. Since that day the manufacture of *delaine* goods has

been established in this country, making a great demand for wool of just the character which is obtained by an infusion of an eighth to a fourth Leicester or Cotswold blood with Merino. Very close, discriminating judgment is undoubtedly required to produce a flock of sheep of this cross-bred origin, which shall possess the requisite uniformity. But I think the task is no more difficult than others which have been accomplished. The inducements are now such that many will doubtless attempt the establishment of flocks for the production of delaine wool; many will probably fail, but some, I think, will succeed.

Messrs. Vaughan, soon after they settled in Maine, introduced the best swine to be obtained, either in England or this country. They obtained some of the stock which it was said the Duke of Bedford had sent over, through the agency of Parkinson, to General Washington, but which from some unexplained cause never reached that destination. This, of course, was the famous "Bedford breed." Other breeds were introduced from time to time. The Bedford breed was re-introduced by myself, of two different families, from 1830 to '35. I also introduced the Mackay swine, of which I made several purchases from Capt. Mackay, the founder of the variety.

But the efforts of the Messrs. Vaughan for the improvement of the agriculture of Maine, were by no means confined to the introduction of live stock. In every department of agriculture and horticulture, they were constantly at work, and always foremost to bring into the State any article which promised advantages. New things were subjected to trial, and if found useful were scattered with a liberal hand. Benjamin Vaughan was specially fond of horticulture. He planted extensive apple orchards, and exported largely both apples and cider—the latter obtaining a celebrity which insured its ready sale at a high price, in various ports, from Boston to New Orleans. He introduced from England, France and Belgium the best varieties of apples, pears and cherries known at this day. He established, by the eradication of the natural forest, a large garden, where was produced grapes, peaches, apricots, plums and many other more delicate fruits, which it had been supposed could only be grown in milder climates.

His experiments with grapes proved that many kinds, either foreign or of southern origin in this country, could be brought to maturity in favorable positions in Maine. Others, as Mr. Stuart

Foster, of Winthrop, availed themselves of the results thus obtained, to cultivate fine grapes somewhat extensively. It is true that the kinds alluded to have been since surpassed by others originated in this country; but this fact does not detract from the merit of those labors which at that early day demonstrated the practicability of grape-growing in a region which had previously been deemed wholly ungenial to the business.

Last, but not least, in reference to usefulness, I would refer to the writings of these men. Both made frequent communications to the press. But the pen of Benjamin Vaughan was ever busy, even to near the time of his death,* which occurred, I think, in December, 1835, at the age of 84 years. For a long period he kept up a correspondence with the most eminent men of the day —Franklin, Washington, the elder Adams, in this country; Lafayette, Michaux (the naturalist) and others, in France; Sir John Sinclair, Sir Humphrey Davy, and various statesmen in England, with some of whom he had been associated as a Member of Parliament. The publications of his pen were numerous and on various subjects,—theological, political and scientific—though agriculture,—or to speak more particularly, horticulture,—seemed to be a favorite topic. The early volumes of the Massachusetts Agricultural Repository and Journal contain many articles from him —some under the signiture of "B. V." and some under that of "A Member of the Kennebec Agricultural Society." The files of the vilage paper (Gazette) in Hallowell, contain a great number of his articles, under different signatures—sometimes that of "A Farmer," seldom, if ever, under his proper name in full.

In regard to "recollections of Dr. Holmes," for which you ask me, I fear I cannot say anything of special interest, as the people of Maine are, or should be, familiar with his history. I had no personal acquaintance with him,—though I had previously known him by reputation,—till about the time he came to Winthrop to edit the Maine Farmer, which was started under the name of the Kennebec Farmer, at that place. At the Agricultural exhibition, at Winthrop in 1831, Samuel Wood, Esq., read at the dinner table, a proposition from Dr. Holmes, in regard to the establishment of

* I was informed by Mr. Vaughan's daughter, that only two days before his death, he was closely engaged in making notes and extracts from his correspondence, for Mr. Sparks, of Cambridge, Mass., who was then preparing for the press the life of Washington.

the Farmer. I remember that the proposition was received with considerable enthusiasm, and the publicatian of the paper was commenced soon afterwards.

At the exhibition at the same place the following year, Dr. Holmes delivered an address. It was listened to with the greatest interest, and was, I thought, as well calculated to stir up the people of the county and State to a realizing sense of the advantages they enjoyed in an agricultural view, as a discourse could be. I think no man understood better the value of the natural resources of Maine than Dr. Holmes, and no man, within my knowledge, did so much towards the developement of these resources. To him, probably more than to any other person, is to be attributed the improvement of the fertile and flourishing "Aroostook section," which fortunately checked the tide of emigration that threatened to take away from Maine a large portion of her most valuable population. In fact his whole life and energies seemed to be devoted to the improvement, in every practicable way, of his adopted and dearly-loved "Dirigo" State.

Yours truly,

SANFORD HOWARD.

NOTE.—In consequence of the severe illness of the author, the Second Part of this paper—which treats of Practical Agriculture as at present existing in the County, giving agricultural and other statistics, and with notices of the principal manufacturing establishments in the county, accounts of the largest and best managed farms, agricultural societies, stock raising, orchards, and other matters of interest—cannot be completed in season for this report, consequently its publication is deferred.

ERRATA.—The reader is requested to make the following corrections:
In the Preface, for "Col. John D. Lang," read "Col. Thomas S. Lang."
Page 127, for "Sylvester Gardiner," read "Silvester Gardiner."
Page 158, for "youngest son," read "eldest son."

DEATH OF EZEKIEL HOLMES, M. D.

In the early part of the current year, the agricultural interests of the State, and not these alone, but the State itself in all its interests, suffered a severe loss in the death of Dr. Holmes, the Nestor of Agriculture in Maine;—a man whose life for many years past has been more fully and successfully devoted to the advancement of scientific and practical agriculture than any other among us.

It is fitting that some tribute to his memory should appear in the pages of the State agricultural document, and I am happy to present the following from the pen of N. T. True, M. D., his successor in the editorial chair of the Maine Farmer, a position held by Dr. Holmes for a period of more than thirty years, with signal ability and success.

It may appear superfluous for me to add anything to what Dr. True has written, but I cannot forbear remarking briefly on the debt of gratitude due to our late beloved friend, growing out of his very earnest and successful labors during the later years of his life, in bringing about a remarkable degree of unanimity in the views both of the agriculturists and legislators of the State regarding the character of the Industrial College proposed to be established on the foundation of the Congressional grant. It is well known that for several years past, various attempts were made and urged with great force and pertinacity, towards merging the proposed college in some one or other of those now in operation, or attaching it to, or in some way, of connecting it with some existing educational institution.

Against all such attempts Dr. Holmes set his face like a flint. Not only through the press did he labor, but, again and again, did he appear before the legislative committees, and lay before them his long considered and carefully matured views upon a subject to which he had not only given deep thought, but had been taught

not a little by practical experience in former years. His last weeks were almost wholly given to this object, and he went directly from the State House to the bed from whence his remains were borne, a few days later, to their final resting place.

It might be almost said that he gave his life to it—for the exertions made in the latter part of January, and early in February, and the risks incurred in order to enable him to appear in Augusta and labor there, doubtless cut short his days. We are told that, in the delirious moments of his last short and severe sickness, his utterances plainly showed his mind to be actively exercised in combatting what he deemed the wrong positions, and untenable arguments of those who urged plans radically differing from his own.

What were Dr. Holmes' views regarding the prominent characteristics of an Institution designed "*for the liberal and practical education of the industrial classes,*" I will attempt only in the briefest manner here to state.

First and foremost, that it be an *independent* institution—or, to use his own expression, "a tub on its own bottom"—and only its own;—that it be wholly untrammeled by the habits, the customs and the methods of existing literary institutions.

Next, that it be so ordered as to involve as little expense to the student as may be, that large numbers may avail themselves of its advantages.

That the teaching be fully as much *out of doors* as *within doors*; that it be as much of *things* as of *theories*, and *more by the study of facts and objects, than by recitations from books.*

And, lastly:—that work and study should go hand in hand,—*each helping the other*,—the work assisting the body to obtain subsistence, and its members and faculties to attain developement and skill, and the study making the man an intelligent laborer instead of a working machine.

The good seed so liberally scattered by our unselfish friend is not lost. It has borne fruit—it shall yet bear fuller harvests.

While his ashes rest in peace let us hope that his highest aspirations, which were ever more for others than for himself or his own, may be fully realized.

What shall his monument be? At present none appears, at least, not to the eye of sense. A small fraction of the coinage of his brain,—already realized in the pocket of the patentee, the me-

chanic and the farmer whom he assisted, would place a fitting stone to mark the resting place of his mortal remains, and erect a memorial more lasting than brass, in connexion with the college he worked for, but did not live to see in operation.

