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BEING THE

ANNUAL REPORTS

OF THE VARIOUS

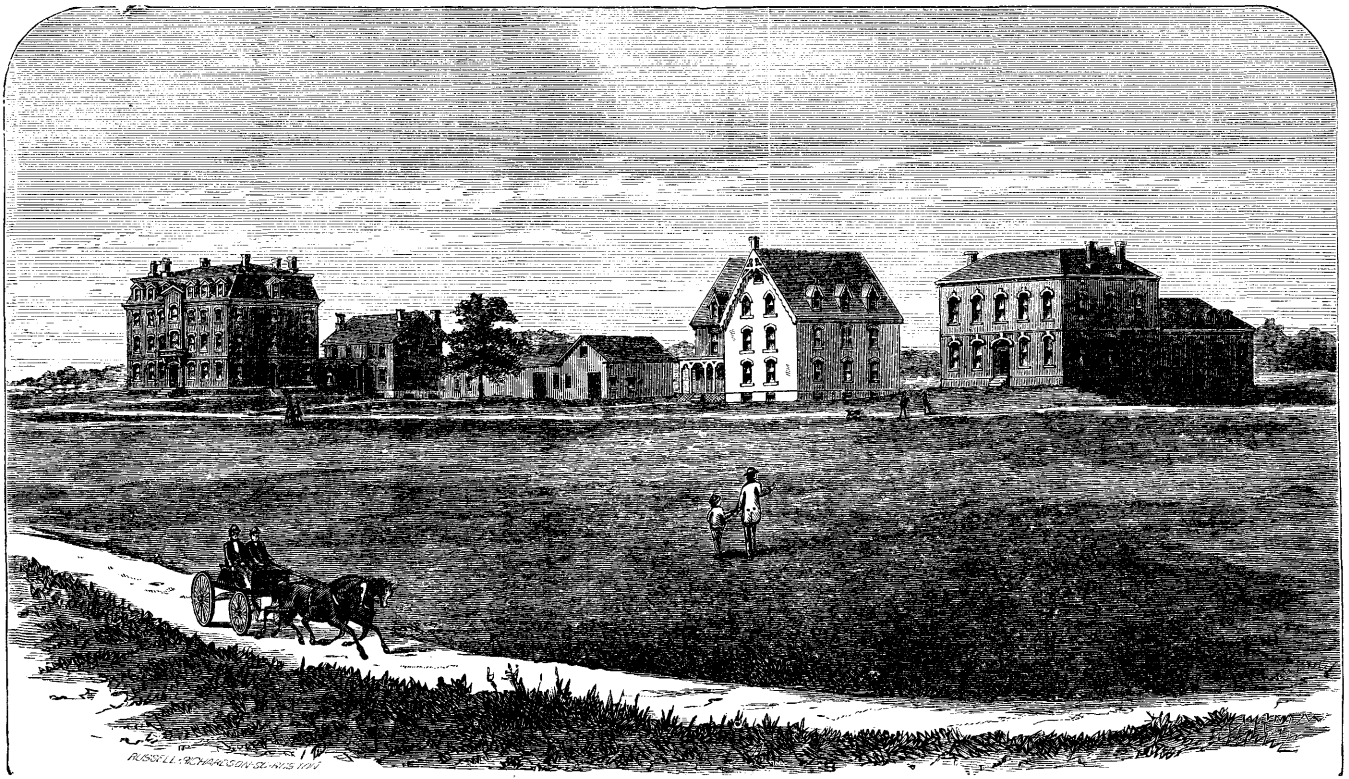
PUBLIC OFFICERS AND INSTITUTIONS

FOR THE YEAR

1877.

VOLUME II.

AUGUSTA:
SPRAGUE, OWEN & NASH, PRINTERS TO THE STATE.
1877.



Dormitory and Boarding House. White Hall. Laboratory.

PRINCIPAL BUILDINGS OF THE STATE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS, ORONO.

ANNUAL REPORTS

OF THE

TRUSTEES, PRESIDENT,

Farm Superintendent and Treasurer,

OF THE

STATE COLLEGE OF AGRICULTURE

AND THE

MECHANIC ARTS.

1876.

PUBLISHED AGREEABLY TO A RESOLVE APPROVED FEBRUARY 25, 1871.

AUGUSTA:
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1876.

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} *Examining Committee.*

TRUSTEES' REPORT.

To the Honorable Senate and House of Representatives, in Legislature assembled:

The Trustees of the College of Agriculture and the Mechanic Arts respectfully submit their Tenth Annual Report.

The reports of the President and Professors of the College, herewith transmitted, exhibit with great clearness the character of the instruction given by them during the year, the methods employed and the results attained. The Trustees have been more than ever before impressed with the usefulness of the college and its importance to the State, and they most earnestly hope that it may receive such aid and encouragement at your hands as to insure greatly increased usefulness and permanent prosperity.

Course of Study.

After careful consideration it has been decided to make a change in the college terms, reducing the number from three to two. The first term will commence early in August and continue until the last week in November. The second term will commence early in February and close toward the last of June. By this change the students will be relieved from study during the warmest part of summer and left at liberty to assist their friends at home or to work for wages, as many of them desire to do, through the season of haying.

A revision of the courses of study, suggested by the experience of the past, has also been authorized by the Trustees. The object sought by this revision is to equalize the amount of study and of educational work between the different courses.

For a fuller explanation of the character of this change you are respectfully referred to the report of President Allen. Your particular attention is called to the "*Special features of the courses,*" as described in the catalogue appended.

Mechanical Engineering.

It has been the constant aim of the Trustees and officers of the college, from the first, to afford opportunities to students, so far as it has been possible, for *putting into practice* the knowledge acquired in the class-room.

Students in the Agricultural course are required to perform educational work upon the farm, and in the garden and orchard. They are taught to conduct experiments and carefully to note results.

Students in chemistry have three hours work in the laboratory several times each week. Those in civil engineering are provided with necessary instruments, and by several hours' practice each afternoon in summer and autumn, are made familiar with the details of railroad construction. But for students in mechanical engineering, no corresponding opportunities have been afforded.

The inability to extend such opportunities to this class of students has always been a matter of serious regret. The plan of furnishing machine shops and supplying them with the necessary equipments, has often been discussed by the Trustees, and as often abandoned on account of its expensiveness and other objections. Institutions similar to our own, in other States, have been vexed with the same difficulties, and have earnestly sought to find their way out of them. At length, it is believed that a solution of the question has been found in the Russian system of shop-work instruction, as presented to the American people at the late Centennial Exposition at Philadelphia. President Runkle, of the Boston School of Technology, who has very carefully examined this system, has recently published an explanatory pamphlet, in which he says:

"The question is simply this: Can a system of shop-work instruction be devised of sufficient range and quality, which will not consume more time than ought to be spared from indispensable studies? The question has been answered triumphantly in the affirmative, and the answer comes from Russia."

The institution over which President Runkle presides has decided to adopt this system and has entered upon the construction of the necessary shops.

At the request of the trustees, Prof. W. A. Pike, who has had charge of the Department of Mechanical Engineering, since 1870, has spent considerable time in the examination of the merits of

the Russian system, and the propriety of its adoption by the State College, and has prepared an elaborate report, giving the results of his investigations.

Professor Pike is an able and successful instructor, and we respectfully ask your earnest consideration of his report, which will be found appended to this. The expenditure involved in establishing this system would not be heavy. Its advantages to students in mechanical engineering would be very great. Its importance to a State like ours, whose prosperity must always largely depend upon the vigor and extent of its manufacturing industries, is not likely to be over-estimated.

Additional Buildings Needed.

The usefulness of the college is greatly circumscribed by the want of additional buildings. The present farm-house is entirely unsuited to the wants of the farm and dairy. It is situated nearly one-fourth of a mile from the barn where the stock is kept. The milk of fifteen to twenty cows has to be hauled from barn to house twice each day. A farm-house and necessary out-buildings should be constructed on the site reserved for them, near the barn, without delay. The great want of the college is larger rooms and more of them. Larger rooms are needed for class recitations, for the increasing library and cabinet collections, for apparatus and for lectures and chapel services.

The value of class-room instruction would be greatly enhanced by the aid of more apparatus. No appropriation has been made for this purpose for two years. Four thousand dollars are needed immediately, and a larger sum could be used to great profit.

If a moderate appropriation should be made each year to meet these various requirements as they present themselves, the burden would scarcely be felt by the citizens of the State, and the usefulness of the college would be greatly augmented.

The Trustees take great pleasure in acknowledging the liberality of the managers of the Bangor Mechanics' Library Association, in offering for the use of the college a valuable set of Public Documents, embracing nearly one thousand volumes. The offer has been gladly accepted.

The President's house, the house occupied by Professor M. C. Fernald, and White Hall, have been re-painted during the summer and some minor repairs made on them, at an expense of $558.91. This was a much needed work, as the walls of these buildings were

receiving much injury from the action of the weather, and it has been accomplished without making a draft upon the college treasury.

Financial Condition.

In their report of last year, the Trustees submitted in detail a statement of what they believed to be those necessities of the college that should be immediately provided for, including the erection of *new* and the repair of *old* buildings, the purchase of much needed apparatus, the usual current running expenses and the payment of salaries and of the then existing debt, amounting to $3,500. The sum asked for these purposes was $23,500. In response, the Legislature appropriated $8,000. Of this sum, $3,500 was required to pay the debt. More than the remaining $4,500 would be required for the payment of salaries of the professors, in addition to the revenue of the Congressional Fund. Nothing would be left to pay the current running expenses of the college.

There was no way to bring the expenditures of the year within the appropriation but to discharge our present excellent and able Board of Instruction and hire cheaper men to fill their places, or to suspend two of the departments.

As either course would have imperilled the prosperity of the institution, both were rejected. The result is, a small debt.

The report of the Treasurer shows that the treasury has been overdrawn by the amount of $1,515.76. The unpaid bills against the college, added to the above amonnt, make its indebtedness at this date $3,000.

Conclusion.

In closing this report, the Trustees desire to repeat some of the suggestions contained in the report of last year: "Although contributions from private sources are most gladly accepted, not only for their intrinsic value, but especially as an expression of generous interest in the institution, the Trustees cannot but express their dissent from the view that sometimes finds expression—that it must look mainly to private munificence for means to equip it for its appropriate work. A former Legislature, after much discussion, accepted a grant of lands proffered by Congress, with a pledge to carry out the condition annexed, viz: to establish at least one college for the practical education of the industrial classes. It had no authority to pledge private citizens

to the fulfilment of the condition. It pledged the only party it had authority to pledge, and that party is the State. The expectation of large contributions, which some sanguine people entertained, has not been realized."

For the present, at least, the institution must be taken care of by the State. Nor need the State hesitate. "It is an important part of the educational system of the State; it has already attained a position of usefulness that fully justifies the expenditures that have been made in its behalf. It is working in entire harmony with the demand of the times for practical education. It sustains an intimate and important relation to our public schools. It is supplying, to many of these schools, competent teachers."

Respectfully submitted.

ABNER COBURN, *President.*

PRESIDENT'S REPORT.

To the Trustees of the Maine State College of Agriculture and the Mechanic Arts:

GENTLEMEN:—I have the honor herewith to present to you in behalf of the faculty, the annual report of the condition of the institution under your care.

The year past has witnessed on the part of my associates the same fidelity and devotion in the discharge of their duties, that heretofore has been manifested in the cause of practical education; and the same success has attended their efforts as that which in previous years crowned their labors for the advancement of the students and the interests of the college.

The exhausting demands made on their time and strength by the various daily recitations assigned to them, effectually precludes all possibility of making extended original investigations in their respective departments. It is enough for them to keep up with the new revelations of science, that are constantly enlarging the boundaries of knowledge. Constant effort is required not to fall behind the advanced intelligence of the age. To be fully acquainted with the most recent discoveries in a particular department of science is indispensably necessary for a successful teacher. It is not an unworthy ambition that prompts the professor to add from his own studies something to the general fund of knowledge.

The failure to secure the needed appropriation for the college has interfered with the accomplishment of much that is desirable in the development of the institution. But few experiments have been tried in agriculture during the past year, and but limited facilities for educational farm-work have been furnished to the students. As is reported by the Professor of Chemistry, analyses have been made of the different kinds of sugar beets raised on the farm. These experiments show that the manufacture of beet sugar may yet become a profitable enterprise in our State, when capital and ingenuity shall furnish an economical method of

separating the sugar. The percentage of sugar found, and the price at which our farmers could furnish the beets, would render the production of sugar a profitable enterprise if sufficient encouragement were given.

For lack of sufficient apparatus in the laboratory, only a small portion of the work asked for by those not immediately connected with the college could be performed. There is a constant demand for the determination of metals, mineral waters, soils, fertilizers and organic substances. The work in the laboratory has been mostly confined to the practical instruction given to the different college classes. Some experiments have been made in the analysis of the roots, stems, leaves and blossoms of the common grasses and cereals, at different stages of growth.

The short period in which the institution has been in operation has been an incessant struggle for existence; and yet, under these unfavorable circumstances, the work accomplished has not been discreditable to the State.

The sharp criticism of enemies and the advice of judicious friends, as well as the actual experience of those engaged in the new field of education, have revealed to us the desirableness of some modifications in our plans of operation. Such changes should be cautiously made. A revision of the course of study is herewith submitted for your consideration. The change from three to two terms in the year, while it secures the same number of weeks for study, leaves a vacation in the heat of summer, which will be conducive to health, and will allow the students an opportunity for profitable work in the busy season. This meets the approval of all connected with the institution.

The revised plan of study has equalized the amount of educational work in the different courses, by providing for afternoon exercises by all the students. A more definite arrangement of study is made for those intending to pursue other than agricultural employments; so that there will be no tendency to select what the student supposes to be easiest in making up the required number of studies, with slight modifications of the course in agriculture. A course in science and literature has been formed, instead of an elective course, which will be found most valuable for all those not designing to be farmers, engineers or chemists.