Whoever would honor his memory by doing good to living youth and coming thousands, let him contribute, as desire or ability may dictate, to the proposed "HOLMES LIBRARY" for the Industrial College;—the very happy conception of his junior editorial brother, Mr. Boardman.

BIOGRAPHICAL SKETCH OF EZEKIEL HOLMES, M. D.

BY N. T. TRUE, M. D.

Dr. Holmes' father was Nathaniel Holmes, born in Kingston, Mass., August 9, 1773. His mother was Asenath Chandler, born in Duxboro', Mass., July 14, 1777. Dr. H. was the seventh generation of his family in this country. His ancestor, William Holmes, was born in England in 1592, and came to this country with his son John Holmes, who was the second minister in Duxboro. Dr. Holmes took great pleasure in tracing out his genealogy, and it was by his efforts in this direction that we are furnished with the foregoing facts.

Dr. Ezekiel Holmes was born in Kingston, Plymouth Co., Mass., August 24, 1801. Of his early life we have no facts at command; nor would they add materially to the interest of our narrative.—Such a life as his demands attention to the man, rather than to his boyhood. He appears, however, from our scanty information of him at this period, to have been fond of books. This led him to seek for those advantages which our Colleges afford to the aspirant for literary attainments. Accordingly he fitted for College under the Rev. Samuel Parris and entered Brown University when 16 years of age, when boyhood is closely allied to the school-room, and we may suppose that he made good progress in his studies to have entered so young.

Mr. Parris had charge of all the schools in Kingston, four in number, making three months in each district. He had a class fitting for College that followed him from one district to another. Mr. P. finally gave up his itinerant mode of teaching, and opened an

Academy when the class in which Dr. Holmes was a pupil finished his preparatory studies.

As a scholar he was not conspicuous for his studies in the exact sciences. He hated to be cramped by the routine of the school, but chose rather to let his mind run in those natural channels of thought that seemed best to suit his tastes. This was manifest to those who knew him only in his writings. While in College he acquired a fondness for Botany and Mineralogy. These studies were pursued by the few at that time. Text books were scarce and teachers almost unknown. But he was not idle. He spent his leisure hours in search of interesting plants and minerals. He was also fond of chemistry and would spend his time and money, which others would devote to mere pleasnre in performing experiments. With a few bottles, a blowpipe and some crucibles, and with such other articles as he could collect, he performed many of the experiments which he had seen in the lecture room or had read in the text books. These studies gave the direction to his mind, enriching it with a vast amount of knowledge which he dispensed to others during his useful life. We recollect an anecdote of him while a student. In company with a fellow student he went out in search of objects in Natural History, when he espied the plant known as the skunk cabbage, (Ictodes fœtida), which he presented to his companion for his inspection, and gave him an impromtu lecture on the spot. Its peculiar odor inspired his pupil with an enthusiasm for the study of botany which he afterward pursued with great zeal and success.

Lectures were given at Brown University on Chemistry at that time by Prof. John D. Wolf, who had the reputation of being a good experimenter, and on Botany by Prof. Solomon Drown, an old man at that time, but full of enthusiasm. A gentleman who was in College at the time, and who has since become distinguished for his scientific attainments, says of Dr. Holmes:—

"As an instance of Holmes' enthusiasm, I remember returning with him from a long walk, one day, when we saw an animal, I think of the *mustela* genus, run in and out of a stone wall. He succeeded in taking it, and as we entered the College Campus, the dinner bell rang. I took my usual place and meal in the Hall. Holmes was absent. Some time after dinner I went to his room. He had drawn and stuffed his specimen, and was mounting it on a board as I entered. He cared little for the old College proverb,

sero venientibus ossa, (Those who are late at dinner must eat the bones.)

"While a student I was impressed with his honest, outspoken, moral nature, his unconcealed and fierce hatred of all tyranny, political, sectarian and social, with an enthusiastic feeling which, under a commonly mild and quiet exterior, would show itself on some subjects in abrupt, sarcastic questions, or in quotations in a loud voice with animated gestures, from the more passionate poets and orators. He belonged to a Philophysian Society in College, which was a source of improvement to him while there. Among his classmates was Dr. Samuel G. Howe, of Greek celebrity, and late of the Sanitary Commission."

Dr. Holmes completed his course of study at Brown University, and graduated at that institution in 1821.

The study of a profession soon engaged his attention, and he chose the one nearest in accordance with his tastes, that of medicine. He came to Paris, Me., soon after graduating from College, and entered the office of his uncle, Dr. Benjamin Chandler of that town. He taught a High School in that village while engaged in his studies. Here he had a fine opportunity to pursue his studies in the Natural sciences. It was on one of his excursions that the splendid minerals of Mt. Mica, situated about a mile east of the village, were discovered. He collected these and carried them or sent them to Brunswick for Prof. Cleaveland. Prof. Cleaveland once remarked to the writer, that so abundant and so magnificent were these minerals that he did not realize their value, and supposed them inexhaustible and, sent them to Europe on exchange with the expectation that he should obtain a constant supply. But, unfortunately, the supply of first class specimens failed, and while royal cabinets in Europe are adorned with them, no cabinet in America can boast a complete suite of the first class of specimens.

Dr. Holmes attended the Lectures at the Medical School at Bowdoin College, and there received instruction from those earnest men, Professors Nathan Smith, John D. Wells, and Parker Cleaveland. Here he enjoyed the Lectures of Prof. Cleaveland in Chemistry, while the numerous interesting minerals in Brunswick and vicinity afforded him peculiar gratification. No two places in the State were so favorable for pursuing the study of Mineralogy as at Paris and Brunswick. In his medical studies he investigated

the science more from a love of the truth, than from the expectation of receiving any pecuniary reward from the practice of the profession. The collateral studies in Natural Science seemed to be of far greater interest to him than the study of bones and muscles. He was fond of the study of Physiology, and pursued it with much zeal. He graduated Doctor of Medicine at the Medical school at Bowdoin College in 1824, in a class of twenty-one young men. He also received the honorary degree of Master of Arts at Waterville College the same year.

He was married August 14, 1825, by Rev. Daniel Hutchinson, to Miss Sarah E. Benson of Livermore, and settled in Gardiner, where he commenced the practice of medicine. His health at this time was poor. Many years had been devoted to study, and he was unprepared to endure the exposure incident to the Medical Profession.

In the year 1821 Gardiner Lyceum was founded, through the munificence of Hon. Robert H. Gardiner of that town. Its primary object was to furnish an education for young men desirous of becoming mechanics and farmers, and who could earn a portion of their expense while attending school. Rev. Benjamin Hale, D. D., a graduate of Bowdoin College, who was afterwards elected a Professor of Chemistry in Dartmouth College, and subsequently President of Geneva College, in New York, was elected Principal of the school at Gardiner, and Dr. Holmes as teacher of the Natural Sciences. This school attracted considerable attention at the time from its novel course of study. It was designed to make it more practical than anything of the kind then existing in the country. It was something like the Cooper Institute of New York, on a smaller scale. Dr. Holmes was evidently in his element while here. He pursued his studies in the Natural Sciences with ardor, and collected and arranged a handsome collection of minerals for the cabinet, besides insects and other objects of Natural History. His associate, Dr. Hale, being a man of similar tastes, their united influence gave a peculiar character to the school, and he continued in this position till Dr. Hale's election to a professorship, when Dr. Holmes was elected Principal in 1829. While at Gardiner he published a monthly periodical of real merit called the *Farmer's and Mechanic's Journal,* which continued but a single year.

During the same year he moved on to a farm in Starks, near the mouth of Sandy River, where he remained about two years, when

in 1831 he came back to Gardiner, and edited a paper for one year called the *American Standard.*

As a teacher in the Lyceum he was not a rigid disciplinarian. He rather sought to inspire a love for study in his pupils without being compelled to resort to methods frequently so necessary to secure attention. He devoted his time and money to the institution as no teacher should do. The school was well conceived, but it lacked the funds necessary to carry on such an establishment, and failed to carry out the design of its founder to its full extent, as all similar institutions must fail without a liberal munificence.

It is, nevertheless, rather remarkable that the course marked out by Dr. Holmes and his associates nearly fifty years ago for an Industrial School, should be essentially the same which in now reviving and being put in operation over the whole country. It plainly shows that he had well considered what were the farmer's wants, and what was necessary to elevate his condition and render farming an honorable occupation. He felt certain that in this progressive age, ignorance and successful agriculture could not go on together; and if he failed in his cherished enterprise, it was only what has happened to all similar efforts when not aided by a generous endowment.