By the report of the Professor in Engineering, you will see that a plan is proposed of giving practical instruction to the students

in mechanical engineering, similar to the field work by the civil engineers, so that the hand and eye of the student shall be trained in the actual work while he is learning the theoretical part of mechanical engineering.

By a better arrangement of the work among the teachers, the Professor of Modern Languages has been relieved from assisting in engineering, and to him have been assigned some of the studies heretofore under the charge of the President.

Arrangements should be made for a plan of ornamentation of the lawn in front of the college buildings. Some trees have been set out during the year by the students, but a regular plan, by a competent landscape artist, should be made, so that gradually the trees and shrubs may be placed in their appropriate positions.

An arboretum, to contain all the native trees of our State which will grow in this locality, should be commenced at once. This could be accomplished mostly by the students, when the site is agreed upon.

Commencement.

The public exercises of the fifth anniversary of the college commenced Saturday evening, July 29th, with the prize declamation of the Sophomore class. The committee of award expressed the warmest commendation of the speakers, who were selected by the class to represent them on the stage. The prize was given to J. C. Patterson.

The prize essays of the Junior class were delivered on Monday evening, July 31st. These essays had been carefully examined by a competent committee without the names of the authors, and as the result of this investigation the prize was given to J. W. Weeks.

On Tuesday morning a review of the Coburn Cadets, on the college grounds, gave great satisfaction to the crowd of spectators who came to witness the military exercises.

The forenoon of Wednesday, July 2d, was devoted to the usual graduating performances. A large and appreciative audience assembled in the Town Hall to listen to the exercises of the graduating class. The liveliest interest was manifested in the themes and in the excellent music which had been provided for the occasion. At the conclusion of these parts, the degrees were conferred upon the candidates who had been recommended by the Faculty and approved by the Trustees. Nineteen received the

degree of Bachelor of Science, ten the degree of Civil Engineer, and four the degree of Mechanical Engineer. The diplomas were presented by Governor Connor, who made a most appropriate address to the graduating class.

In the afternoon, by invitation, B. F. Tefft, D. D., gave a highly finished and learned address before the college, in which was presented in a most original and impressive manner the life and philosophy of Orpheus, and his influence on the literature of Greece and on the thought and civilization of the human race.

In the evening was the concert by Miss Clara Louise Kellogg, assisted by the Mendelsshon Quintette Club of Boston.

Thursday, July 3d, was class-day, when the usual parts on such occasions were well performed by the members of the graduating class, to whom they had been assigned. Thus closed the exercises of a pleasant and interesting commencement week.

Department of English Literature.

The charge of instruction in Rhetoric, English Literature and History, Elocution and Composition, has been part of my work during the year.

As it is comparatively of little avail for the student to acquire a knowledge of science, unless he is able to clothe his thoughts in suitable language, each student has regular exercises in composition and declamation extending through the whole college course.

The fears entertained in some quarters, and the opinions expressed, that too much attention is given to merely literary studies, are entirely groundless; as a slight inspection of our course of study will show. A more reasonable criticism would be that too little time is devoted to such exercises.

The recitations in Rhetoric extend through a single term of the Freshman year, in connection with other studies that task the mental powers of the class. The Sophomores recite part of one term in the history of English literature; while those only in the Scientific and Literary Course will have any more recitations in English literature and history. Scarcely enough of instruction can be given in the recitations and lectures to furnish the students with correct principles, sufficient to guide them in the selection of their subsequent reading, and to lay the foundation of literary acquirements.

Mental and Moral Science.

Members of the Senior Class who are not in the Engineering courses receive instruction in Mental and Moral Philosophy, History of Civilization and Logic. The study of Political Economy and the Constitution of the United States is required of all in the Senior Class. As these studies in metaphysics and literature, the correction of compositions and the training of the students in elocution, in addition to the general superintendence of the institution, are more than can properly be cared for by one person, some of these studies have been transferred to the Professor of Modern Languages, who will hereafter take charge of the classes in Logic, Political Economy and the Constitution of the United States.

Conclusion.

After several years' employment as a teacher and twenty-eight years of professional life, in which I had been intimately connected with educational work in different parts of the State, I entered upon my present position. As the result of my observation and experience, I am most fully convinced of the value and importance of furnishing facilities for a practical and liberal education, especially adapted to the wants of those who are to engage in industrial pursuits; and that it is the true policy of our State to sustain this College.

Respectfully submitted.

C. F. ALLEN.

DEPARTMENT OF MATHEMATICS AND PHYSICS.

President Allen:

The purely mathematical recitations to which I have attended are algebra, geometry, trigonometry, analytical geometry and calculus. In these branches of study it is sufficient to say that satisfactory progress has been made by the several classes.

The other branches which I have had occasion to teach are physics and astronomy. As in previous years, the science of physics has been taught, in part, by the use of an advanced text-book, and in part by lectures, in which the physical apparatus has been brought into constant service. The members of the class have been required to take notes of the lectures and to make recitations upon the topics thus presented as systematically as upon those required from the text-book. It is believed that a double advantage has thus been derived—a facility in making fully available instruction when presented orally, and the advantage of that degree of precision and faithfulness which only daily recitations or very frequent examinations can secure.

In the recently modified scheme of studies, the subject of physics, hitherto pursued in the Freshman year, has been transferred to the Junior year. This change will be attended with many advantages, among the more important of which may be mentioned the greater maturity of mind and the larger mathematical acquirements that can be brought to bear upon physical problems.

The needs of this department are essentially the same as heretofore indicated. The pieces which should be added at the earliest date to the stock of physical apparatus are a galvanic battery of at least fifty cells, an electric lamp and lantern, and the other minor pieces necessary to constitute an electric projection apparatus.

The most successful results in physical study can be attained only by the aid of the appliances and apparatus of a physical laboratory. Arrangements for such a laboratory can hardly be made until a new building, which might meet pressing wants of several departments, can be constructed. It is hoped that at an early day provision can be made for the construction of a building

which may include chapel, library, engineering rooms, cabinet, rooms for the department of agriculture, physical laboratory, and rooms giving enlarged accommodations for recitations and for other purposes.

To the subject of general astronomy, but a few weeks—the latter part of the summer term—were devoted. To physical astronomy more time has been given.

The vertical circle, by Messrs. A. Repsold & Sons, Hamburg, Germany, ordered nearly three years ago and received within the present year, has proved highly serviceable to the class in practical astronomy.

A generous amount of field work has been done by the members of this class, with the transit, the sextant and with the vertical circle, and they have acquired a very commendable facility in the taking of observations and in their reduction for the determination of latitude and longitude.

A sextant and an artificial horizon are needed for the students in practical astronomy.

Respectfully submitted.

M. C. FERNALD.

DEPARTMENT OF CHEMISTRY.

President Allen:

A part of the Sophomore class pursued the course in qualitative analysis, beginning with the spring term this year. The class was divided into two sections, practicing on alternate days, on account of the scarcity of apparatus rather than the size of the class. During the same term the Senior class in mineralogy, under Prof. C. H. Fernald, occupied a part of the laboratory. In the summer term, those in the Sophomore class taking chemistry being reduced in number, all could be admitted at the same time. During these two terms the Seniors in chemistry studied "Naquet's Principes de Chimie," which they finished before the end of their course. The remainder of the time was taken up with lectures on chemical manipulation and kindred subjects. This class employed their afternoons in quantitative estimations of various kinds, including analyses of solder, dolomite, feldspar,

superphosphates, milk, iron ore and other important and useful determinations. I have also instructed the Junior class in the first volume of Naquet's chemistry. This class made quantitive estimations in the laboratory in the afternoons.

During the fall term I taught the Sophomore class in general chemistry, using Miller's Elements of Inorganic Chemistry as a text-book. A small class in metallurgy has occupied a part of my time, as well as a recitation of the Senior chemical students. I have also had recitations in agricultural chemistry. It is my intention to lengthen this course so as to give a more thorough drill in the theory and practice of manuring land and in the food and feeding of cattle.

The wants of this department remain essentially the same as last year. The need of more glassware is daily felt. A larger supply of chemicals, an assay furnace and an assay balance are very necessary. Less than eight hundred dollars would not cover these most pressing wants.

I have made some sugar determinations of sugar beets grown on the farm, the results of which in a brief and somewhat condensed form are given below :—

REPORT ON THE SUGAR BEETS GROWN ON THE COLLEGE FARM.

The plat upon which these beets were grown is a moist sandy loam. The following is the history of the same as given by Mr. J. R. Farrington, Farm Superintendent:

"The plat of land on which the sugar beets were grown was broken from grass and planted to potatoes in the Spring of 1872. The three succeeding years it was sown to onions. To enrich the land for each onion crop, a heavy dressing of manure from the cow stable was plowed under in the Fall, and the following Spring nitrogenous fertilizers, such as poudrette, hen and sheep manure, were spread in liberal quantities and worked into the surface soil. Ashes and superphosphates were also used in small quantity. The crops raised were not sufficiently abundant to exhaust the land, it rather increased in fertility.

In the autumn of 1875 manure from the cow stable was again plowed under. In the Spring of 1876 a good dressing of like manure was spread and harrowed in. No other fertilizer was applied to the beets. The ground was sufficiently worked with cultivator and hoe to keep it in good tilth and free from weeds."

The beets were pulled up about the second week of October. Three or four light frosts had occurred previous to their harvesting, but had not been deep enough to affect the beets. The beets were of good shape and size, being generally clean and free from roughness. Most of them grew well under ground, the Vilmorin being especially well covered. It seems probable that richer beets might have been produced had the land been less charged with nitrogenous substances. The leaves of the beets were rather more luxuriant than is common in good sugar beets.

Analysis of Sugar Beets grown on the College Farm.

NAME OF VARIETY.	SEED OBTAINED FROM,	Average weight of roots used for analysis.	Specific gravity of juice.	Per cent. of sugar in juice.
Improved French white sugar beet .	J J. H. Gregory	585 grammes	1.070	12.68
Improved Vilmorin do	Dept. of Agriculture..	450 do	1.068	11.41
Carter's improved nursery do	do do	589 do	1.062	10.67
Silesian sugar beet	Illinois	519 do	1.063	10.64
Imperial do	Dept. of Agriculture..	613 do	1.059	9.44
Silesian do	do do	575 do	1.057	8.17
FODDER BEET.				
Lane's improved sugar beet.....	Kendall & Whitney ..	–	1.050	8 07

The determinations of sugar percentages were made by myself with Fehling's solution. It is but just to add that I owe many thanks to Mr. A. M. Farrington, a graduate of the course of agriculture of this college, for his kindness in preparing the juice of the beets for analysis. Had it not been for his valuable aid, I doubt whether I could have found time to do all the work.

Respectfully submitted.

ALFRED B. AUBERT.

DEPARTMENT OF NATURAL HISTORY.

President Allen:

I have given instruction during the past year in physical geography, human anatomy, physiology and hygiene, by means of text-books and lectures; in botany and horticulture, by text-book, lectures and excursions; in zoölogy, entomology and comparative anatomy, by lectures, excursions and objective work in the cabinet; in determinative mineralogy, by lectures and laboratory practice; and in geology, by lectures and excursions.

The class in human anatomy, physiology and hygiene did very good work, but as the text-book used gives very little of anatomy, this was taught by means of lectures. If a manikin were used to illustrate these lectures, they would be far better understood and rendered much more valuable. I therefore desire that this piece of apparatus may be provided.

I have been obliged to conduct the recitation in botany in a room altogether too small for the size of the class, and could only hear the recitations from the book, supplementing them with lectures, and devoting what time we could to the analysis of simple flowering plants. It is desirable to change this method of instruction to one more on the objective plan, like that now pursued here in the instruction in entomology, and I have no doubt it would prove as successful as it has in that study. It is desirable that ere long a building may be erected, affording facilities for pursuing this method in botany.

A valuable adjunct to the instruction in botany would be an arboretum upon the college premises, which shall contain representatives, at least, of all the native trees and shrubs of Maine that would grow in this locality. If the Trustees think favorably of this suggestion, I would recommend that a site be fixed upon for this arboretum, and that the shrubs and trees be transplanted to it as fast as time and circumstances permit.

In the zoölogical studies, my own cabinet has been freely used to illustrate the principles taught, but this cabinet is purely zoölogical, containing almost nothing to illustrate the principles

of comparative anatomy. Models, apparatus and diagrams are absolutely indispensable to illustrate the lectures by which this study must necessarily be taught. Therefore, I would respectfully request an appropriation for procuring the needed apparatus.

Respectfully submitted.

C. H. FERNALD.

DEPARTMENT OF CIVIL ENGINEERING.

President Allen:

The instruction in this department has been in no way different from that of former years, except in the problems given out in the various subjects taught.

The Junior class have, beside their regular recitations, had considerable field practice in levelling, laying out curves and railroad work. In the drawing room they have received instruction in shading and in isometric and railroad drawing.

The field work of the Seniors consists of topography, and they have during the last term cross-sectioned a part of the college farm, putting in contour lines every two feet, vertically. Their drawing consists of perspective and machine drawing, and during their last term finished working drawings of bridges, etc., designed by them. In making the designs just spoken of, the students make complete calculations, drawings and specifications.

We feel the need of the same apparatus as we have felt for several years, the things most needed being a plane-table for topographical work and some mounted drawings to serve as copies.

DEPARTMENT OF MECHANICAL ENGINEERING.

There have been, unfortunately, no additions to the apparatus of this department during the last year, consequently we have been able to make no change in the methods used. The work has gone on as satisfactorily and smoothly as could be expected with the material we have to work with.

Beside the regular text-book work, the students in this department spend two hours and a half a day in the drawing room, where they receive thorough instruction in machine, isometric and perspective drawing. We have made our usual trips to Bangor, where the students take sketches and measurements of actual machines, from which they afterwards make working drawings.

The class which graduated last August, spent the last term of their course in designing engines and boilers, of which they made the necessary drawings and calculations.

We are feeling now more than ever, the great necessity of affording some practical instruction for the students of this department, to correspond to the field practice of the students in civil engineering.

In connection with a course in mechanical engineering, it has always been accepted as a fact, that the student must at some time acquire practical experience in the way a given design shall be carried out, in order that he may so design his machines that there will be no trouble in executing them in the shops. Except in a few instances, in this country, it has been decided that such experience cannot be given at the same time as the class-room work, without interfering too much with it, and as a consequence it has been left to the student to obtain this experience after graduation, in the manner which may seem to him best. Every one will, however, admit that if a course can be so arranged that this practice can be given to a student while at school, in connection with his other work, and in such a way that it will not take too much of his time, and also give him a better knowledge of the use of tools and machine processes than he could obtain by the

old way, much will be gained. A solution of this problem has been found, it is thought, by those most interested in the subject, and this solution was suggested by the Russian Technical School exhibit, at the Centennial Exhibition.

After a few explanatory remarks, we will describe the Russian system of technical education which is so well adapted to use here. Let us suppose that we wish to instruct a number of young men in any subject—say mechanical drawing—how shall we go to work? Shall it be by putting them into a large room and setting one of them at geometrical drawing, another at projection drawing, another at shading, and another at isometric, &c., &c.; or shall we form a class in geometrical drawing and instruct all its members in that, and then pass to projection drawing, &c., keeping all students employed on the same work at the same time? Evidently we should select the latter method, thereby ensuring with a competent instructor thorough work in one branch at a time, giving at the same time an impetus to the student, by means of the natural desire to keep up with his fellows, that he would not otherwise have.

Again, it may be asked, if such a method be adopted, does the student find trouble afterwards in combining the different methods he has learned in some one finished drawing? Experience tells us at once that he does not, but that he who has learned each of the various processes in drawing, finds no trouble in using them in combination afterwards.

We know that the system of class-teaching is everywhere conceded to be far better than the old method adopted in the country district school, where there were as many classes as scholars. Now if the method of systematic class instruction succeeds in all other departments, is there any reason why it should not apply equally well to the use of hand and machine tools? I say at once, no, and say it not only from experience had in other branches but from knowledge of the remarkable results obtained by applying such a method to this work.

In the Russian Technical Schools at Moscow and St. Petersburg, such a system has been thoroughly tested and is as thoroughly successful. They have established for this purpose separate shops for each of the processes used in machine construction, and in each of these shops instruction is given by the class-method to students desirous to become either Mechanical Engineers or Mechanical Constructors.

Let us quote directly from the Russian pamphlet describing their method of shop instruction:

"No one will deny that a close acquaintance with hand labor, and in general, practical experience in mechanical works, are matters of the utmost importance to every Engineer. (Mechanical Engineers and Constructors are meant.) The drawings of an Engineer thus trained, will always be distinguished by solidity and that practical judgment which is the result not only of the study of scientific truths, but also of the acquirement of a certain familiarity with their application to practice."

"If we contemplate the matter more profoundly, and acquaint ourselves more closely with the circumstances of the practician at private works, we must, disregarding exceptional cases, arrive at the sad conclusion that a young man desiring to acquire practical experience in a short time, and without the aid of an experienced guide, loses at private works nine-tenths of his whole time."

"A young man, on leaving a Polytechnical School, should endeavor to carry on his practical education; should fix upon some works in which he may find place and opportunity for his further self-education."

"At this moment, so critical is the career of youthful Engineers, the insufficiency of material resources causes a majority to take service at a very low rate of remuneration, as draughtsmen in the drawing office of a mechanical works, or in the drawing offices of railway companies; others, more fortunate, enter a works in the capacity of artizans; but even they are hardly to be envied, from the fact that in the majority of cases, the speciality of the first works which they happen to enter, becomes their specialty through life. An experienced observer will find no difficulty in perceiving all the inconveniences to a technical education which are the results of such an order of things."

"If the Directors of Polytechnical Schools would take upon themselves the work of following the industrial career of their pupils, who on leaving school enter a drawing office, they would easily perceive that these young people experience extreme difficulty, when they are once engaged, in leaving such an office, and in the majority of cases they remain draughtsmen all their lives. In such offices a young man acquires but very inconsiderable technical information, neither can these offices serve him as practical schools for his further self-instruction. And we must here observe that the more extensive the works are and consequently

the drawing office attached, the fewer are the advantages offered the young practician, since he has to do with an institution which, division of labor being an essential principle, will not permit of his coming speedily acquainted with the general progress of work."

"The peculiar circumstances by which the young people who have finished the course of the Polytechnicums, find themselves surrounded, do not admit of the acquirement of even a superficial, general, practical education, but place them in the necessity of devoting all their activity from the first day of their leaving school, and often during their whole life, to a narrow speciality."

"The attention of the Directors of Polytechnical Schools has often been drawn to this, and attempts have frequently been made to familiarize young people at school with the practical work of mechanics, but all these endeavors proved to be unsuccessful from the following reasons:

"1st. The school work-shops for the practical occupation of the students were constructed on a very small scale."

"2d. The consequent want of room in these work-shops did not admit of all the students being occupied at once, and therefore their attendance was not obligatory, while the majority of the professors and masters expressed their disapprobation of such employment."

"3d. There existed no systematical method of practical instruction in the work-shops similar to that which had been applied to practical teaching in the chemical laboratories."

"4th. The time allowed for the whole course of study in the Polytechnical Schools was insufficient to admit of the combination, in the course, of theoretical with practical instruction in technology."

"The Imperial Technical School of Moscow, the course of which from the theoretical subjects taught therein, equals the course in many of the Polytechnical Schools of Western Europe, combines theoretical with practical education, and consequently is enabled to present real proofs of the possibility and advantages of such combination, since the trial of this combination has been made on an extensive scale and during a considerable length of time."

"Every thing that we exhibited at the International Exhibition relates exclusively to this, in our opinion, important question, and was exhibited in the desire of sharing with specialists in the work

of technical education in the New World, all those results which have been attained by the School in the independent investigation of this special question."

"For the practical education of young men in the two branches, (Mechanical Engineers and Mechanical Constructors,) the school possesses a large mechanical works with *hired* workmen, accepting and carrying out orders from private individuals, and on a commercial footing, for the construction of steam engines, pumps, &c."

"These works being within the walls of the institution itself, and managed by well instructed technologists, would be of important assistance in the education of the young men, even if they took no active part in the working of them."

"*But* in order that the pupils may derive the greatest possible advantage from such auxiliaries, the school possesses apart from the mechanical works, school work-shops intended solely for the use of the pupils; these shops are, a joiner's shop, with turning lathes, a pattern shop, a metal turning shop, a fitter's shop, smithy and moulding shop. Every one of these shops is under the management of a skilled workman, whose duty is to instruct the pupils in the rudiments of hand labor."

"Every young man becomes acquainted, by fulfilling the obligatory programme, with all the works of mechanical art, namely: turning, fitting, carpentering and forging, in the school work-shop, and only then is admitted to the mechanical works."

"By the separation of the school workshops from the mechanical works, the principal aim was far from being attained; it was found necessary to work out such a method of teaching the elementary principles of mechanical art, as, firstly, should demand the least possible length of time for their acquirement; secondly, should increase the facility of supervision of the gradatory employment of the pupils; thirdly, should impart to the study of practical work, the character of a sound systematic acquirement of knowledge; and fourthly and lastly, should facilitate the demonstration of the progress of every pupil at any stated time. Everybody is well aware that the successful study of any art whatsoever, as free hand or linear drawing, music, singing, painting, &c., is only attainable when the first attempts at any of them are strictly subject to the laws of gradation and succession, when every student adheres to a definite method, surmounting little by little the difficulties to be overcome."

"All those arts which we have named, possess a method of study which has been well worked out and defined, because since they have long constituted a part of the education of the well instructed classes of people, they could not but become subject to scientific analysis, could not but become the objects of investigation, with a view of defining those conditions which might render the study of them as easy and regular as possible."

"To the Imperial Technical School belongs the initiative in the introduction of a systematical method of teaching the arts of turning, carpentering, fitting, forging, &c."

"The auxiliaries of education selected for the teaching of any mechanical work, as for example, fitters' work, are classed in three categories."

"To the first of these categories belong the collections of instruments employed in fitters' work, with which the beginner must make himself perfectly familiar before entering upon work, afterwards using these instruments during the execution of the work itself."

"To the second category belongs the collection of models appointed for the systematical and gradatory study of hand labor in the fitter's art. These collections have the same significance with regard to the work of fitting as have scales and exercises in music."

"These collections are so arranged that the pupil may be enabled to overcome gradually (and systematically) the difficulties which present themselves to him."

"Hence we arrive at the conviction without any difficulty, that, with such a system of teaching art, the supervision of the teacher over the pupils and his observation of their progress becomes exceedingly easy, and that the fact of a large number of pupils being occupied at the same time presents no great disadvantage, nor will it increase the teacher's duty to any considerable degree. And further, it will be impossible that a pupil who has been working for sometime in the work-shops, should be unable to use the drill or mark out a piece to be worked, though he may handle satisfactorily the chisel or the file."

"To the third category belongs the collection of such articles or parts of machines as require in their execution all the hand labor of the fitter's art, skill in which has been acquired during the work of the present course."

"What we have said in relation to the study of the work of fitting must also be acccpted with regard to the other branches of

labor, namely: wood turning, carpentering, smithy and foundry work."

"In conclusion, we consider it our duty to observe that eight years have already elapsed since this method of instruction in the mechanical arts was introduced in the work-shops of the school, and it has been found to attain in the most brilliant manner the aims proposed in its introduction."

In order to make the working of this system still more clear, we will give a list of the exercises gone through with in one department of the joinery-shop at the Moscow School:

1. Sawing in a straight line and along the fibre.
2. Sawing in a curved line.
3. Planing of wood of a square section.
4. Planing of wood of an octagonal section.
5. Planing of wood of a hexagonal section.
6. Planing of wood of a triangular section.
7. Planing of wood of a toothed section.
8. Planing of wood of a compound section.
9. Preparing for interior sawing out.
10. Interior sawing out.
11. Cross scarfing.
12. Joint by a passing tenant.
13. Joint by an interior tenant.
14. Joint by means of a swallow-tail.
15. Mitred quoin.
16. Joint by means of an interior tenant with chamfer.
17. Joint by a key.
18. Joint by tongues.
19. Edge-joint by grooves and dovetail-spikes.
20. Joint with acute and obtuse angles.
21. Edge-joint with a chamfer and channel.
22. Edge-joint by a mitre-dovetail.

From this list it will be seen that the method employed is one of a complete system, that the first work is the easiest that can be done in carpentry, and that the tasks increase in difficulty as the student becomes skilled in the use of the tools.

It will also be seen that the work is arranged, as far as possible, so as to give familiarity with one tool before another is taken up.

Preceding (it should be remembered) work with the tools, the student is taught the purpose for which each tool is intended, and

the principle of its construction, thus giving to the engineer or machinist an acquaintance with his tools that no hap-hazard experience in a machine shop could supply.

Besides these exercises, the students also make, in the wood-working shop, a set of patterns for iron casting, in which the above processes with those of the turning shop are repeated in actual construction.

A similar course in each of the school work-shops is gone through with, so that the student on finishing his studies has a thorough knowledge of the various processes of hand labor, and as a farther advantage has obtained this knowledge in far less time than would be possible in a regular machine shop.

In an ordinary machine shop a young man is, in the majority of cases, employed for a considerable time at labor which will be of no help to him in his profession, (as carrying water, sweeping the shop, cleaning castings, &c., &c.,) and after he does get at real work is very likely to be confined to some one tool for a very long period, thus prolonging the time required for his practical education almost indefinitely.

As at this time our State is feeling the necessity of developing her industrial resources, it seems as if the present is the time when the State College should make an effort to supply young men fitted to aid in this work; and it is, we think, a fact that no plan will accomplish this object as well as the establishing of such work-shops as are above described, of course varying and adapting the method as may be required to use here.

The Massachusetts Institute of Technology has already started a vise-shop where instruction is now given in the use of the file, chisel and hack-saw. The other shops are in process of fitting up, and it is expected that the forging shop will be ready for work by the first of February. The practical results of this method were well shown in the Russian exhibit, where work done entirely by students in their courses was exhibited. These specimens, for accuracy and delicacy of workmanship, far surpass the work generally done in our regular shops. At the Massachusetts Institute of Technology the work already done in the vise-shop exceeds greatly the expectations of those interested.

The plan proposed for the accommodation of such shops at the State College is to adapt what is known as the "long barn" to this purpose, which it is estimated will not cost more than $1000.

The equipment of the wood-working shop, the vise-shop, the

forging-shop, and the foundry, it is thought, will cost about $500 each. The turning or machine-shop should have $2000 spent upon it, while an engine such as will be needed to run the lathes, blower, &c., will cost from $600 to $800, making the cost of establishing the shops, needed for classes as large as we are likely to have for the present, about $6000.

After these shops are once equipped it is not expected that any large outlay will be needed, as those in charge of them will be held responsible for the condition of their contents, beyond of course the necessary wear and tear. The cost of material used, which will be but slight, we shall charge, of course, to the students, as is now done in the chemical laboratory.

To superintend these shops and give the practical instruction, we shall of course need men expert in the various processes taught, but as it will not be necessary nor desirable to keep all the shops at work at the same time, we shall need but one, or at most two skillful mechanics at any one time, thus bringing the annual expenses down to a very small amount.

It is hoped that we may succeed in bringing this matter to the attention and consideration of the people of the State in such a way that they may appreciate the importance and advantage of such shops to the State in the development of her industries.

Respectfully submitted.

W. A. PIKE, *Prof. of Engineering.*

DEPARTMENT OF MODERN LANGUAGES AND MILITARY INSTRUCTION.

President Allen:

The classes in French, German and Mechanics have, this year, gone over the same ground as usual. In French, the text-books have been Smith's French Principia, parts I and II; in German, Aker's Grammar and Evans' Otto's Reader; in Mechanics, Goodeve's Elements of Mechanism and Rankine's Machinery and Mill-work.