Dr. Holmes removed to Winthrop in 1832, and settled in the village near the shores of the Annabescook Pond, which in the Indian language signifies the Fish-Water-Place, whose reputation is still high up in that respect for the abundance of its fish. Fond as he was of natural objects, we believe he rarely engaged in hunting or fishing. His naturally quiet manner would not lead him easily to indulge in such sports. He spent thirty-two years of his life here in the use of his pen, and in agricultural pursuits.

In 1833 he was appointed Lecturer on Chemistry and Natural History in Waterville College. Besides giving his annual course of Lectures, he performed the duties of professor in the college till 1837. His place of residence being so remote from the college, and the compensation so small, he could not well afford to remain in that position any longer.

Thus it will be seen that he was employed as a teacher of youth for much of the time during nearly twenty years. He was an educationist by nature. To impart knowledge to others was the work of his whole life. He was a superintendent of common schools in

Winthrop during some of the last years of his life, and took an interest in their prosperity.

During the Fall of 1832 an effort was made by a few individuals to establish an agricultural paper in Maine. They had never had an organ of their own through which they could freely exchange their opinion. Accordingly the *Kennebec Farmer* was issued by William Noyes, in Winthrop, January 21, 1833, with Dr. E. Holmes as editor. It was in a small quarto form, about one half of its present size. About the year 1837 it was removed to Hallowell, where it was published a year or two, when it was purchased by Marcian Seavey, Esq., and moved back again to Winthrop. In a short time it was purchased by Russell Eaton and removed to Augusta in 1844, when it was enlarged to near its present size. During all these changes Dr. Holmes was its editor, and continued as such till his death, and was consequently, by several years, the oldest editor in the State.

His editorials were generally short, but to the point. He was a ready writer. He would go into the office, and when a topic was presented to him could immediately take his seat at the desk and throw off an article ready for the printer in a few minutes. He avoided controversy except in self defence, and always had the same pleasant style and quaintness of expression so characteristic of the man. It was as editor of the *Maine Farmer* that he was best known. For nearly thirty-three years he discoursed weekly to thousands of readers. He had lived to see agriculture raised from a dependent condition to a degree of intelligence and prosperity of which he might well be proud. From a single town organization, he had lived to see every county, and many towns, having their societies for mutual improvement in agriculture. He had passed through the most disagreeable of all ordeals, the banishment of superstitious notions in agriculture which had enslaved the world since the flood, and had set forth in their stead rational and even scientific truths which could be comprehended by the readers of his paper. Rev. David Thurston, in his History of Winthrop spoke of him in this wise: "he rendered his weekly issues highly popular and useful to husbandmen and mechanics."

When Dr. Holmes commenced the first volume of the *Maine Farmer and Journal of the Arts* in 1833, there was no agricultural paper in the State and only five or six in the whole country. The enterprise was looked upon with the greatest distrust by many,

under the supposition that such a paper could not be supported in Maine. The public mind was exceedingly sensitive at that time lest it should be drawn into the vortex of party politics, and become the organ of one of the two great contending parties, while the prejudices of the farmers themselves was exceedingly strong against *book farming* as it was called. The paper commenced with only about two hundred subscribers, a number certainly not very flattering; but the fertile mind of its editor soon rendered it attractive by his popular methods of explaining scientific truth until at length the *Maine Farmer* rested on a foundation not to be shaken. During the past seven years it had strongly advocated a system of internal improvements, a Geological survey of the State, and an exploration of the wild lands in the State; and it did much to divert the attention of emigrants from the west, to the eastern portions of Maine. It was instrumental in developing the agricultural productions of the State in a ratio unknown before. He always advocated the manufacture of home productions, and believed that a homespun jacket was one of the best cures for hard times. Improvement and progress were his watchwords.

About the year 1840 he began to advocate the establishment of a Board of Agriculture. From this has grown up our present system in the State. Co-existent with the Maine Farmer was the birth of the first agricultural society in Maine. The Kennebec Agricultural Society was organized after a hard struggle and had its head quarters at Winthrop where the Farmer was published. The influence of the society extended no farther at that day than many a town Farmer's Club at the present time, but by persistent efforts legislative aid was furnished to any society that would raise among themselves a given sum of money. Since then societies have sprung up in different portions of the State, and have served to elevate the condition of the farmer in a remarkable manner. In all these movements Dr. Holmes was deeply interested.

For many years The Farmer was the organ of our common schools as well as of the farmer. Many of its correspondents were deeply interested in the improvement of our common school system, and its columns were always open to communications in their behalf. He never exhibited a narrow policy in the management of his paper. Its columns were ever open to what might make men happier, wiser or better. We think but few papers at the time manifested that liberality and freedom for discussion as did the Farmer.

Dr. Holmes was elected a representative to the State Legislature from Winthrop during the years 1835-6-7-8-9 and in 1850, and was elected and reélected Senator from Kennebec County in 1840 and '41, and was in 1852 and '53 made a candidate for Governor by the Liberty party, at a time when its members were objects of but little sympathy North or South. While in the Legislature he was active in introducing such measures as he deemed of value to the cause of agriculture. He succeeded in carrying through a law for giving a bounty on wheat, which during its continuance served to stimulate farmers throughout the State to cultivate the wheat crop. His legislative experience rendered him familiar with the legal history of the State, particularly with everything pertaining to its agricultural interests.

In 1832 an act was passed by the legislature authorizing Agricultural Societies, and granting aid on certain conditions from the Treasury of the State, and it was required that returns should be made to the Secretary of State. Few societies published their transactions till the year 1852, when a Board of Agriculture was established, and Dr. Holmes was elected Secretary. The duty devolved on him of collecting and publishing the returns of the several societies. This was then a work of much difficulty and the remuneration small, but he collected what could be found of 1850-2, and published in two parts. From 1850 to 1855 the transactions are not complete, but valuable. In 1855 the law was changed making it imperative on the several societies to make full returns to the Secretary of the Board of Agriculture.

In 1855 the Maine State Agricultural Society was incorporated and Dr. Holmes was made its Secretary, which office he held till his death.

In the year 1837 there was awakened a spirit of public improvement in the State, especially with reference to the developement of its natural resources. Dr. C. T. Jackson had commenced a Geological survey of the State the year previous, and it was the wise decision of the Legislature to employ some person to make such a survey of the Aroostook Territory. Accordingly the Board of Internal Improvement, through the Land Agent, employed Dr. Holmes for that purpose. His instructions were to explore the sources of the Penobscot and St. John rivers, ascertain the practicability of a water communication between the two rivers; to examine the geology and mineralogy of the country, and des-

cribe its topography as far as possible, with reference to its future settlement, as well as for its facilities for lumbering operations.

During the Spring and Autumn of 1838, Dr. Holmes was busily engaged in the performance of these duties. No better selection could possibly have been made at the time for this purpose. In the spring he examined the head waters of the St. John and Penobscot, when the waters were high, to ascertain their capabilities for navigation, mill-sites and for the transportation of lumber; and again in Autumn for the purpose of learning everything respecting its natural productions.

He faithfully performed his duties and his report to the Legislature the next winter was sought for with great interest. His services had much to do in awakening the public mind towards settling this territory. Thousands of emigrants within a few years moved in, and have since made for themselves good farms and comfortable homes.

Dr. Holmes was unwearied in his efforts to promote the public interests of the State. Everything pertaining to its natural resources—from the humblest plant to the giant tree of the forest, from the soil to the mountain, from the bottom of the small stream to that of the neighboring ocean,—bore testimony to his zeal and knowledge. Nothing escaped his eye that might render service to the wants of his fellow man. His influence in promoting emigration to the Aroostook was of a far greater value in erecting a barrier against foreign encroachment, than a line of forts in an unbroken forest from Canada to the Atlantic.

A resolve was passed by the Legislature of Maine during the winter of 1861, authorizing a scientific survey of the State, and Dr. Holmes was appointed Naturalist, and C. H. Hitchcock of Massachusetts, Geologist, with authority to select assistants to carry on the survey.

Dr. Holmes, assisted by Dr. George L. Goodale as Botanist, explored the district between Winthrop and Farmington, thence across the State by way of the Umbagog Lakes, thence to Kittery Point, and thence to the mouth of the Kennebec River. Their attention was especially devoted to Zoölogy and Botany.

In August, Dr. Holmes with his scientific corps started, (Aug. 7th,) to explore the northeastern portion of the State. Their report was a most valuable addition to the geology and natural history of the State and country. Dr. Holmes' labors were not

confined to zoölogy alone, for his watchful eye observed the geology of the country wherever he went, as may be seen on reading his report for that year.