The military instruction has been somewhat changed in character, but the hours devoted to it have remained the same—fifteen

minutes five days in the week and one hour extra one day each week. I think this arrangement has proved beneficial. Early in the spring the State authorities furnished the Cadets with one hundred breech-loading muskets and the proper equipments. These have been in daily use during the summer and autumn terms. The muzzle-loaders formerly in the hands of the students have been turned in to the State.

At the meeting of the Board of Trustees in August last, it was intimated that, if a large majority of the students would purchase uniforms by the end of the present term, the Trustees would adopt the uniform and make the wearing of it compulsory. By the kindness of Ex-Gov. Coburn, the few who would have been unable to purchase uniforms, have been enabled to do so; so that now there are only three students present who have no uniforms, and one of these intends to get his uniform next spring. The uniform adopted is made of blue yacht cloth, without brass buttons or other trimmings that attract attention. It can be worn elsewhere as well as at the college, and is a neat and economical dress. Messrs. Lowney & Baker of Bangor, have made them this year, and their work has given fair satisfaction. To complete our equipments we need eight swords for the officers. The State does not furnish these, and I will suggest that the Trustees be asked to set apart fifty dollars to purchase them.

The Coburn Cadets, under my charge, attended the meeting of the Board of Agriculture at Fryeburg. We started from the College on the morning of October 31st, and reached Fryeburg in the afternoon. We found quarters in readiness for us at the building on the Fair Grounds. The Cadets were busily occupied in attending the meetings of the Board, and drilling, for two days. November 3d, we returned to Orono. We received many favors from the citizens of Fryeburg, and, in fact, from every one with whom we had intercourse while we were away. We are especially indebted to the Presidents of the Maine Central and Portland and Ogdensburg Railroads, and to the Superintendents of these roads, and the European and North American Railroad, for granting us passes over their roads and setting apart special cars for our use.

Your servant,

W. S. CHAPLIN.

DEPARTMENT OF AGRICULTURE.

President C. F. Allen:

The several studies in the agricultural course that are more immediately connected with practical farming, are assigned to my care. They are those treating of the elements of agriculture, farm implements, mechanical cultivation of the soil, farm drainage, dairy farming, stock breeding, sheep husbandry, landscape gardening, cultivation of the cereals, and rural architecture. So far as suitable text-books can be obtained, they are made the basis of the instruction given, supplemented by such oral teaching as will make the student familiar with the recent advances in agricultural knowledge.

Instruction relating to farm implements is imparted by lectures. The tool shop and implement room are drawn upon for means of illustration. Farm tools and machines are either taken to the class-room or examined in the building where they are kept; the excellencies they possess and the defects there may be in them are pointed out and explained. Several lectures are given on the plow, in which I endeavor to show, step by step, the changes that have been made in its form and construction, by which a rude and inefficient implement has been converted into the well nigh perfect plow of the present day. The plows of various kinds and patterns now in use are described, and their fitness or unfitness to do the work for which they were designed, is shown. I endeavor to present the different parts of the plow, their relation to each other and to the work demanded of them, to show the forms of the share, mold-board and land-side required for different soils and for different ways of plowing, and to so familiarize the student with their points, that he will be able of his own knowledge to select a good plow, fitted for the work he may have in hand.

The subject of mechanical cultivation of the soil is also presented by lectures; explaining its relation to the seed, to the soil, and to the growing plant; how it develops and makes available natural fertility, and by what means and under what conditions it is best accomplished. The theories and practical

experiments of Jethro Tull, the methods of fallowing in use among European agriculturists, the Lois Weedon system of cultivation, and the more recent writings and experiments of Dr. Sturtevant, together with our own farm practice, furnish some of the sources of information.

The text-book used in farm drainage, is "Draining for Profit and Health," by George E. Waring, Jr. Daily recitations are required. The teaching of the work is enforced by the experience of farmers who have drained their fields and the result of draining on the college farm. By means of blackboard and chart, plans of fields to be drained are given, measurements are taken, lines of ditches are marked, areas are calculated, and the required size of tiles determined. Appropriate tools for ditching and tile-laying, together with tiles of different kinds and sizes are displayed, and the manner of using them is shown. No opportunity of reducing the teaching in the class-room to actual practice is afforded to the student. A small outlay for this purpose, will, so far as it goes, fulfil the design of the institution and add much to the value of the instruction given.

I use in dairy farming a work by X. A. Willard. It was evidently not intended for a text-book. It however contains much that is important and embodies valuable information. Students are encouraged to make analysis of dairy products while pursuing this topic, and test by their own investigations some of the statements made. Interesting results and valuable practice are in this way obtained. By an excursion of the class to some factory in the vicinity, an opportunity is given them to note the processes in the manufacture of cheese, and gather useful knowledge by observation and inquiry. The students inspect the dairy cows at the barn, and note their points of excellence or inferiority. Opportunity is afforded for the exercise of individual judgment on the dairy qualities of the animals, and to test these opinions by the daily record that is kept of the milk given by each cow.

The principles of stock-breeding are taught from a work by Hon. S. L. Goodale. It is to be regretted that this book is out of print, and we are not able to supply the copies needed. From the more recent investigations of scientific men and the observations and experience of intelligent breeders, additional knowledge is obtained, and is imparted in connection with recitations from the text-book. The thoroughbred stock on the farm furnishes living

illustrations of the distinguishing points that mark the leading breeds of cattle. These points are presented and made familiar to the student. The results of coupling different animals is noted, and so far as may be the theories taught in the class-room are tested by actual observation.

The method of instruction pursued in Sheep Husbandry is very like that followed in Stock Breeding. Randall's Practical Shepherd is taken for a text-book. It is used topically, omitting the unimportant portions. Youatt, Spooner, Morell, and the current agricultural literature, furnish additional material for class-room use. The farm flock affords some examples of thoroughbred sheep. They are, however, not of the first-class, and cannot be presented as good illustrations of the breeds they represent. A small appropriation of money would supply the deficiency.

Cultivation of the Cereals is presented by lectures.

Landscape Gardening and Rural Architecture are taught with the aid of text-books. Plans drawn on the blackboard are critically discussed, and students are required to make and present original plans and designs.

With the exception of Elements of Agriculture, which has been taken by all in the Sophomore class, these studies have been pursued only by students in the course in agriculture, and a part of the elective students. By the new arrangement of courses, Farm Drainage occurs in the Freshman year, and is required of all the students. Mechanical cultivation of the soil is taken by all the Sophomores. The other topics are taken up in the Junior and Senior years, and are only required of the agricultural students.

We are yet without drawings, models and other appliances suitable to use in the class-room. I have in former reports stated this great need of the course in agriculture. The experience of another year makes this want more apparent. If the means to fully supply our wants cannot be immediately granted, it would be encouraging to both students and instructor to know that something, however small, shall be done to meet them.

J. R. Farrington.

CONDITION OF THE LIBRARY.

President Allen:

The following report of the Library is respectfully submitted. During the year 271 volumes of books and 167 pamphlets and magazines have been added to the library. Of these, 42 have been received through the continued liberality of Ex-Gov. Coburn. From the trustees of the estate of the late Rufus Dwinel we have received 170 volumes of books and 151 numbers of magazines; 21 volumes have been received from Hon. S. L. Boardman; 6 volumes and 13 pamphlets from the U. S. Department of the Interior; 6 volumes and 2 pamphlets from the State Library; 4 volumes from Hon. Hannibal Hamlin; 4 volumes and 1 pamphlet from the Speaker of the House of the Province of Quebec. One volume has been received from each of the following gentlemen, viz: President White of Cornell University; Rev. T. Hill, D.D., of Portland; J. E. Hilgard of the U. S. Coast Survey; J. R. Dodge of the U. S. Department of Agriculture; Henry Seely of the Vermont Board of Agriculture, and Mr. John Gilman of Orono. During the year 15 volumes of magazines have been bound, and 17 volumes of books have been re-bound.

There are in the library at the present time, 2,641 volumes of books and 583 pamphlets.

The set of Public Documents which the Trustees of the Bangor Library generously offered to this library on condition that should their set be destroyed by fire, this should be returned to them, has not been brought from Bangor; because further action of the Trustees of the College is necessary, before they can be properly stored here. There are about a thousand volumes in this set, many of which are very valuable to us. A suitable place can be provided for them by placing two alcoves in the library room. The expense of fitting up these alcoves need not exceed twenty-five dollars.

G. H. Hamlin, *Librarian.*

TREASURER'S REPORT.

To the Trustees of the State College of Agriculture and the Mechanic Arts:

GENTLEMEN:—I present herewith a statement showing the Receipts and Expenditures of the College since Nov. 17, 1875, the date of my last Annual Report:

GENERAL ACCOUNT.

1875	RECEIPTS.	
Nov 18,	Note of College, dated Nov. 17, 1875, at 5 months for $3,000—less discount $88.67	$2,911 33
1876.		
March 3,	Legislative appropriation	8,000 00
Nov. 18,	Interest on bank deposits	45 09
		10,956 42
1875.	EXPENDITURES.	
Nov. 17,	Balance due the Treasurer, per last annual report	1,095 33
Nov. 20,	Paid Homan & Badger, advertising	5 00
Nov. 22,	D Bugbee & Co., record book	2 75
Nov. 24,	Dole Brothers, furniture	22 88
Dec. 3,	J. R. Farrington, road to new barn	347 06
Dec. 3,	Same, improvements of college grounds	126 12
1876.		
Jan. 12,	M. C. Fernald, physical apparatus	517 00
Jan. 27,	E. Mansfield, repairs of college buildings	20 99
Mar. 4,	George H. Hamlin, repairs of library room	7 40
Mar. 24,	Wm. P. Wingate, six Babcock fire engines	233 57
Apr. 7,	C. A. Chaplin, expenses as Trustee	57 20
	S. F. Dyke, do do	34 45
Apr. 8,	L. Oak, do do	41 50
	Bangor Mutual Fire Insurance Co., insurance Presdent's house	20 00
Apr. 13,	Bangor Insurance Co., do do	20 00
Apr. 14,	Burr & Robinson, balance due for printing catalogue	45 00
Apr. 15,	J. R. Farrington, farm purposes	300 00
Apr. 17,	Boutelle & Burr, printing	9 50
	D. McMillan, repairs college buildings	62 60
Apr. 18,	S. F. Hincks, expenses as Trustee	30 40
Apr. 19,	Note of College, dated Nov. 17, 1875, at 5 months	3,000 00
Apr. 22,	Wm. P. Wingate, expenses as Trustee	37 00
May 12,	G. W. Fillebrown, repairs college buildings	186 81
May 20,	A. B. Aubert, for photographs of college buildings and apparatus sent to Centennial	25 00
	A Leighton, labor and materials since Nov. 25, 1874	279 09
July 7,	W. H. Pennell & Co, repairs heating apparatus	102 87
July 8,	J. R. Farrington, farm purposes	300 00
Aug. 2,	J. R. Farrington, to pay bills against the College	500 00
Sept. 19,	J. R. Farrington, do do	500 00
Sept. 23,	Germania Insurance Company, insurance of house	25 00
		$7,954 52

CONGRESSIONAL ENDOWMENT FUND.

1875.	RECEIPTS.	
Dec. 2,	Interest on State of Maine bonds	$2,145 00
1876.		
Jan. 5,	Interest on Bangor city bonds	180 00
"	" preferred stock of St P. & S. C. R. R. Co	103 03
Feb. 22,	" State of Maine bonds	990 00
Apr. 4,	" State of Maine bonds	417 00
Apr. 6,	" preferred stock of St P. & S. C. R. R. Co	104 06
June 3,	" State of Maine bonds	2,145 00
July 5,	" Bangor city bonds	180 00
July 6,	" preferred stock of St. P. & S. C. R. R. Co	105 10
Aug. 18,	" State of Maine bonds	990 00
Oct. 5,	" preferred stock of St. P. & S. C. R. R. Co	106 15
Nov. 11,	" State of Maine bonds	417 00
		7,882 34
1875.	EXPENDITURES.	
Nov. 19,	Paid C. H. Fernald, 3 months' salary	375 00
Dec. 2,	M C. Fernald, do	450 00
Dec 3,	W. S. Chaplin, do	375 00
Dec. 7,	George H. Hamlin, salary in part	60 00
Dec. 17,	W. A. Pike, 3 months' salary	450 00
1876.		
Jan. 5,	George H. Hamlin, balance of 3 months' salary	190 00
Jan. 12,	C. F. Allen, 3 months' salary	500 00
Jan. 15,	J. R Farrington, 3 months' salary	225 00
Feb. 8,	D. S. Tibbetts, do do	100 00
Mar. 1,	W. A. Pike, do do	450 00
	A. B. Aubert, do do	375 00
Mar. 2,	C. H. Fernald, do do	375 00
Mar. 4,	M. C Fernald, do do	450 00
	W. S Chaplin, do do	375 00
	Geo. H. Hamlin, do do	250 00
	C. F Allen, do do	500 00
Apr. 8,	A. B. Aubert, salary in part	125 00
Apr. 15,	J. R. Farrington, 3 months' salary	225 00
	W. A. Pike, salary in part	150 00
May 9,	D. S. Tibbetts, 3 months' salary	100 00
June 1,	M. C. Fernald, do do	450 00
	A. B. Aubert, balance due on salary	250 00
	W. A. Pike, do do	300 00
	C. H. Fernald, 3 months' salary	375 00
	W. S. Chaplin, do do	375 00
	Geo. H. Hamlin, do do	250 00
	C. F Allen, do do	500 00
July 15,	J. R. Farrington, do do	225 00
Aug. 2,	C H Fernald, do do	375 00
Sept. 1,	W. S Chaplin, do do	375 00
	Geo H Hamlin, do do	250 00
Sept. 2,	M. C Fernald, do do	450 00
Sept. 2,	W. A. Pike, do do	450 00
	A. B. Aubert, do do	375 00
	C. F Allen, do do	500 00
Oct. 19,	J. R Farrington, do do	225 00
Oct. 21,	W. C Fuller, 3 months' salary to Aug. 6, '76	100 00
Nov. 9,	W. C. Fuller, 3 months' salary to Nov. 6	100 00
Nov. 18,	A. B. Aubert, 3 months' salary	375 00
		$12,400 00

SUMMARY.

RECEIPTS.		
GENERAL ACCOUNT.		
Loan $3,000—less discount $88 67	$2,911 33	
Legislative appropriation	8,000 00	
Interest on bank deposits	45 09	
		$10,956 42
ENDOWMENT FUND.		
Interest on State of Maine bonds	7,104 00	
Interest on other securities	778 34	
Balance due the Treasurer, carried to new account	1,515 76	
		9,398 10
		20,354 52
EXPENDITURES.		
GENERAL ACCOUNT.		
Payment of amount due Treasurer, per his last annual report	1,095 33	
Payment of loan	3,000 00	
Babcock fire engines	233 57	
Payment of college debts under supervision of the Trustees	1,000 00	
Physical apparatus	517 00	
Farm purposes	600 00	
Improvement of college grounds	126 12	
Repairs on college buildings, heating apparatus, &c	659 76	
Building new road	347 06	
Expenses of Trustees	200 65	
Incidentals	175 03	
		7,954 52
CONGRESSIONAL ENDOWMENT FUND		
Salaries of President, Professors, Farm Superintendent and Assistant	-	12,400 00
		$20,354 52

The Expenditures of the past year have exceeded the Receipts $1,515.76.

The amount due on unpaid bills, I am unable to report.

I estimate the income from the College Funds for the ensuing year at $7,885.

Respectfully submitted.

ISAIAH STETSON, *Treasurer.*

November 20th, 1876.

Having, by a vote of the Trustees, been directed to audit the Treasurer's annual account, I have attended to the duty assigned me, and have carefully examined said Treasurer's accounts as presented in the foregoing exhibit, and find them correctly cast and properly vouched.

W. P. WINGATE, *Auditor.*

FARM SUPERINTENDENT'S REPORT.

Some changes have been made in the series of experiments carried on during the year covered by my report. In complying with the request of the Trustees of the college, that I study reduction of expenses and economy on the farm in all possible ways, it became neceesary to drop from the list of experiments some things of value, and to reduce to the minimum of expenditure all of those retained. The more certainly to secure the reduction of expense, I have entrusted the harvesting, weighing and making up of results to the assistant superintendent, Mr. W. C. Fuller. This course takes away from the students much of the educational value of the experiments; but the feeling of disappointment often expressed because the farm is not made a source of revenue to the college, has led me to yield to the strong pressure of public opinion and pursue a course evidently not in accordance with the design of these institutions. Just why it is insisted of the farm department alone that it shall be made a source of income to the college, and not chiefly a means of education in practical agriculture, does not readily appear. By ignoring the educational and experimental uses of the farm it can without doubt be made financially remunerative, but in proportion to the faithfulness with which its capabilities for higher and more valuable purposes are recognized and developed, it will, like the other educational departments of the college, take from the funds in the treasury, rather than contribute to them.

Experiment in feeding swine with cooked and raw meal and with skimmed milk, to ascertain the relative value of such food for the production of pork.

This experiment has been tried for seven successive years, with the same result as far as the value of raw meal and cooked meal have been compared. This year a comparison has been made with one pig fed on milk, while the others were fed on meal.

The four pigs selected to feed were from a cross between a Yorkshire boar and a White Chester sow. They were

taken from one litter, and were ten weeks old at the time of commencing the experiment. They were kept separately, in small pens with open yards, affording opportunity for exercise and for access to the fresh earth. Grass, weeds and charcoal were occasionally fed to them, as conducive to appetite and health. With these exceptions, nothing but meal mixed with water was fed to Nos. 1, 2 and 3, and nothing but milk to No. 4. The amount of food given was proportioned to the wants of each, and care was taken that while none of it was wasted, a full supply should be constantly provided. The food for each was weighed and prepared every morning. During the first four weeks of the experiment No. 1 was fed on cooked meal and Nos. 2 and 3 received raw meal. For the second period of four weeks No. 1 received raw meal and Nos. 2 and 3 were fed on cooked meal. This method of alternating the kind of food given was continued throughout the time of the experiment. Although it is open to objection on account of the change that is made in the character of the food at the end of each period of four weeks, it affords opportunity to compare the effect produced by the two kinds of food upon the same pigs at different times, and also upon different pigs at the same time.

	No. of Pig.	Kind of food.	Pounds of food.	Cost of food.	Increase in weight.	Cost per pound of increase.
End of first week.....	1	Cooked meal,	17	23.8	5 5	4.33
	2	Raw,	17.5	24.5	7.0	3.5
	3	Raw,	17 5	24.5	6 5	3.77
	4	Milk,	124.25	62.12	7.5	8.28
End of second week.....	1	Cooked meal,	19.75	27.65	3 5	7.9
	2	Raw,	18	25.2	1 5	16.8
	3	Raw,	19 25	26.95	4 0	6.74
	4	Milk,	142.75	71 37	6.0	11.89
End of third week.....	1	Cooked meal,	22	30.8	7 5	4 1
	2	Raw,	17.5	24 5	2 5	9.8
	3	Raw,	21 75	38.45	7.5	4.06
	4	Milk,	165 75	82 87	8 5	9.75
End of fourth week.....	1	Cooked meal,	25	35 0	4.0	8.75
	2	Raw,	17.75	24 55	2.5	9.82
	3	Raw,	22	30.8	3.5	8 80
	4	Milk,	174 5	87.25	9.0	9.69
End of fifth week.....	1	Raw meal,	21	29.4	6 5	4 52
	2	Cooked,	18.5	25.9	1.5	17.27
	3	Cooked,	20	28.0	1 5	18.66
	4	Milk,	173.5	86.75	2 5	34.7
End of sixth week	1	Raw meal,	21	29.4	5 0	5.88
	2	Cooked,	19	26 6	6 5	4.09
	3	Cooked,	21	29.4	7.5	3 92
	4	Milk,	154	77.0	7.5	10.27

	No. of Pig.	Kind of food.	Pounds of food.	Cost of food.	Increase in weight.	Cost per pound of increase.
End of seventh week.....	1	Raw meal,	24 5	34 3	5 0	6.86
	2	Cooked,	21	29 4	2.0	14.7
	3	Cooked,	24.5	34.3	3 5	9.8
	4	Milk,	172	86.0	6.5	13.23
End of Eighth week.....	1	Raw meal,	24.5	34.3	5 0	6 86
	2	Cooked,	21	29.4	3 0	9.8
	3	Cooked,	24.5	34.3	6.0	5.72
	4	Milk,	176.25	88.12	6.5	13.56
End of ninth week.....	1	Cooked meal,	28	39.20	6 5	6.03
	2	Raw,	24.5	34.30	6.5	5.28
	3	Raw,	28	39.20	7.5	5 23
	4	Milk,	186.50	93.25	8 5	10.97
End of tenth week	1	Cooked meal	28	39.20	1.0	39.2
	2	Raw,	24.5	34 30	1.0	34.3
	3	Raw,	28	39.20	2 0	19 6
	4	Milk,	203	101.50	3 5	29.0
End of eleventh week.....	1	Cooked meal,	31.5	44 1	8 0	5.51
	2	Raw,	28.5	39.9	6 5	6.14
	3	Raw,	31.5	44.1	8 0	5 51
	4	Milk,	210	105 0	5 0	21 0
End of twelfth week.....	1	Cooked meal,	31.5	44.1	5 5	8 02
	2	Raw,	27	37.8	2.0	18.9
	3	Raw,	31.5	44 1	5.3	8 02
	4	Milk,	210	105.0	9 0	11 67
End of thirteenth week	1	Raw meal,	31.5	44 1	5.5	8 02
	2	Cooked,	27	37.8	3.0	12 6
	3	Cooked,	31 5	44.1	0.5	–
	4	Milk,	251	125.5	6.5	19.31
End of fourteenth week.....	1	Raw meal,	31.5	44.1	4.0	11 02
	2	Cooked,	28	39.2	3.5	11.2
	3	Cooked,	31.5	44.1	11.0	4.01
	4	Milk,	252	126.0	10.5	12 0
End of fifteenth week.....	1	Raw meal,	31 5	44 1	5 0	8.82
	2	Cooked,	28	39 2	4 5	8 71
	3	Cooked,	31.5	44 1	3 0	14 7
	4	Milk,	252	126.0	6.0	21 0
End of sixteenth week.....	1	Raw meal,	29.5	41.3	4 0	10.32
	2	Cooked,	28 5	39.9	4.0	9.97
	3	Cooked,	31.5	44.1	5 5	8 02
	4	Milk,	252	126 0	2 0	63.0
End of seventeenth week.....	1	Cooked meal	31.5	44.1	7.5	5.88
	2	Raw,	28	39 2	5 0	7.84
	3	Raw,	31.5	44.1	6.0	7.35
	4	Milk,	253.5	126.75	9.0	14 08
End of eighteenth week.....	1	Cooked meal,	30 5	42.7	6 5	6.55
	2	Raw,	22	30 8	8 0	3.85
	3	Raw,	33.5	46.9	14.5	3 23
	4	Milk,	285	142 5	10.0	14 25
End of nineteenth week.....	1	Cooked meal,	31.5	44 1	2 0	22.05
	2	Raw,	28	39.2	1 5	26.13
	3	Raw,	35	49 0	0.5	98 0
	4	Milk,	294	147 0	5 5	26.73
End of twentieth week.....	1	Cooked meal,	28 5	39 9	5 0	7.98
	2	Raw,	31.5	44 1	9.0	4.9
	3	Raw,	38.5	53.9	9 5	5.67
	4	Milk,	294	147.0	9.5	15.47
End of twenty-first week.....	1	Raw meal,	31.5	44.1	15 0	2.94
	2	Cooked,	35	49 0	8.5	5.76
	3	Cooked,	42	58 8	13 0	4.52
	4	Milk,	315	157.5	1.0	157.5

	No. of Pig.	Kind of food.	Pounds of food.	Cost of food.	Increase in weight.	Cost per pound of increase.
End of twenty-second week.....	1	Raw meal,	41	57 4	5 0	11.48
	2	Cooked,	36	50.4	7.0	7.2
	3	Cooked,	42	58.8	8.0	7.35
	4	Milk,	315	157 5	7 0	22 5
End of twenty-third week.....	1	Raw meal,	42	58 8	6 0	9.8
	2	Cooked,	27	37.8	3.5	10.8
	3	Cooked,	45	63.0	10.0	6.3
	4	Milk,	318	159.0	6.5	24.46
End of twenty-fourth week.....	1	Raw meal,	43	60.2	2 5	24.08
	2	Cooked,	32.5	45.5	5 dec.	-
	3	Cooked,	49	68 6	7.0	9.8
	4	Milk,	323	161 5	4.5	35 78

Periods of Four Weeks.	No. of Pig.	Food.	Pounds in four weeks.	Cost for four weeks.	Pounds gain in four weeks.	Cost per pound of increase in weight.
First.....	1	Cooked meal,	83 75	$1,17 25	20.5	5 72
	2	Raw,	70 75	99 05	13.5	7.34
	3	Raw,	80.50	1.12 70	21.5	5.24
	4	Milk,	607.25	3,03 62	31.0	9.79
Second.....	1	Raw meal,	91	1,27 40	21 5	5.93
	2	Cooked,	79 5	1,11 30	13.0	8.56
	3	Cooked,	90	1 26.00	18 5	6 81
	4	Milk,	675.75	3,37 87	23.0	14.69
Third.....	1	Cooked meal,	119	1,66 60	21.0	7.93
	2	Raw,	104.5	1,46.30	16.0	9.14
	3	Raw,	119	1,66 60	23 0	7.24
	4	Milk,	809.5	4,04 75	26 0	15.57
Fourth.....	1	Raw meal,	124	1,73 60	18 5	9.38
	2	Cooked,	111.5	1,56.10	15 0	10 41
	3	Cooked,	126	1,76 40	19.0	9.28
	4	Milk,	1007	5,03 50	25.0	20 14
Fifth.....	1	Cooked meal,	122	1,70 80	21 0	8.13
	2	Raw,	109 5	1,53 30	23 5	6 52
	3	Raw,	138 5	1,93.90	30.5	6 36
	4	Milk,	1126.5	5,63.25	34.0	16 57
Sixth.....	1	Raw meal,	157.5	2,20 50	28.5	7.74
	2	Cooked,	130.5	1,82 70	18.5	9.88
	3	Cooked,	178	2,49.20	38 0	6.56
	4	Milk,	1271	6.35 50	19 0	33 45

The cost of each pound of live weight produced by feeding:

Pig No. 1, on raw meal, was	7.8	cents; on cooked meal,	7 3
No. 2, " "	7.6	" "	9.7
No. 3, " "	6 2	" "	7.3
Average,	7.2		8.1

The average cost of increase in live weight by feeding on cooked meal is 12½ per cent. more than by feeding on raw meal.

The cost per pound of live weight produced by feeding milk to pig No. 4, was 17.4 cents; or 141 3-5 per cent. more than the cost of producing pork from raw meal.

In the above experiment meal is reckoned at 70 cents per bushel of 50 pounds; and milk at one-half a cent per pound, or one and one-eighth cents per quart.

In conducting the experiment last year, skimmed milk was mixed with the meal fed to Nos. 1, 2 and 3, at the rate of six pounds of milk to every ten pounds of meal or sixty per cent. of the meal by weight; one hundred and ninety-four pounds of raw meal were fed with the skimmed milk given to No. 4. This year only meal mixed with water was given to Nos. 1, 2 and 3, and skimmed milk alone was fed to No. 4. The pigs in both cases were of the same parentage, were kept in the same pens, under the same conditions except this difference in feeding. It is interesting to compare the results of the two methods of feeding as given below.