The survey was continued during the summer of 1862. Conspicuous among the labors of that year, was Dr. Holmes' Report on the Ichthyology of the State. No so complete a catalogue and description of the fishes of Maine had been previously made. His report is a valuable one. He also explored the Helderberg series of limestones in Aroostook County, of which he gives us, in connection with other portions of his report, a graphic description of his explorations.

As the legislature, the next winter, refused to continue the survey, much of the labor commenced at that time remains unfinished. But enough was accomplished to stamp the men engaged in it with much credit for their industry and ability.

In a letter received by the writer from Dr. Holmes, near the close of the survey, he remarks that he "went into the work poor, and returned poorer," so great were the incidental expenses, and so small the rumuneration. For a man of Dr. Holmes' temperament to complain, there must have been adequate reason. That he labored hard and with enthusiasm to accomplish his work, his reports bear sufficient evidence, and it is much to be regretted that every department of natural history in the State should not be thoroughly completed. The State never lost a dollar in all that it has expended in developing its natural resources.

Dr. Holmes was frequently engaged to deliver addresses before the different agricultural societies in the State: in fact, there was scarcely a society existing before which he had not spoken. These addresses were eminently practical in their character; he indulged in no fine spun theories, or simple rhetoric, but at once engaged the attention of his hearers by a direct appeal to the understanding. Many of these addresses were published from time to time in the Maine Farmer, and in the Agricultural Reports.

As a public speaker, he never rose before an audience unless he felt that he had something to communicate which he deemed worthy of the occasion. Unless fairly aroused by an opponent, he spoke in a familiar manner, and paid no attention to the rules of oratory during the delivery of what he might have to say.

He occasionally wrote articles for the Patent Office Report, and for the State Agricultural Reports, which were very valuable.

He was a vice-president of the National Agricultural Society, and of the New England Society, the latter of which he attended on its first exhibition at Springfield, Mass., from which he communicated to the Maine Farmer a mass of valuable matter, the result of his own observation.

As a writer, his style was simple, his argument clear, and well expressed. The elements of progress were everywhere stamped upon his productions. He sometimes indulged in a poetical strain, but he evidently felt that he was neither born nor made a poet. His mind had too much of the practical element in its composition to find much favor with the Muses.

No one would hardly suppose, as they reviewed his editorials for a third of a century, that he had ever studied a foreign language. He made use of the pure Saxon element in his ordinary communications, yet when occasion demanded, he could express his thoughts in the most technical manner.

Dr. Holmes never acquired an extensive practice in his chosen profession. His mind was too much taken up with matters foreign to the sick room. The management of a paper like that of the Maine Farmer, and the management of a patient, are widely different. He had not the courage of the surgeon: his head was too full of sympathy for his patient. Nor do we think from our limited observation of him in his professional duties, that he could, on a sudden emergency, grapple with a difficult case, like one of a bolder cast of mind and body. He never seemed to us to be really in his element while in practice. He shrunk from everything that appeared like obtrusiveness, and was ill adapted in his nature to be jostled about by a competitor, but chose rather to let his thoughts run upon subjects more congenial to his tastes. Some agricultural or scientific topic would engross his attention while riding to visit his patient, rather than the condition of his patient, or his patient's money. Still, he secured the entire confidence of many families while engaged in his professional duties. Whatever he did was pretty likely to be done with as correct a diagnosis as possible, and he was frequently called in consultation by neighboring physicians.

Dr. Holmes early devoted his attention to the natural sciences, as we have already intimated. In botany he made himself familiar with most of our native plants, especially with such as might possess any economical value. He examined with care the various

kinds of grasses, their habits, and adaptation to our soils and climate. In this, as in all his other studies, he seems to have turned all his knowledge, as far as possible, to a practical account.

In mineralogy he collected a large and beautiful cabinet, which he arranged with much good taste in the Gardiner Lyceum, where we suppose it still remains a monument to his zeal and industry. Not more than two or three persons had made a similar collection in this State at that time. We can only cite the names of Prof. P. Cleaveland of Brunswick and of Rev. Amos Cook of Fryeburg.

In geology he rendered himself familiar with the various formations of rocks, so as to converse familiarly and intelligently in that science, and examine them in place.

Dr. Holmes was well fitted for a chemist. His mind was of that cast which delighted in experimenting. This he did with the most imperfect instruments, many of which he could improvise for the occasion; and he actually performed, as he once informed us, for his own instruction, all the popular experiments in that science. His knowledge of this science rendered him exceedingly useful in popularizing natural science so as to be comprehended by the general reader. This gave him a decided advantage as an agricultural editor over most of his contemporaries. It saved him from forming a thousand false conclusions, to which one is subject without a knowledge of this science. Had he devoted the energies of his life to chemistry and geology, and been furnished with ample means for prosecuting his studies, he would have stood among the eminent scientific men of his day in these two branches of human learning.

He early made quite a collection of insects; but the difficulties then in the way of receiving instruction in the science of entomology, prevented him from pursuing it to a great extent. He, however, was able to classify insects according to the system of Latreille.

In ichthyology, or the study of fishes, he took quite an interest, and his report on the fishes abounding in the waters of Maine, is the best we have on that subject, and bears ample testimony to his faithfulness in rendering it as complete as possible.

Thus we see from our brief sketch that his range of study in the natural sciences was by no means small, while his knowledge of them individually was sufficient to comprehend any subject to which he might direct his attention.

He was thoroughly conversant in agricultural literature. The opinions of English, French, German, as well as American writers, were familiar to him on all agricultural questions, so that he never was at a loss for resources wherewith to replenish his own mind, or impart instruction to others.

As a companion he was very congenial. Few men could pass through the world, and, whether among friends or strangers, render themselves agreeable to those around them, as he. A pleasant stock of good humor would put every one around in the same state of feeling. No one ever heard him grumbling at the slowness of a stage coach, or of his dinner at a hotel. While traversing the forests, away from all human beings save his little company of explorers, he kept up that same degree of buoyancy of feeling which rendered the task before him so much the lighter. In his official intercourse with others he paid all due deference to their opinions, and even when attacked in an ungentlemanly manner, would forgive the insult, and in a few moments recover his accustomed equanimity of temper.

He enjoyed the ludicrous, and not the less when at his own expense. The readers of the Maine Farmer can well remember his description of his diet consisting of saw-dust puddings and a snuff of the east wind, and what an advance he had made in his bill of fare when he discovered that wine could be made from saw-dust! Such playful turns of thought served to buoy him up amid the deprivations of life to which he may have been exposed.

His relations to the editorial fraternity were of the same character. He was not fond of controversy, and generally managed his side of a question by his playful wit, which kept both parties in good humor. When, however, he was fairly aroused by what he considered an act of injustice, his sarcastic retorts were such as would make the boldest controversialist wince. Such occasions were, nevertheless, very rare.

He was well versed in the political questions of his time, but he would not have made a successful political editor. He could not with readiness pitch into an opponent as an aggressor. He could only stand at bay and act on the defensive. It was a saying of his, that the meanest of all *biting* animals was the species known by the name of *backbiter*.

He had not a giant intellect. There were no outbursts of eloquence on great occasions, no brilliant discoveries in science, and

no tide of public favor on which he could ride into political power. He passed on in the even tenor of his way, as the useful citizen, dispensing his knowledge as a good teacher, without particularly caring for his reputation. Conscious that the principles he was advocating were those of the truth, he scattered them broadcast over the land, never doubting but in due time a bountiful harvest would be the result.

The following letter is from a gentleman who knew him well. It accords so well with our own opinion of the man, that we transcribe it in full:

"Dr. Holmes was of eminently a philosophical turn of mind, clear in his apprehensions, and a keen observer. He could give the best possible directions for practice, for he was no visionary or mere theorist, but somehow he lacked tact or ability to practice himself, or to turn his talents to pecuniary benefit to himself. He was generous and public-spirited to a fault, and always ready in every good work. He did a great deal in the way of introducing choice breeds before they were popular, and lost much money by it, but the State reaped the benefit. With Charles Vaughan of Hallowell, he introduced the South Down Sheep. He owned the first pure blood Short Horn in Maine, Young Denton of the Herd Book. This animal was presented to him by Stephen Williams of Northboro, Mass., who imported the first pure blood from England. He was the first also to introduce the Cotswold Sheep into Maine: a pure buck from Albany, New York.

Dr. Holmes was always ahead of the times in which he lived. He was affable, good-natured, and quiet; strong and eloquent when roused, and very quick and keen in perception and repartee. He always had a fund of good humor and anecdote, and was universally beloved."

The crowning element of his character may be best explained by the word *suggestiveness*. Probably no other man in the State of Maine could propose to a good account everything that came up before him as could Dr. Holmes. This was manifest in almost every number of the Farmer. Every mill site, rock, plant or tree had some useful purpose designed for it. Much that has since been put in practice by farmers in this State took its origin from him.