Pigs fed with mixed food in 1875:

Weight of Pigs June 15th.	Gain in live weight in 24 weeks.	Live weight of Pigs Nov. 30.	Dressed weight of Pigs Dec 2.	Shrinkage.
No. 1, 45½ pounds....	264½ lbs.	310 lbs.	257½ lbs.	52½ lbs.
No. 2, 45½ "	169½ "	215 "	178¼ "	36¾ "
No. 3, 41½ "	233½ "	275 "	232½ "	42½ "
No. 4, 37 "	238 "	275 "	227 "	48 "

Pigs fed with only one kind of food in 1876:

Weight of Pigs June 12th.	Gain in live weight in 24 weeks.	Live weight of Pigs Nov. 30.	Dressed weight of Pigs Dec. 2.	Shrinkage.
No. 1, 36½ pounds....	131½ lbs.	167½ lbs.	139 lbs.	28½ lbs.
No 2, 37½ "	99½ "	137 "	112½ "	24½ "
No. 3, 40½ "	150½ "	191 "	156 "	35 "
No. 4, 35 "	158 "	193 "	156½ "	36½ "

The aggregate gain from the mixed food given last year in the twenty-four weeks of the experiment, was 905½ pounds.

The aggregate gain from the method of feeding followed this year in the twenty-four weeks of the experiment, is 539½ pounds, a difference of 366 pounds in favor of the mixed food.

Experiment in planting potatoes.

The Scientific Society of the Maine State College originated some experiments of different methods of planting potatoes, hoping they would be tested by the students at the College farm, and by practical farmers in other parts of the State; so that by comparison of results in different conditions and localities, definite conclusions may be reached, which shall be of real value to those seeking the best methods of raising potatoes.

The potatoes used for seed are classed as follows: Large, those weighing seven to eight ounces; Medium, those weighing three to four ounces; Small, those weighing one to two ounces.

Where not otherwise stated, large potatoes are cut into four pieces; medium potatoes are cut into two pieces; and one piece dropped in a hill.

These experiments were conducted this year by E. J. Blake, class of 1879. The results reported by him were obtained from potatoes planted in a gravelly loam broken from grass in Sept. of 1875. The land was well dressed with manure from the cow stable, and was in good condition when planted May 31st.

The average results of six trials of these experiments are given in the last column of the following table. Two of these trials were made by G. O. Weston, a graduate of the institution, on his farm in Norridgewock, four of them were made on the farm by students of the College.

No. Exprm't.	Potatoes.	CONDITION OF EXPERIMENTS.	Large lbs.	Small lbs.	Total lbs.	Average for six trials.
1	Seed end.	Potatoes divided through the centre and the product of the seed end and the butt end compared.	16½	3½	20	16 1-6
	Butt end.		18	3½	21½	19 2-3
2	Large potatoes.	Large, medium and small potatoes compared; the seed planted each year to be the product of potatoes of a like class.	16½	3¾	20¼	17 1-3
	Medium "		18¾	1¾	20½	16 1-3
	Small "		11½	1¾	13¼	10 5-6
3	Large potatoes	Large, medium and small potatoes compared; the seed to be selected from an ordinary pile of potatoes.	10¾	2½	13¼	15 1-6
	Medium "		11½	2¾	14¼	15 1-4
	Small "		14	4	18	15 3-4
4	6 inches.	The product of large potatoes compared, when planted six, twelve, eighteen and twenty-four inches apart	6¼	3½	9¾	15 1-2
	12 "		8	3	11	15 1-6
	18 "		14¼	2¾	17	13 1-2
	24 "		12	5½	17½	16
5	Large potatoes.	Equal weight, per acre, of lage, medium and small potatoes, planted at equal distances.	13¼	1¾	15	17 1-4
	Medium "		18½	2½	15¾	16 1-2
	Small "		11½	2½	14	16 5-6

No. Exprm't.	Potatoes.	CONDITION OF EXPERIMENTS.	Large lbs.	Small lbs.	Total lbs.	Average for six trials.
6	2 inches.	Seed planted on the surface and covered to the depth of 2, 4, 6 and 8 inches.	13	2	15	15 2-5
	4 "		11½	2	13½	15 4-5
	6 "		9½	2	11½	11 1-2
	8 "		11¾	2¾	14½	15 4-5
7	2 inches.	Seed planted below the surface 2, 4, 6 and 8 inches, and covered to the same depth.	12	2¼	14¼	13 1-2
	4 "		10¾	2¼	13	14 2-3
	6 "		12	⅜	12⅜	10
	8 "		10	2¼	15¼	10 1-2
8	One piece.	Medium potatoes cut to two parts and the product of one part in a hill, compared with two parts in a hill.	14¾	3	17¾	15 2-3
	Two pieces.		11¼	4¼	15½	16 1-6
9	Whole potatoes	Medium potatoes planted whole, compared with the same cut to two eyes, and one piece planted in each hill.	13½	3¾	17¼	15 1-3
	Cut to two eyes		13	1	14	17 1-8
10	Flat hills.	The amount of potatoes produced by planting in flat hills, compared with the amount produced from pointed hills.	13¼	3⅜	16⅞	15 1-2
	Pointed hills.		13⅜	3⅛	16⅞	17 2-3
11	Small hills.	The product of potatoes planted in small hills, compared with the product of potatoes planted in large hills.	18	2⅓	20⅓	13 5-6
	Large hills.		11½	2	13½	15 2-3
12	One piece.	Large potatoes cut to two pieces, the product of one piece in a hill compared with two pieces in a hill.	11¼	3½	14¾	–
	Two pieces.		13¼	5	18¼	–
13	Two stalks.	An equal number of eyes planted in each hill, and an equal number of stalks allowed to grow.	14⅓	2	16⅓	–
	Four stalks.		14⅔	2	16⅔	–
	Six stalks.					
14	2 inches.	Seed planted at the ordinary depth, and covered to the depth of 2, 4, 6 and 8 inches.	11½	3⅛	14⅞	–
	4 "		12⅓	3⅓	15⅞	–
	6 "		16½	2	18½	–
	8 "		17	1¼	18¼	–

Experiment in the use of Manures for top-dressing grass land.

The experimental plats are each two rods square, containing 1-40 of an acre; they are staked out in two rows, four in a row, and are separated from each other by a strip of land four feet wide, which received no manure. These plats are situated near the easterly corner of the farm, in a level field of heavy undrained clay soil. This field is one of the more recently cleared portions of the farm; it is in better condition than are the other unmanured fields, yielding on the average this year about one ton of hay per acre.

The manures were first applied May 20th, 1873, and the grass was cut the second week in July.

In 1874, manures similar in kind and quantity to those used the previous year, were applied to the same plats May 22d; the grass was cut July 29th.

In 1875, no top-dressing was used; the plats mowed July 26th.

This year (1876) no top-dressing was applied; the plats were mowed July 19th. The following are the results:

MANURE.	Rate per acre.	1873. Weight of Hay.	1874. Weight of Hay.	1875. Weight of Hay.	1876 Weight of Hay.
Cow manure	Five cords	63 lbs.	150 lbs.	182½ lbs	122 lbs.
Horse manure	Five cords	71 "	127 "	152 "	102 "
*Fine old muck	Five cords	83 "	148 "	117 "	76 "
Fine old muck and salt	Muck, five cords / Salt, three bushels	73 "	121 "	108 "	67 "
Plaster	Two bushels	51 "	115 "	79 "	33 "
Wood ashes	Five bushels	81 "	97 "	103 "	56 "
Salt	Three bushels	87 "	92 "	101 "	43 "
Nothing	- -	87 "	88 "	88 "	46 "

* From a bed of swamp muck four feet in depth. It had been exposed to the weather one year.

Experiment comparing the product of wheat sown broadcast by hand with wheat sown in drills by a machine on plats of ground prepared in two different ways, viz: by pulverizer and harrow, and by subsoil plow.

The plats were located in field No. 1, which lies along the town road next to the southerly line of the farm. The ground was broken from grass in September, 1873. In the spring of 1874 it was liberally dressed with manure from the cow stable and hog pens, and sown to rutabagas. It was again plowed in October of that year. To prepare the field, which contained one acre, five cords of cow manure were spread upon the furrows and well worked in with Randall's harrow. Two-thirds of the field were loosened to the depth of fourteen inches with Rigby's subsoil plow; one-third of the field being left without subsoiling for comparison. Six equal plats were measured and marked with stakes. Nos. 1, 2 and 3 were subsoiled. Nos. 1 and 4 were sown broadcast at the rate of two and one-half bushels seed to the acre; Nos. 2 and 5 were sown broadcast at the rate of one and one-fourth bushels to the acre; Nos. 3 and 6 were sown with the grain drill at the rate of one and one-fourth bushels to the acre. The rate of yield per acre from these plats was, from No. 1, 29 bushels, No. 4, 23 bushels 11 quarts; from No. 2, 24 bushels 5 quarts, No.

5, 20 bushels 10 quarts; from No. 3, 23 bushels 4 quarts, No. 6, 19 bushels 15 quarts. The average yield per acre of the subsoiled plats is 25 bushels 14 quarts; that of the harrowed plats is 21 bushels 1 quart. The yield from two and one-half bushels to the acre sown broadcast, as indicated by the plats is 26 bushels 5 quarts. The yield from one and one-fourth bushels to the acre sown broadcast, is 22 bushels 7 quarts The yield from one and one-fourth bushels to the acre sown with the grain drill, is 21 bushels 9 quarts.

Experiments with the Stockbridge Fertilizers.

The deep interest felt by many agriculturists in the experiments in feeding plants that have for several years been carried on by Prof. Stockbridge of Mass. Agricultural College, seemed to authorize some expenditure for testing on the College farm the practical value of fertilizers compounded according to his formulas. Early in May a quantity of these fertilizers was ordered of the authorized agents, W. H. Bowker & Co., Boston, Mass. The order was mislaid by them, and the fertilizers were not received until June 10th. A maximum yield could not reasonably be expected from seed planted after that time. We are therefore not disappointed to find that in only one instance the promised increase was obtained.

Two plats in the south garden, each containing twenty square rods, were planted to corn June 14th. This land has been used for a garden and heavily manured for many years. Enough of the fertilizer to give five bushels above the natural yield, was applied to one plat. No manure was put on the others. Five and four-sixth bushels of excellent corn were harvested from the manured plat. The unmanured plat yielded 4 5-6 bushels corn of inferior quality. The result is an apparent failure, yet not so entire as at first appears, since the superior value of the corn grown on the manured plat consisted more in the quality of the product than in the quantity of it.

The fertilizer for potatoes was given for trial to D. W. Freeze, a resident of Orono, who reports using upon one-fortieth of an acre a quantity warranted to give two and one-half bushels above the natural yield. The land was dry, sandy loam, and had received no manure for ten years, at least. The potatoes were planted June 20th, in rows three feet apart, and were dropped one foot apart in the row. A plat without manure was planted in the same manner. The potatoes were dug October 17th and yielded

on the unmanured plat 116 lbs., all small ones. The manured plat gave 340 lbs., four-fifths of which were merchantable.

This result shows a falling off of three-tenths of a bushel from the expected yield; or an increase of 188 bushels per acre where 200 bushels above the natural yield were expected.

A quantity of the fertilizer for corn fodder, sufficient to grow half a ton of air dry fodder more than the natural product of the soil, was used on one-fourth acre of very poor, dry, gravelly, old pasture land. This plat was broken up in 1874 and had evidently never been plowed before. It was fallow during the season of 1875, and was prepared and sown to corn fodder June 21st, 1876. The plat produced 1180 lbs. dry fodder. A plat joining this, sown without the fertilizer, produced at the rate of 400 lbs. of fodder from one-fourth acre. The increase from the use of the fertilizer is 780 lbs., 220 lbs. less than was expected. The corn was cut September 9th and weighed December 20th.

Enough of the fertilizer for rutabagas to produce 100 bushels above the natural yield, was applied to one-fourth acre of exhausted clay loam, that had been broken from grass the previous autumn. The land was prepared and sown to turnips June 26th. Two adjoining rows eighteen rods long were sown without manure at the same time. The one-fourth acre treated with the fertilizer produced 120 bushels of turnips of good size and excellent quality. The plat sown without manure produced at the rate of 34 bushels on one-fourth acre. The turnips were of inferior size and quality. The increase produced by the fertilizer is 86 bushels, 14 bushels less than the required number.

The yield of turnips where the fertilizer was used equalled in every respect the yield on other parts of the field, where manure from the cow stable was applied at the rate of fifteen cords to the acre.

A small quantity of the fertilizer for wheat was used on a plat sown a full month before the manure was applied. It gave an increase of eight and one-half bushels, where under favorable circumstances twenty-five bushels were to be expected.

Experiments like these, where important conditions vital to their success are not fulfilled, cannot be regarded as tests of the points considered. The fertilizers were received too late for a fair trial, since the time remaining in which they could influence the growing crop was not sufficiently long to exhaust the plant food they contained.

Farm Implements.

A Randall's Harrow, given by the manufacturer through their agent, D. M. Dunham of Bangor, has been used on the farm through the season. As a pulverizer of the surface we have nothing equal to it. While it is in some respects like the Nishwitz Harrow, it is in most points of difference superior to it.

A Remington Horse Rake, left at the farm during the last few days of haying, was used a few hours. Good work was done with it, and it was so easily handled that a boy ten years old managed it without difficulty. Judging from the trial we were able to give, it seems to rank in the first class of such machines.

At the request of Messrs. Benjamin & Allen of West Waterville, manufacturers of True's Potato Planter, who have for three years given the use of one of these machines to the farm, a trial was made of the practical value of the machine with a view to test not only its power to plant potatoes rapidly and well, but also to compare the crop grown from seed planted by it with the crop grown from seed planted by the more common method. The Planter furrows the ground, cuts, drops and covers the seed at one operation. As shown by the trial, it requires the labor of two men and two horses two and one-half hours to put in one acre of seed with the Planter. By the common method it requires, to furrow the land, cut and drop the seed, and cover it with Chandler's Horse Hoe, the labor of one boy seventeen hours, two men and two horses two and one-half hours, one man and horse two and one-half hours. The cost of planting an acre with True's Planter was $1.50. The cost of planting one acre in the common way was $4.00. The land planted with the Planter produced 149 bushels per acre. That planted in the common way produced 165 bushels, giving an excess of 16 bushels in favor of the usual method, at a cost of $2.50, or 15 5-8 cents per bushel. A single test like this can hardly be considered final; it should rather become one of a series, which if continued, will furnish the requisite data from which to judge the value of the machine.