To him must be rightfully accorded the honor of being the founder of systematic and intelligent farming in Maine. Individuals

had previously done something in a limited sphere in their respective localities towards the introduction of improved breeds of cattle, and sheep, and new varieties of fruit, but it was reserved for him to spread these improvements broad-cast before the farmers of Maine. He did more than any other man to make farmers think and read, as well as work. He had the prejudices of past generations to combat, but he broke them down by his good humor, and good sense.

But we wish to be understood. Great as was his suggestive power, he almost entirely failed to carry out his own suggestions to a practical account. The difference between his ability to plan, and to execute was greater than in any man we ever knew. He was apt to commence a work and leave it half executed. He seldom arrived at satisfactory pecuniary results. There may be several ways of accounting for this. He was a ready writer. He was fond of communicating his thoughts to paper. He loved a good book, and would become absorbed in its perusal till his mental powers were exhausted, and with them, his physical powers lost their energy. Not one man in ten thousand can spend his time in intense writing or reading, till the period of exhaustion, and then engage in physical labor to great advantage. He only half executes what he has undertaken. This habit applied to farming will prove a failure.

It was a wonder to many that he could so successfully edit an agricultural paper with a mind stored with everything useful, not only in great principles, but in all the minutiæ of farming, and yet fail to put in practice what he knew. We account for it on the principles just explained. As a consequence, Dr. Holmes lived and died poor. When he received a dollar he did not know how to make it return another dollar with it. He devoted his energies for the welfare of others, little regarding his own personal advantage. His long continued devotion to the public good, had rendered him careless of his own private affairs. Such apparent inconsistencies are not uncommon in public men. They are martyrs to the public good, and their reward is in the grateful remembrance of their deeds by those who live after them.

An intimate friend of his, a resident of Winthrop, thus writes:

"He was a remarkable man. Apparently he cared nothing for money, and spent it freely when he had any. He was always heavily involved, but never wished to wrong any one out of a cent.

He would pay one man and borrow of another; remarkable for projecting and suggesting, but failed in executing. His limited means had much to do with the latter. No man, woman, or child was ever turned away from his door empty handed. He would divide the last crust or a cent, if necessary. In fact, Winthrop knows not how to do without him. The whole town called on him for information and help. It is a common saying among us that Dr. Holmes knew everything, and was ever ready to impart his knowledge without money or price. We have not his equal."

Dr. Holmes was a believer in Divine Revelation and Providence. Of his early religious habits we have no information. He never made a public profession with any religious denomination, but respected all who were sincerely engaged in doing good to their fellow man.

He has been known for many years as a sympathizer with the doctrines of the New Jerusalem Church, and practised its principles to the letter, though he never made a public profession with that denomination. A friend of his, a clergyman of that denomination, writes of him as follows:

"I think Dr. Holmes was a man of a good deal of religious thought and feeling. When I used to meet him occasionally, as I only did, I always found him ready and desirous of conversing on religious subjects. The subject of the future state especially, always seemed to interest him. He dwelt with pleasure and delight on the scenes of eternity. The spiritual world and life there, he looked forward to with none but pleasant anticipations. His mind was often there. His dominant trait of character, I think, was to do good, be useful to, and serve his fellow man in every way possible. His own self interests never stood in the way of the interests of his fellow man."

His last sickness was of short duration. His last labor was to appear before the Legislative Committee and advocate the establishment of the Agricultural College apart from existing institutions and found it on an independent basis. He felt that a crisis was near in the history of Maine Agriculture, and he exerted himself with uncommon energy to prevent a course of action which he thought would be ruinous to the College. On retiring to the hotel, he complained of feeling unwell, and the next morning was severely attacked with chills and fever, and against the remonstrances of friends, returned by stage to his home the same morning.

While on his death bed he expressed himself that he had no fears of the future world, but if he could have his wish, he would like to have things of an earthly nature changed, (probably meaning his own pecuniary affairs.) In reply to a remark of one of his friends, "it is hard, doctor," he said, "yes, but I have no quarrel with my Maker, I am in the hands of God, and His will be done." Another said, "you are struggling,"—in response he said, "yes, I am wrestling with the Angel, Death." He exhibited the ruling passion of his life even in his last struggle. Just before he died, when being raised up, he laconically said, "now put in the wedge," meaning the bolster and chair employed to keep him in an elevated position. These were his last words. When his mind wandered, which it did at intervals, the subject of the Agricultural College seemed to control him, and at times he appeared to be combatting the arguments of his chief opponent. His disease proved to be typhoid pneumonia. He died at half past 6 P. M., February 9th, 1865.

The funeral obsequies were attended at the Congregational Church on the Sunday following, February 12th. The large church was filled to overflowing. Among those present were J. F. Anderson, President, and S. L. Goodale, Secretary of the Board of Agriculture. The funeral services were conducted by Rev. Mr. Dike of the New Jerusalem Church, in Bath, assisted by Rev. Mr. Snow of Bethel. The Masonic Fraternity, of which the deceased was a Royal Arch Mason, assembled in large numbers in full regalia to deposit in its last resting place all of what remained of that unselfish and honored man.

He was buried in the Village Cemetery at Winthrop, but no monument is yet erected over his remains to tell the enquiring traveller where they lie.

Dr. Holmes left a widow and two children to mourn their loss. Both of them have children and reside in Augusta.

A happy thought was expressed by Mr. S. L. Boardman, junior editor of the Maine Farmer, soon after Dr. Holmes' death, that a Library be created in the forthcoming Agricultural College to be called the Holmes Library, and that this should be the perpetual monument of what he had done for the cause of agriculture. The thought was seconded by the most prominent agriculturists in the State, and subscriptions were at once forwarded to Mr. Boardman at Augusta. It is to be hoped that a generous sum will be col-

lected for this purpose. But while the wish is expressed that this be done, it is hoped that the monument to mark his final resting place will not be left undone.

The death of Dr. Holmes, so sudden, produced a deep sensation wherever he was known. The leading agricultural journals throughout the country, noticed it with sentiments of great respect for his character. The Legislature of the State being then in session, the following resolutions were introduced in the House of Representatives on the next Saturday, by Mr. Heath of Detroit:

Resolved, That in the recent decease of Hon. Ezekiel Holmes, the State of Maine has lost one of her most useful citizens.

Resolved, That in testimony of our respect for the memory of the deceased, these resolutions be entered on the journal of this House.

Subsequently, the resolutions were taken up, and in support of them, Mr. J. L. Stevens, of the Kennebec Journal, made some brief remarks. They were finely and feelingly expressed, and as they show a just estimate of the character and public services of Dr. Holmes, we give them entire, from the report in the Journal:

"Mr. Stevens of Augusta, said, that civilians and soldiers—statesmen and generals—have chiefly filled the pages of history as well as of biography. Some niche ought to be found for the men who have labored for the benefit of the industrial interests of society. While we so readily yield honors and fame to poets, orators, and political leaders, those who have faithfully labored through long years for the development of the wealth of the soil, for the advancement of the mechanic arts, and the general welfare of the sons of toil, should not be forgotten. Ezekiel Holmes was a valuable citizen, and his character and worth should be held in esteem by the people of the State, and his death deserves to be noticed by their chosen agents, in Legislature assembled. He possessed superior ability, extensive acquisitions, and faithfully did he apply them to the service of the public. Modest, unpretentious, firm in his convictions, he quietly pushed his labors in the channels which seemed to him most promising of beneficial results to the educational, mechanical, and manufacturing interests of Maine. Born of the stock of the Pilgrims on the soil which they made hallowed ground, he became early a citizen of the community for whose advancement he has labored for nearly half a century. For more than thirty years he was the editor of the Maine Farmer, through whose columns he exerted a large and

healthful influence on the public mind. He was active and influential in establishing the Agricultural institutions of the State, especially the Agricultural Board, whose deliberations, discussions and reports have done and are doing so much to unfold the agricultural resources of Maine. He took an active interest in the Scientific Survey of the State, and was ever a vigilant watchman of whatever tended to awaken the popular mind to new facts and suggestions beneficial to the industrial interests of his adopted State. The fruits of his labors may be seen by all who give due attention to the improvements which have been made in the farms and stock of large numbers of towns within the last twenty-five years. Death has removed all that is mortal of him to the grave, but his character and labors will continue to exert a benign influence for the public weal."

The resolutions were unanimously adopted, and on motion of Mr. Oak of Garland, it was voted that the Clerk of the House send a copy of the resolutions to the family of Dr. Holmes.

The following sketch of Dr. Holmes appeared in the Maine Farmer, on the week following his death, which portrays his character in fitting language:

"He possessed an inbred thirst for knowledge, (especially in the direction of the natural sciences,) keen powers of observation, a remarkable quickness to recognize the relations of objects to each other, an early and long continued culture of these powers, resulting in large acquirements in agricultural science, during many years of familiarity and even contact with its progress in this and other countries. Practically acquainted with the minutest details of farm operations, and always a diligent student of the principles which underlie them, he also possessed a remarkable facility and clearness of expression, which enabled him successfully to bring his views and convictions upon all subjects distinctly to the comprehension of the common mind. That his editorial labors have been appreciated, is abundantly demonstrated by the support which has always been so generously accorded to the paper of which he was the founder, by the people of Maine.

Thus has passed from earth one of the best and most useful citizens of the State. All the years of a long and active life, and the eminent abilities with which he was endowed, were spent, not in the selfish and sordid pursuit of gain or personal advantage—indeed, in this respect he may have erred, giving too little heed to

the suggestions of a worldly prudence—but in the service of his fellow-men. Of a singularly sensitive and sympathizing nature, he was always ready to respond, even at great personal inconvenience and sacrifice, to any call upon him for the benefit of others. No good cause ever found in him an unwilling or indifferent advocate, as the columns of this paper will truthfully testify. No benevolent or philanthropic movement, no worthy enterprise for the development and improvement of the resources of the State, no loyal and patriotic measure for the support and preservation of the life of the nation, has ever appealed to him for word or work in vain. Nor has his tongue or his pen been silent in the presence of wrong and injustice, of vice and immorality. Whenever the right was to be sustained and the wrong rebuked, he has fearlessly and conscientiously done his whole duty. And his life has ever been the exemplar of his teachings. Pure in morals, simple in his tastes and desires, equable and kindly in disposition, obliging to all with whom he came in contact, and with abilities and attainments that fitted him for the highest public positions, he has been content to move in the modest yet influential sphere in which Providence had cast his lot, honestly endeavoring to fulfil the injunction of the Apostle, by doing good as he had opportunity. His virtues will be fragrant in the hearts of those who knew and loved him, and his good deeds will be cherished as an inestimable legacy by his fellow-citizens. 'The memory of the just is blessed.' "

Such are some of the prominent traits of character exhibited by Dr. Holmes as a public man. Thousands of his contemporaries, who secured places of influence, and reaped therefrom a rich pecuniary reward, and have had erected to their memory the costly monument, will nevertheless be forgotten, while the memory of such a man will long live in the hearts of his countrymen. Time and posterity will honor him. His good deeds will be embalmed in the good words and writings of those who best knew him. Surely a man's work will follow him, of whatever sort it may be.

Few men have acted so well their part through life with so broad a spirit of philanthropy, as did Dr. EZEKIEL HOLMES, who took for his motto at the outset of his career, "*Our Home, our Country, and our brother Man,*" and steadily carried it forward through life as the banner under which he was sure he should win the victory.

THE STATE AGRICULTURAL COLLEGE.

It is a matter of great satisfaction and of sincere gratitude, that after the varied and widely differing plans for an Agricultural College which were strenuously urged before the Legislature of this State for three years past, that body did, at its last session, adopt one which accords in its distinctive features with the views of the great majority of farmers throughout the State—at least with the views of all those who have uttered their well-considered views on the subject; a plan which, if faithfully and effectively carried out, will secure to our children and our children's children better and more accessible educational advantages than have hitherto been enjoyed in the State, and very possibly a better school in some important respects than has yet been established on this continent.

The organic act establishing this College is as follows:

STATE OF MAINE.

AN ACT TO ESTABLISH THE STATE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

SECTION 1. Samuel F. Perley, N. T. Hill, Bradford Cummings, Thomas S. Lang, Dennis Moore, Wm. D. Dana, S. L. Goodale, Robert Martin, Alfred S. Perkins, Joseph Farwell, Seward Dill, Joseph Day, Ebenezer Knowlton, Hannibal Hamlin, Charles A. Everett, and Wm. Wirt Virgin, are hereby constituted a body politic and corporate by the name of the Trustees of the State College of Agriculture and the Mechanic Arts, having succession as hereinafter provided, with power to establish and maintain, subject to the provisions and limitations of this act, such a college as is authorized and provided for, by the act of the congress of the United States, passed on the second day of July, in the year eighteen hundred and sixty-two, entitled "an act donating lands to the several states and territories, which may provide colleges

for the benefit of agriculture and the mechanic arts." They shall be entitled to receive from the state the income, which shall accrue from the funds granted to the state by the act aforesaid, and shall apply the same, together with all such income as they shall receive from any other sources, to the maintenance of the college in conformity with the act of congress.

SECT. 2. The trustees shall annually elect one of their number to be president of the board. They shall appoint a clerk and treasurer, both of whom shall be sworn, and shall hold their offices at the pleasure of the trustees. The clerk shall record all proceedings of the board, and copies of their records, certified by him, shall be evidence in all cases in which the originals might be used. The treasurer shall be required to give suitable bonds, and to renew the same whenever the trustees shall require.

SECT. 3. The governor and council shall at all times have the power, by themselves, or such committee as they shall appoint, to examine into the affairs of the college and the doings of the trustees, and to inspect all their records and accounts and the buildings and premises occupied by the college. Whenever the governor and council shall have reason to believe that the trustees are exercising or attempting to exercise any unlawful powers, or unlawfully omitting to perform any legal duty, they may direct the attorney general to institute process against the trustees in their corporate capacity, in the nature of a complaint in equity before the supreme judicial court in the county in which the college may be established, and the court, after notice, shall hear and determine the same, by summary proceeding, in term time or by any judge in vacation, and may make any suitable decree, restraining the trustees from performing or continuing the unlawful acts complained of, or requiring them to perform whatever is unlawfully omitted, and may enforce such decrees. In like manner a complaint may be instituted against any individual trustee, and be heard in the county where he resides, alleging against him any cause deemed by the governor and council sufficient to disqualify him for the trust; and if, in the judgment of the court such allegation shall be sustained, a decree shall be made removing such trustee from office, and his place shall be thereby vacated.

SECT. 4. No person shall be a trustee, who is not an inhabitant of this state, nor any one who has reached the age of seventy years. The clerk of the trustees shall give notice of all vacancies

to the governor and council. Vacancies occurring in any of the foregoing modes, or by the resignation or decease of any trustee, shall be filled in the following manner: the first vacancy which shall occur shall be filled by the legislature, at the next session thereafter, by joint ballot of the two branches; the second vacancy shall be filled by the trustees at their next meeting; and all succeeding vacancies shall be filled in like manner, alternately by the legislature and the trustees.

SECT. 5. The trustees in their corporate capacity may take and hold, in addition to the income which they shall receive, through the state, from the endowment made by congress, such other real and personal property as may be granted or devised to them for the purpose of promoting the objects of this act. But they shall not be entitled to receive any benefactions made to them upon conditions inconsistent with the act of congress aforesaid, or for purposes different from what is therein prescribed.

SECT. 6. The governor and council shall take measures, as soon as may be advantageously done after the passage of this act, to sell the land scrip received by this state under the act of congress, and to invest the same as required by the fourth section of said act. The securities shall be kept by the state treasurer, and he shall report annually to the legislature the amount and condition of the investments and of the income of the same. He shall, from time to time, as the income shall accrue, pay over the same to the treasurer of the college.

SECT. 7. It shall be the duty of the trustees, as soon as may be, after their organization, to procure a tract of land suitable as a site for the establishment of the college. If no other provision shall be made therefor, there shall be placed at the disposal of the trustees for this purpose, such proportion as the governor and council may deem suitable, of that part of the fund, which is authorized by the fifth section of the act of congress, to be expended for the purchase of lands for sites or experimental farms.

SECT. 8. The trustees shall appoint such directors, professors, lecturers and teachers in the college, and employ such other persons therein from time to time, as the means at their command may permit, for the accomplishment of the objects enumerated and prescribed in the fourth section of the act of congress. Every officer and every person employed shall hold his office or employment at the pleasure of the trustees. They shall, as soon as may be, ar-

range and make known the several courses of instruction, which they will undertake, at the outset of the college, and shall enlarge and improve the same whenever practicable, subject to the limitations prescribed by congress. They shall also establish the qualifications for admission, and modify the same as circumstances may require. But no student shall be admitted into or continued in the college, nor shall any person be employed in any office or service, who is not of good moral character and pure life.

SECT. 9. In addition to the instruction which is to be given by classes, text-books, lectures and apparatus, in such branches of learning as are related to agriculture and the mechanic arts, the trustees shall provide, as fully as may be, for practical experiments and demonstrations of scientific principles and rules. They shall encourage, and, for due proportions of time at different seasons of the year, and with reference to other exercises, require all the students to engage in actual labor, upon the lands and in the workshops, with which the college may be furnished, and shall provide suitable oversight and direction in such labor, so that they may become habituated to skilful and productive industry.