The grain drill (The Farmers' Favorite) that has been loaned to the farm for three years by J. S. Grant of Sidney, was at his request returned to him in June. I regret our inability to purchase the machine, having no doubt it would be a measure of economy to do so, but as there were no funds for that purpose, I could only return it with thanks that we were allowed to retain it so long.

Farm Crops.

The areas devoted to the several crops grown on the farm and their products are as follows:

Potatoes,	2.5	acres,	yield	345	bushels.
Barley,	12.4	"	"	326	"
Wheat, Lost Nation,	3.1	"	"	70	"
Oats,	1.2	"	"	40	"
Rutabagas,	1.2	"	"	600	"
Beets, for stock,	1.3	"	"	550	"
English turnips,	.2	"	"	50	"
Fodder corn,	1.3	"	a fair yield.		
Millet,	1.5	"	a large yield.		
Strawberries,	.3	"	a failure.		
South Garden,	1.5	"	Corn and garden vegetables.		
	26.5	"			

The mowing fields have not been measured, but are estimated to contain eighty acres. From these eighty-five tons of hay were harvested, fifteen less than were gathered last year. This reduction in quantity is due to the partial failure of the grass seed sown last year, and to the severity of the previous winter, when the mowing fields were bare for weeks, exposed to the effect of alternate rain and frost. The per cent. of loss in the crop when compared with that of last year, is smaller than that reported by farmers in this vicinity.

The yield of potatoes was at the rate of 145 bushels to the acre. 150 bushels of these were Early Rose, 128 bushels Oronos, and the remainder were Excelsiors, Early Vermont, Early Ohio, Burbank's Seedling and Compton's Surprise. The potatoes were nearly free from rust and rot, and the unusual mildness of the autumn was favorable to the full maturing of the crop. The tubers were well ripened and are of superior quality.

One and three-fourth acres of barley and one and one-half acres of wheat were sown on moist clayey land, just in the rear of the Laboratory, that was last year planted to potatoes. It was then fairly enriched with manure from the barn cellar. This year the manure was hauled from the cellar the first of April and put in piles, where it remained until spread and harrowed in June 1st and 2d. To incorporate the manure with the soil, it was harrowed with Randall's Harrow, followed by Share's Harrow. June 3d the grain was sown and covered with Share's Harrow, followed

by a hinged Scotch harrow. The mixture of grass seed sown on this field of three acres consisted of one bushel timothy, one-half bushel of foul-meadow, three-eighths bushel redtop, thirteen pounds Alsike clover, one and one-half pounds white clover. June 21st, two and a half acres of wet clayey land, on the slope west of the new barn, were sown to barley. The ground plowed up in hard, compact clods, but a vigorous use of Randall's and Share's harrows, with the farm rollers, reduced the lumpy surface to a good seed bed. This field was well enriched and sown to grass. Two and one-fourth acres of barley were sown June 21st with a light dressing of stable manure, on land lying southeast of the barn, which was broken from green sward the previous autumn. Two acres were sown on exhausted pasture land lying east of the barn, which had never before been plowed. Several smaller plats in other parts of the farm were sown before this date. Three acres of flat clay land near the north line of the farm, were sown to grass last year without realizing the expected crop. This land was plowed the last of June, and was sown to barley July 3d; one-half ton of superphosphate was sown and harrowed in with the grain. A field of barley put in so late in the season might well be regarded as an experiment, and it was watched with some solicitude through its seasons of growth and maturity. The result however was favorable, and a fair crop of straw and grain was harvested. It was mowed Oct. 3d, and put into the barn in good condition the 13th.

Improvements.

By means of barter and exchange of work, expedients familiar to other farmers in straightened circumstances, I have been able to do some work preparatory to the improvement of the pastures. Four acres of new land have been fenced, cleared, plowed and fitted for sowing in the spring. This field is to be used for a calf pasture. It is near the new barn and is supplied with water from an unfailing spring. The bushes have been cut and piled on eleven acres of wild land, that with some further outlay can be made to afford excellent pasturage. The piles of brush should be burned in the spring and the land sown to grass.

Lying between the south line of the farm and the new road to the barn is a low, mucky swale, containing about two and one-half acres. It is kept constantly wet by water from springs breaking out from the slope rising to the east of it, in field No. 3,

and produces only coarse water grasses. A ditch that will furnish adequate drainage has been dug through the length of the swale, and the muck that was taken out wheeled to firm ground and put in piles for future use. Other improvements above those necessary to keep the farm up to its present condition, are put to the credit of the farm in the financial statement made in this report, to which those wishing for information can refer.

Herewith I submit a financial statement of the farm for the year ending Nov. 30, 1876, comprising an exhibit of receipts and expenditures for each month of the year, the principal sources of income from the farm, and some of the larger bills which go to make up the farm expenses.

Farm receipts and expenditures for each month of the year, ending Nov. 30, 1876.

Year.	Month.	Receipts.	Expenditures.	Excess of Receipts.	Excess of Expenditures.
1875.	Dec.,	$396 45	$300 46	$95 99	–
1876.	Jan'y,	230 32	283 96	–	$53 64
"	Feb'y,	236 19	217 18	19 01	–
"	March,	155 93	250 85	–	94 92
"	April,	210 63	254 07	–	43 44
"	May,	223 58	333 68	–	110 10
"	June,	122 93	280 74	–	157 81
"	July,	313 70	648 88	–	335 18
"	Aug.,	309 90	363 44	–	53 54
"	Sept.,	227 56	285 11	–	57 55
"	Oct.,	326 02	334 70	–	8 68
"	Nov.,	498 55	493 83	4 72	–
		$3,251 76	$4,046 90	$119 72	$914 86

Excess of expenditures above receipts, $795.14.

Receipts for farm labor, produce, &c., for the year ending Nov. 30, 1876.

Labor of students, farm hands and team	$675 23
Stock sold	249 50
Hay "	72 97
Pork, beef, mutton and veal sold	282 97
Milk sold	323 72
Butter "	418 24

Pigs sold	$155 00
All other farm produce	1,074 13
	$3,251 76

Expenditures for labor on the farm, groceries, meats and fish for board of family and hired help, for meal, corn and fine feed for stock, for hired help in house, &c., &c.

Labor of farm hands	$831 14
" of students	662 67
" all others on farm	267 68
" cutting cord wood and cedar rails	68 11
" hired help in house	190 07
Groceries for family and board of hired help	453 13
Meats " " " "	96 80
Fish " " " "	14 51
Meal, corn and fine feed for horses, neat-stock and swine	798 62
Blacksmithing and wheelwright's work	88 00
Farm tools and machines	90 00
Hardware, horse blankets and repair of harnesses	46 00
Fertilizers	68 00
Seeds	98 00
Sundries	274 17
	$4,046 90

Permanent improvements and additions to farm stock and implements, and cost of experiments, &c.

Fencing yard for bulls	$55 00
Improvement in root-cellar	22 00
Platforms to old barns	20 00
125 rods new cedar fence	190 00
Clearing up pasture	85 00
Breaking and preparing for sowing four acres of new land	80 00
Removing stone wall near new barn	50 00
Improving, enriching and seeding to grass ten acres of old ground	200 00
Ditching swale from south line of farm to new road to barn	50 00
Cutting and hauling 20 cords of wood now on hand	60 00
One ton cotton-seed meal now on hand	38 00

Increase in value of farm stock		$166 00
Farm tools and machines		90 00
Cost of experiments		210 00
		$1,316 00
Deduct balance from account of receipts and expenditures	795 14	
Deduct salary of assistant farm superintendent	400 00	
		1,195 14
Net proceeds of farm		$120 86

It should be remembered that this farm, with its different breeds of stock, with its improved implements and methods, is an educational appliance of the college as strictly as is an air pump, a transit, or levelling instrument, and as such its highest value and service do not appear in the foregoing exhibit; in fact, cannot be made to appear in dollars and cents. It is hardly expected that pieces of apparatus used for instruction will prove sources of revenue, hence it is gratifying to record an exhibit so favorable as that which has just been presented for this appliance of the institution.

Names and value of Stock on farm of Maine State College.

NEAT STOCK.

Shorthorn cow Cornelia, 10 years old	$150 00
" " Duchess of Lakeside, 4 years	150 00
" heifer Cornucopia, 2 years	125 00
" " Duchess of Maine, 2 years	150 00
" bull Napoleon 2d, 13 months	150 00
" " calf Dirigo, 7 months	50 00
Ayrshire bull Mains, 7 years	100 00
" cow Olee, 5 years	200 00
" " Isabel, 6 years	175 00
" heifer Olivia, 2 years	140 00
" " Oleeannee, 14 months	85 00
" " calf Oletta, 3 months	50 00
" bull calf Irondo, 3 months	40 00
Jersey bull Harry, 15 months	75 00
" cow Hebe, 10 years	250 00
" " Pride of Lachine, 7 years	200 00
" heifer Hepsy, 2 years	200 00
" " calf Pride of the Island, 5 months	50 00

Jersey heifer calf Hesta Hart, 5 months	$75 00
Grade Shorthorn heifer Tilly, 3 years	40 00
" " " Maggie 3d, 3 years	45 00
" Ayrshire calf Jennie, 7 months	30 00
" " " Tilly 2d, 7 months	30 00
" Jersey cow Joanna, 11 years	45 00
" " " Maggie, 7 years	70 00
" " " Topsy, 6 years	100 00
" " " Gipsey, 4 years	70 00
" " heifer Marilla, 3 years	50 00
" " " May, 2 years	45 00
" " " Tina, 15 months	25 00
" " " Totsy, 15 months	45 00
	$3,010 00

HORSES.

Dick, 12 years old	$200 00
Louis, 11 years	200 00
Robin, 9 years	250 00
Nell, 10 years	300 00

SWINE.

1 Yorkshire boar	35 00
1 " breeding sow	30 00
1 White Chester boar	35 00
3 " " breeding sows	80 00
3 " " pigs	15 00
1 fat hog	45 00
1 store hog	15 00

SHEEP.

1 Cotswold buck	20 00
1 " ewe	10 00
1 " " lamb	8 00
10 grade Cotswold ewes	40 00
10 " " ewe lambs	35 00
1 South Down ewe	8 00
1 " " " lamb	8 00
3 grade South Down ewes	12 00
3 " " " ewe lambs	11 00
	$1,357 00
Neat stock	3,100 00
Total	$4,367 00

INVENTORY OF FARM TOOLS AND EQUIPMENTS.

1 Sward Plow with Subsoil Attachment.
1 Subsoil Plow.
4 Sward Plows.
4 Stubble Plows.
1 Charter Oak Swivel Plow.
1 Light one-horse Plow.
1 Garden Plow.
1 Furrow Plow.
1 French's Cultivator.
1 Nishwitz' Pulverizer.
1 Share's Coulter Harrow.
2 Scotch Harrows.
1 Chase Revolving Tooth Harrow.
1 Powels' Wheel Harrow and Grain Coverer.
1 Randall's Harrow.
1 Chandler's Improved Horse Hoe.
1 Share's Horse Hoe.
1 Farm Roller.
1 Farm Scraper.
3 Stone Drags.
1 Clipper Mower.
1 Warrior Mower.
1 Superior Hay Spreader.
1 Bay State Horse Rake.
1 Yankee Horse Rake.
1 Whittemore's Horse Rake.
1 Remington Horse Rake.
20 Long Handle Shovels.
7 Short Handle Shovels.
3 Long Handle Garden Spades.
2 Short Handle Garden Spades.
4 Spading Forks.
8 Manure Forks.
3 Garden Trowels.
18 Garden Hoes.
6 Potato Diggers.
1 Grubbing Hoe.
4 Garden Rakes.
10 Grass Scythes.
10 Scythe Snaths.
1 Grain Scythe.
3 Bush Scythes.
20 Hay Rakes.
3 Drag Rakes.
22 Hay Forks.
1 Hay Knife.
1 Hay and Straw Cutter.
1 Fanning Mill.
1 Root Cutter.
6 Potato Baskets.
10 Wooden Pails.
20 Grain Bags.
1 Steelyard.
1 Beam Scales.
1 Fairbanks' Platform Scales.
3 Wheelbarrows.
3 Grindstones.
1 Jackscrew.
4 Clay Picks.
4 Gravel Picks.
2 Iron Bars.
2 Steel Bars.
2 Cant Dogs.
1 Queen of Harvest Separator.
1 Patent Wain Jack.
2 Two-horse Hay Racks.
1 Two-horse Farm Wagon.
1 Two-horse Farm Jigger.
3 Two-horse Farm Carts.
1 One-horse Express Wagon.
1 One-horse Riding Wagon.
1 One-horse Pung.

FARM TOOLS AND EQUIPMENTS—Concluded.

2 Two-horse Logging Sleds.
1 Two-horse Wood Sled.
1 One-horse Wood Sled.
2 Double Team Harnesses.
1 Single Team Harness.
1 Carriage Harness.
4 Sets Double Whiffletrees and Chains.
3 Crotch Chains.
4 Logging Chains.
2 Draft Chains.
1 Set Tag Chains for Logging.
10 Horse Blankets.
6 Head Halters.
5 Surcingles.
2 Spring Scales.
1 Pike Handspike.
3 Stone Hammers.
6 Chopping Axes.
2 Broad Axes.
3 Hand Axes.
4 Nail Hammers.
4 Jack Planes.
2 Jointing Planes.
1 Smoothing Plane.
4 Mortise Chisels.
5 Paring Chisels.
2 Bitstocks.
1 Set Auger Bits.
1 Extension Bit.
3 Handsaws.
1 Splitting Saw.
1 Fine Saw.
1 Pruning Saw.
1 Cross-cut Saw.
6 Wood Saws.
1 Meat Saw.
2 Carpenters' Squares.
1 Try Square.
1 Carpenter's Bevel.
1 Draw Shave.
1 Spoke Shave.
2 Saw Setts.
1 6-8 inch Gauge.
1 Eagle Pruning Tool.
1 Ralph's Oneida Cheese Vat.
1 Ralph's Cheese Press and Equipments.
1 Lactometer.
2 Milk Testing Tubes.