SECT. 10. Military tactics shall be taught, during some suitable part of each year, to all the students; and they shall be required to form and maintain such habits of obedience and subordination as may be useful to them if called into military service. The adjutant general shall be authorized to furnish to the college, for military drill, such arms and equipments, not needed by the state for other service, as may suffice for the number of students. He shall also furnish to the college a United States flag.

SECT. 11. Such other studies are to be taught, within the limitations of the act of congress, as the facilities of the college and the periods of instruction will permit.

SECT. 12. Students who satisfactorily complete any one or more of the prescribed courses of study, may receive public testimonials thereof, under the direction of the trustees stating their proficiency.

SECT. 13. No charge shall be made for tuition to any student who is an inhabitant of this state; and the trustees and all persons employed by them shall constantly endeavor, by the adoption of judicious and effective arrangements in all the labor departments of the college, to reduce the cost of subsistence to the students, and to render the institution, as far as possible, self-sustaining.

SECT. 14. It shall be the duty of the trustees, directors and

teachers of the college to impress on the minds of the students the principles of morality and justice, and a sacred regard to truth; love to their country, humanity and universal benevolence; sobriety, industry and frugality; chastity, moderation and temperance, and all other virtues which are the ornaments of human society; and among other means to promote these ends, and to secure the best personal improvement of the students, the trustees shall provide, as fully as may be practicable, that the internal organization of the college shall be on the plan of one or more well-regulated households and families, so that the students may be brought into relations of domestic intimacy and confidence with their teachers.

SECT. 15. If at any time the number of students applying for admission shall be greater than the means of the trustees will enable them to receive, they shall make regulations for the number to be admitted, having reference to the proportions of population in the several senatorial districts in the state, and equalize the admissions according to such proportions, as nearly as may be.

SECT. 16. The trustees shall hold a regular session at the college, at least once in each year, and may provide for periodical visitations by committes. No trustee shall receive any compensation, except actual traveling expenses, to be paid from the treasury of the college.

SECT. 17. The treasurer of the college shall make, as often as once in six months, a detailed report of all receipts and expenditures, and the trustees shall cause the same to be verified by full inspection and settlement of all his accounts, and shall transmit a copy of the same, as verified by them, to the governor and council. The trustees shall also cause to be made, annually, such report as is required by the fifth section of the act of congress, and communicate the same, as therein provided.

SECT. 18. The legislature shall have the right to grant any further powers to, alter, limit or restrain any of the powers vested in, the trustees of the college established by this act, as shall be judged necessary to promote the best interests thereof. And this act shall take effect upon its approval by the governor.

One of the distinctive features of the foregoing plan is, that the students will not only be taught the sciences which have a bearing upon their vocation in life, but they will come forth skilled

in and accustomed to productive labor. This is something very different from simply becoming possessed of knowledge which may be rendered productive hereafter. The latter might be accomplished at some of the scientific schools attached to several of the colleges in other States—provided of course that the parents or pupils possessed the pecuniary ability to avail themselves of the advantages of these institutions. We thankfully acknowledge the fact that these scientific schools do supply a great need in this age of material progress. They do graduate accomplished mechanics, miners, metallurgists, engineers, and some who have given special attention to scientific agriculture. But it is also a fact that those who attend those schools are very few compared with the numbers who are actively engaged in industrial pursuits, and of those few graduates, a very small proportion ever become practical farmers. Indeed, those who attend those schools do so in order to become *professional* men in their several pursuits, as much so as the lawyer or the doctor. They do not look forward to laboring skilfully with their own hands, so much as to plan and direct and use to advantage the labor of others. Without detracting in the slightest from the merit of those schools, no very profound investigation is required to see that they are not of the character indicated by the act of Congress—to wit, for "the liberal and practical education of *the industrial classes.*"

A great obstacle in the way of obtaining a good education, and what alone prevents many of our young men from attending institutions of learning away from the place where they reside, is the expense. They might perhaps contrive to meet the tuition fees and the cost of clothing and of travel and other incidental expenses, but the thought is effectually vetoed by the vision of board bills, two, three, or five dollars, or perhaps more, every week for subsistence alone.

Now, if through private munificence, the college can be furnished with a productive farm and comfortable buildings, and if the professors can be supported on the income of the fund arising from the sale of the congressional land grant, and if, as demanded by the organic act, the trustees "shall encourage, and, for due proportions of time at different seasons of the year, and with reference to other exercises, require all the students to engage in actual labor, upon the lands and in the workshops, with which the college may be furnished, and shall provide suitable oversight and

direction in such labor, so that they may become habituated to skilful and productive industry," is it unreasonable to hope that the cost of a course of study may here be brought to a minimum, and be so far reduced as to exclude none who ought to go?

On the 25th of April, twelve of the persons named as trustees in the foregoing act assembled at Augusta, effected their organization by the choice of officers, and spent some time in deliberating the laying out of work, appointment of committees, etc. One of these committees was charged with the preparation of an address to the people of the State, which was subsequently prepared and printed, and to some extent was circulated through the newspapers. It was as follows:

"Under the act establishing this College, passed by the last Legislature, the Trustees assembled at Augusta, on the 25th and 26th of April last, and effected their own immediate organization.

Hannibal Hamlin of Bangor, was appointed President; Stephen L. Goodale of Saco, Clerk; and Phinehas Barnes of Portland, Treasurer.

As a part of the result of their deliberations, the Trustees submit the present address to their fellow-citizens. They wish to secure immediate attention to this very important enterprise, and to open effective communication with all persons interested in the best improvement of our young men, who are devoted to the pursuits of practical industry.

By the returns of the Census, it appears that there are in this State, currently, fifty thousand young men between the ages of 15 and 23 or 24. The number of these, who intend to engage in the learned professions, and for whom the existing colleges were chiefly designed, is very small indeed, compared with the great mass.

By the enlightened provisions of the Act of Congress of July 2, 1862, an opportunity is at length presented, for attempting the establishment of a college "to promote the liberal and practical education of *the industrial classes.*" Whatever may be thought of the importance of good intellectual culture for the learned professions, all enlightened and philanthropic persons should be sensible of the immense good which may result to the State, by securing the means of a higher and better early training for the large number of our young men who, in their homes of labor, are to consti-

tute so great a part of the life of the State, and who by their labor are to create and sustain so much of the public wealth and of private happiness and comfort.

The scientific truths, upon which agriculture and the mechanic arts are founded, are but those laws of material nature, which God has established for his own glory, and for the good of the beings he has created. The better these laws are known and the more skilfully they are applied, the higher is the honor paid to the Author of nature, and the more complete the accomplishment of those human ends for which these laws were made.

The proper objects of an industrial college must be to teach these laws,—not merely to a select and learned few,—but to the very persons who, in the great masses of actual busy life, are to work by these laws, and, with physical labor, to produce their useful, practical results.

In the college which the State of Maine has now established, upon the endowment of Congress, the Trustees will endeavor, as the charter expressly requires, to combine theoretical instruction with practical applications. They distinctly contemplate, and will spare no reasonable pains to carry out, such a form of the college, that all the students will be taught to work skilfully and productively, as well as to understand the reasons and truths on which their work rests.

This provision for labor will, of course, be subject to a proper distribution of time, so that work will be in just proportion with study. The different seasons of the year, and a judicous arrangement of the hours of the day, will enable the balance to be properly maintained. Very high medical authority assures us, that actual physical labor, in much larger proportion than is usual with studious persons, really invigorates and quickens the powers of the mind. Merely sedentery learning is not without danger of becoming torpid and dull, and does not always lead to valuable economical results. On the other hand, the mere laborer, without intellectual exercise, is often a drudge. It is by the union of scientific knowledge with physical industry, that labor becomes most productive, and the laborer gains his worthiest elevation.

To unite study and labor in one course of training—to make the student an effective hand-worker, at the same time that skilful teachers are imparting to him knowledge, upon the subjects of his work, may be a novelty; but the conditions of life, in the State of

Maine, seem to require that this novelty should, at length, be tested and tried. It is perfectly well settled, that in our high northern latitude, no community can exist, with any comfort, unless a very large proportion of its members are actual working men. If the State of Maine is worth living in at all,—and we are more than half a million of souls who have decided to accept this lot,—we should exalt the condition of our life, by improving all the faculties of the men who sustain our life by their physical work, and by giving to as many of them as possible, in their early years, the best attainable instruction in those truths of nature, which are the foundation of all our practical arts, and by training them in well-directed habit, to the most perfect manual applications of those truths.

The Trustees contemplate also, with earnest favor, another special provision of the charter, which may be regarded as a novelty in the arrangements of a higher institution of learning. It is provided that the college, as to its internal organization, shall be, as far as practicable, on the plan of one or more well-regulated households and families, so as to promote domestic intimacy and confidence among all the inmates of the establishment. Since there is ever great danger of unhappy results when young persons, in courses of education, are withdrawn from the restraining and purifying influences of the family, it is designed to try the experiment here, whether our young men, being engaged, in this college, in those very pursuits which are to be afterwards their life-work, may not be arranged in domestic relations under the same roofs with those who are their directors and teachers, in that which is, and is to be, their actual life. The teacher, who instructs them in the sciences which pertain to agriculture, will, himself, know what agricultural labor is, and will be ever ready with practical applications, on the soil, of the laws which he teaches. The instructor who imparts to them a knowledge of mechanics, will know how to guide their hands, in the workshop, in applying these laws. Thus, in the daily life of the college, the teachers and the learners will be brought very near together, and if wise discretion is employed in the selection of the persons who are to be set over all the departments of the college, they will be recognized by the students with respect and attachment, as the heads of the household, and will be constant models, before their pupils, of learning, of order, of industry, of good manners, and of pure morals.

Comprehensively, it may be said, that if the college can work out its main design in harmony with these special provisions, training its students to live and work as they ought to live and work in their own future homes, it will perfect its young men, not in one or two practical arts alone, but in the whole Art of Life for the great majority of our people.

The more general studies, which the Act of Congress does not exclude from the industrial colleges, tending necessarily to discipline the minds and to refine the manners of the students, and the instruction in military tactics, which Congress has explicitly enjoined, tending with equal certainty to enforce habits of order and obedience, will all combine to promote harmony, confidence, and mutual respect, throughout all the departments and grades of the establishment.

The charter contemplates, without question, that the college will be established upon a productive farm. This will be its home, and the site of its workshops, for the most part. With this resource, the labor of the students, properly directed, and cheerful because skilful, will yield a large part of the subsistence of the institution, thus exciting industry and promoting economy, and keeping ever before the minds of all, the interesting problem of making the college, as far as possible, self-sustaining, and of making a good education itself pay a part of its own cost.

With these views of the primary objects of the college, and of its special methods for their accomplishment, the Trustees proceed to make some further statements, as to resources and outlay of the institution.

The endowment granted to this State by the Act of Congress, consists of land scrip to the amount of 210,000 acres. The scrip has been received by the State, but is not yet sold, and at the moment of presenting this address, the state of the market does not enable the Trustees to estimate the amount, which the Governor and Council may realize from selling it.

A sum not exceeding ten per cent. of the amount received by the State, is allowed by the Act of Congress to be expended for the purchase of a site for the college. It is confidently hoped, however, that by the generous offers, which have already been made to the State, for this purpose, or by some that may hereafter be made, *this* expenditure will be avoided. But the Act does not permit any part of the fund to be expended for *buildings*, and it

will be indispensable that some buildings be provided, beyond what can be found on any existing farm. A sufficient shelter for the officers and students, and adequate apartments for the various objects of the college, will be a first necessity. The Trustees will not, under any circumstances, permit themselves to indulge in any architectural extravagances. A judicious economy, with true good taste and good sense, can devise the requisite structures, upon the same ratable scale of cost that is applied in the building of commodious private residences in the country. These structures can be made architecturally pleasing, by symmetry of proportion and fitness for use, without any mere ornament and without expensive material.

In addition to the cost of building, there will be required funds, beyond the Congressional endowment, for procuring apparatus, books, and collections in natural science.

It is indispensable, also, that the means and income from all sources, shall be sufficient to command the services of the most competent men in every department of instruction and oversight.

As to the number and magnitude of the buildings, the extensiveness of apparatus, books, and collections, and the number of persons who are to be employed to manage the college, it is, of course, not now practicable for the Trustees to make precise exhibits, since they do not now know what public favor and patronage the college will receive, either in benefactions or in students. The first undertaking must be, to some extent, experimental, and they expect and design that, under any circumstances, the college will be started upon a moderate scale of expenditure in all departments,—not only as a probable necessity, but as the best policy. By this course, they will be less liable to make mistakes, or to fall into extravagances, and by adhering to simplicity and unity, they will more immediately test the proper capacities of the enterprise. Experience will lead to improvement and enlargement, and the public favor will follow apace.

The Trustees propose to follow this address by appeals to their fellow-citizens, for such contributions as will enable them to provide the requisite buildings and apparatus for setting the College in operation. They rely both upon small contributions from large numbers, and upon the liberality of those who can bestow greater benefactions upon an object so worthy of the greatest. It ought not, at this day, to be a vain expectation that patriotic and high-

minded men of wealth will found for themselves enduring monuments by their contributions to this enterprise. If they make it successful, it will carry their names to the hearts of all the people of the State, in many generations.

The inhabitants of Maine have resolutely sustained very heavy public burdens during the past four years of war. But a good Providence is now restoring to us rest and peace. It will be a noble memorial of this eventful year, if we now devote a generous and grateful endowment to the better education of our working young men. It is they who have won our victories, it is they who are to constitute the life of the State. They have defended our national integrity in perilous war,—let us open to them the highest blessings of peace."

The next meeting of the trustees was called to be held at Bangor the latter part of May. At that time the president read a letter from B. F. Nourse, Esq., of Boston, a native of this State, containing the following offer: "I will, until the first day of October next hold myself ready to make to your college a deed of gift of all my farm lands, buildings, &c., in Orrington, as described in my letter to the State Commissioners last season, whenever I shall be notified that the sum of fifty thousand dollars has been given, pledged or secured to the satisfaction of the trustees for the erection of buildings and other uses of the college, and that my farm is accepted for its location."

As a quorum was not present no definite action could be had at this meeting. Those of the trustees who were present visited and examined the farm of Mr. Nourse. In June a meeting was held at Waterville, and in August the trustees met at Topsham, the latter being with special reference to overtures from the friends of the college in that vicinity.

In September a meeting was held at Augusta, at which time it appeared that only about half the necessary amount had been pledged which was required to secure the farm of Mr. Nourse. The thanks of the Board were voted to Mr. Nourse for his very liberal offer, but the attempt to complete the subscription was abandoned.

A call was issued for a meeting to be held at Bangor in November having reference chiefly to informal propositions relative to a productive tract of land in the town of Orono as the site of the

College, but as a quorum failed to be present, the matter rests. As more definite action may follow the assembly of the Trustees at Augusta in January next it seems inexpedient for me here to attempt more than the briefest outline of the labors and deliberations of that body for the year past.

It may not however be improper for me to state that, in my own opinion, the proposed location at Topsham fulfills, as complete as could be reasonably expected of any place, the conditions which have been held by the Board of Agriculture as desirable to be posessed by the College Farm. These, as expressed in the well considered resolutions of 1863 were that "the farm should embrace such a variety of soils and of surface as should constitute it, or near as may be a fair epitome of the State, and that it should occupy a location easily accessible, and as nearly central to the State as may be, considering both geographical position, population and social and other advantages."

The proposed tract of some five hundred acres embraces sufficient variety of surface, and nearly all the different soils usually found in the State, clay, clayey loam, lighter loam, gravel, sand, muck, &c., in quality generally good, varying, however, from deep rich and through medium to thin and hungry. Some of it has been long in cultivation, some recently cleared, while a portion has never been cut over and yet bears the primitive growth, the original monarchs of the forest. It is not far from the centre of population, it is easy of access and surrounded with social and other advantages.

In addition to the desirable features alluded to in the resolves above mentioned, it may be remarked that the Cathance river flowing through it furnishes several water priveleges and rare opportunities for irrigation; besides which, while far enough from the sea to represent inland farming, it is so accessible from it, by easy water communication that rockweed, marlebed and other marine manures may be landed directly upon its borders at little cost.

Other tracts might undoubtedly be found in the State where an equal area might sell for as much or more money, or yield as large returns for equal labor expended; but for the purposes of such an institution, to illustrate and to teach agriculture under the widely varying conditions which exist in different parts of this broad State, it might be no easy matter to find another location embracing such a combination of advantages as the one at Topsham.

Whatever maybe finally decided upon in regard to the location, it is hoped that the people of the State will appreciate its noble design and accord to it the substantial aid and encouragement which is needful to enable it to do well its legitimate work in elevating the standard of intelligence and culture among the industrial classes, and so to increase the wealth, power and influence of the State. That it is destined, at no distant day, to take an honorable and elevated position among the educational institutions of the State I cannot doubt.

S. L. GOODALE,
Secretary of the Board of Agriculture.

JANUARY, 1866.