J. R. FARRINGTON, *Farm Superintendent.*

DONATIONS TO THE CABINET.

Collection of Cuban Seeds,	from R. S. Howe.
" Fish,	G. M. Shaw.
Sponges and Shells,	E. M. Blanding.
Minerals from Auburn, Me.,	G. P. Merrill.
Fossils and Minerals,	J. H. Bennock.
Collection of Specimens,	E. S. How.
" "	A. A. Lewis.
Building Stones,	N. M. Hartwell.
Collection of Specimens,	H. H. Hartwell.

CATALOGUE

OF THE

MAINE STATE COLLEGE OF AGRICULTURE

AND THE

MECHANIC ARTS.

1876-7.

FACULTY.

CHARLES F. ALLEN, D.D.,
President and Professor of English Literature and Moral Science.

MERRITT C. FERNALD, A. M.,
Professor of Mathematics and Physics.

ALFRED B. AUBURT, B. S.,
Professor of Chemistry.

WILLIAM A. PIKE, C. E.,
Professor of Civil and Mechanical Engineering.

CHARLES H. FERNALD, A. M.,
Professor of Natural History.

———— ————,*
Professor of Modern Languages, and Military Instructor.

GEORGE H. HAMLIN, C. E.,
Professor of Drawing and Field Engineering.

JOSEPH R. FARRINGTON,
Farm Superintendent and Instructor in Agriculture.

HENRY LANDERS,
Steward.

Prof. W. A. PIKE,
Secretary.

Prof. G. H. HAMLIN,
Librarian.

* Vacancy.

STUDENTS.

SENIOR CLASS.

Blackinton, Alvah DeOrville ..... Rockland.
Burns, Robert Bruce..... Fort Fairfield.
Danforth, Edward Franklin..... Norridgewock.
Elkins, Augustus Jerome..... Oldtown.
Emery, Alicia Town..... Orono.
Gould, Samuel Wadsworth..... Hiram.
Lunt, Joseph Cony..... Benton.
Phillips, Fred Foster..... Hermon.
Shaw, Samuel..... Augusta.
Stone, Frank Pierce..... Livermore Falls.
Stevens, Thomas Jefferson..... Auburn.
Sturgis, George Eugene..... Vassalboro'.
Towne, Charles Elmer..... East Dover.
Weeks, James Walter..... Castine.
Weeks, Nellie Estelle..... Orono.
Webster, Ivan Eldorus..... Orono.

JUNIOR CLASS.

Brown, Emma..... Orono.
Caldwell, Andrew James..... Orono.
Chamberlain, Cecil Calvert..... Foxcroft.
Crocker, Appleton..... West Enfield.
Fernald, George Everett..... South Levant.
Hartwell, Howard Hampson..... Fox Island.
Heald, James ..... Orono.
Howe, Richardson Scrope ..... Fryeburg.
Locke, John, Jr ..... Fryeburg.
Oakes, Frank Judson ..... Oldtown.
Patterson, John Cameron..... Dexter.
Perkins, Frank Judson ..... Oldtown.
Tripp, Winfield Eastman..... Lyman.
Walker, Edward Colby..... Fryeburg.
Warriner, Edson..... Fryeburg.
Webster, Otis Colby..... Augusta.
Webb, Clara Ella..... Unity.

SOPHOMORE CLASS.

Bean, Henry Percy ..... Bangor.
Blake, Edward Josiah..... North Bridgton.
Brown, Arthur Prentiss..... Orono.
Cochrane, Byron Harris..... Woonsocket, R. I.
Colburn, Fred Alden ..... Orono.
Cousens, James William..... Stillwater.
Crosby, Simon Percy..... Dexter.
Curtis, John Andrew..... Bowdoin.
Cutter, John Dana.. ..... Brewer.
Decker, Wilbur Fisk..... Bowdoinham.
Decrow, David Augustus..... Bangor.
Ferguson, Willis Edwin..... Bangor.
Gibbs, Charles Wingate..... Glenburn.
Goodale, Loomis Farrington..... Bangor.
Gould, Annie May..... Stillwater.
Hawes, Edwin Augustus ..... Riverside.
Holt, Annie Maud..... Orono.
Johnson, Edward Clinton..... Gorham.
Jones, Oliver S..... Corinna.
Kidder, Frank Eugene..... Bangor.
Libby, Mark D..... Riverside.
Loring, Charles Sewall ..... Phipsburg.
Merrill, Albert Young..... Orono.
Merrill, George Perkins..... Auburn.
Meserve, John William..... Rockland.
Moore, Arthur Lee..... Limerick.
Morse, Charles Adelbert..... Bangor.
Morton, Asa Croxford..... Bangor.
Peaks, Henry Wilson..... Charleston.
Potter, Fred David..... Waldoboro'.
Smith, Eugene Gardiner..... Richmond.
Titus, William Nelson..... Alna.
Warren, George Otis..... Fryeburg.
Webster, Herbert..... Orono.
Webster, Howard Elmer..... Orono.
Vinal, Percia Ann..... Orono.

FRESHMAN CLASS.

Allen, Charles Morse.....Orono.
Bartlett, Monroe James .....Litchfield.
Brown, Albert Hinckley.....Oldtown.
Brown, Sylvester Andrew.....Kennebunkport.
Cleaveland, Woodbury Fremont.....Skowhegan.
Davis, Marcia.....Stillwater.
Dyer, Samuel H.....Yarmouth.
Fernald, Charles Wilbur.....South Levant.
Fuller, Osgood Everett.....Camden.
Goodwin, Harry Herrick.....Biddeford.
Jones, Daniel Sherman.....Dennysville
Keyes, Prescott, Jr.....Richmond.
Lufkin, George William.....North Yarmouth.
Mansfield, Frank Albert.....Camden.
Matthews, Annie A.....Stillwater.
Nash, Charles Wilson.....Addison.
Purinton, James Frank.....Bowdoin.
Spratt, Frank Allen.....Hermon.
Wellington, Arthur Lee.....Fort Fairfield.
Wentworth, Arthur.....Orrington.

SPECIAL COURSE.

Dakin, Eugene Herbert.....Bangor.
Elwell, Charles C.....Patten.

SUMMARY.

Seniors	16
Juniors	17
Sophomores	36
Freshmen	20
Special	2
Total	91

OFFICERS OF THE COLLEGE MILITARY COMPANIES.

COMPANY A.	COMPANY B.
Captain, S. W. Gould.	Captain, A. D. Blackington.
1st Lieutenant, J. C. Lunt.	1st Lieutenant, C. E. Towne.
2d Lieutenant, S. Shaw.	2d Lieutenant, R. B. Burns.
3d Lieutenant, G. E. Sturgis.	3d Lieutenant, F. P. Stone.
1st Sergeant, C. C. Chamberlain.	1st Sergeant, A. J. Caldwell.
2d Sergeant, J. Locke, Jr.	2d Sergeant, J. C. Patterson.
3d Sergeant, H. H. Hartwell.	3d Sergeant, G. E. Fernald.
4th Sergeant, F. J. Oakes.	4th Sergeant, E. Warriner.

PRIZES FOR 1876.

Coburn Prize for best Sophomore Declamation, awarded to J. C. Patterson.

Coburn Prize for best Junior Essay, awarded to J. W. Weeks.

Prize for best Essay before the Board of Agriculture, awarded to F. P Stone.

DESIGN OF THE INSTITUTION.

It is the design of the Maine State College of Agriculture and the Mechanic Arts, to give the young men of the State who may desire it, at a moderate cost, the advantages of a thorough, liberal and practical education. It proposes to do this by means of the most approved methods of instruction, by giving to every young man who pursues the course of study an opportunity practically to apply the lesson he learns in the class-room, and by furnishing him facilities of defraying a part of his expenses by his own labor.

By the act of Congress granting public lands for the endowment and maintenance of such colleges, it is provided that the leading object of such an 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."

While the courses of study fully meet this requisition, and are especially adapted to prepare the student for agriculture and mechanical pursuits, it is designed that they shall be also sufficiently comprehensive, and of such a character, as to secure to the student the discipline of mind and practical experience necessary for entering upon other callings or professions.

CONDITIONS OF ADMISSION.

Candidates for admission to the Freshman class must be not less than fifteen years of age, and must pass a satisfactory examination in Arithmetic, Geography, English Grammar, (especial attention should be given to Orthography, Punctuation and Capitals) History of the United States, Algebra as far as Quadratic Equations, and five books in Geometry.

Although the knowledge of Latin is not required as a condition of admission, yet the study of that language is earnestly recommended to all who intend to enter this institution.

Candidates for advanced standing must sustain a satisfactory examination in the preparatory branches, and in all the studies previously pursued by the class they propose to enter.

Satisfactory testimonials of good moral character and industrious habits will be rigidly exacted.

The day after commencement, which is the last Wednesday of June, and the day before the beginning of the first term, are the appointed times for the examination of candidates.

COURSE OF INSTRUCTION.

Five full courses are provided, viz: A course in Agriculture; in Civil Engineering; in Mechanical Engineering; in Chemistry; and in Science and Literature. The studies of the several courses are essentially common for the first two years.

In the course of Science and Literature those studies marked with a star are to be taken in place of those that immediately precede them in the Agricultural course.

There will be regular exercises during the four years in English Composition, Declamation and Military Tactics. Lectures will be given to the Freshman class, on Physics, Meteorolgy, Physical Geography and Botany; to the Sophomore class, on Chemistry, Horticulture and Practical Agriculture; to the Junior class, on Anatomy, Physiology, Astronomy and English Literature; and to the Senior class, on Rural Law, Mineralogy, Geology, Stock Breeding, Cultivation of Grasses and Cereals.

SPECIAL COURSE.

Students may be received for less time than a full course, and may select from the studies of any class such branches as they are qualified to pursue successfully. Students in the Special Course are not entitled to a degree, but certificates of proficiency may be given them.

DEGREES.

The full course in Civil Engineering entitles to the Degree of Bachelor of Civil Engineering; the full course in Mechanical Engineering, to the Degree of Bachelor of Mechanical Engineering; the full course in Agriculture, Chemistry, or Science and Literature, to the Degree of Bachelor of Science.

Three years after graduation, on presentation of a thesis with the necessary drawings, and proof of professional work or study, the Bachelors of Civil Engineering may receive the Degree of Civil Engineer; the Bachelors of Mechanical Engineering, the Degree of Mechanical Engineer; the Bachelors of Science, the Degree of Master of Science.

COURSES OF STUDY.

FIRST YEAR.

First Term.	Second Term.
Physical Geography,	French,
Meteorology,	Algebra and Geometry,
Algebra,	Farm Drainage and Botany.
Rhetoric.	P. M. Book-Keeping and Labor.
P. M. Labor on Farm.	

SECOND YEAR.

French and Farm Implements,	Mechanical Cultivation of the Soil, and Surveying, or (L) History of England,
General Chemistry.	English Literature and Physics.
Trigonometry,	Analytical Geometry and Calculus or Qualitative Chemistry.
P. M. Free Hand Drawing and Chemistry.	P. M. Mechanical Drawing and Field Work.

THIRD YEAR.

COURSE IN AGRICULTURE.

Physics,	Zoology and Entomolgy,
Physiology, Human Anatomy and Hygiene,	German,
German,	Astronomy and Mechanics.
Agricultural Chemistry or	P. M. Chemistry and Experimental Farming, or
English Literature.	Analysis of American Authors.
P. M. Chemistry or Analysis of English Authors.	

COURSE IN CIVIL ENGINEERING.

Calculus,	Astronomy,
Hinoks' Field Book,	Descriptive Geometry,
Physics,	First Part of Rankine's Civil Engineering and Mechanics,
German.	German.
P. M. Field Work and Shading.	P. M. Isometric and Cabinet Projections and Perspective.

COURSE IN MECHANICAL ENGINEERING.

First Term.	Second Term.
Calculus,	Astronomy,
Machinery and Mill Work,	Descriptive Geometry,
Physics,	Machinery and Mill Work,
German.	German.
P. M. Machine Drawing and Shading.	P. M. Machine Drawing and Designing.

COURSE IN CHEMISTRY.

Physics,	Zoology and Entomology,
Physiology,	German,
German,	Chemistry.
Chemistry,	P. M. Laboratory Work.
P. M. Laboratory Work.	

FOURTH YEAR.

COURSE IN AGRICULTURE.

Comparative Anatomy,	U. S. Constitution and Political Economy,
History of Civilization,	Mineralogy and Geology,
Dairy Farming and Stock Breeding,	Cultivation of Cereals, Landscape Gardening,
Logic.	Rural Architecture and Sheep Husbandry,
P M. Experimental Farming and Agricultural Botany,	Mental and Moral Science.
Historical Readings and Analysis.	

COURSE IN CIVIL ENGINEERING.

Second Part of Rankine's Civil Engineering,	U. S. Constitution and Political Economy.
Logic,	Mineralogy and Geology,
Physiology,	Third Part of Rankine's Civil Engineering.
P. M. Stereotomy, Topography and R. R. Work.	P. M. Machine Drawing and Designing.

COURSE IN MECHANICAL ENGINEERING.

Steam Engine,	Steam Engine Designs and Specifications,
Logic,	U. S Constitution and Political Economy,
Physiology.	Mineralogy and Geology.
P. M. Applied Descriptive Geometry and Machine Drawing.	P. M. Machine Drawing and Designing.

COURSE IN CHEMISTRY.

Comparative Anatomy,	U. S. Constitution and Political Economy,
History of Civilization,	Mineralogy and Geology,
Logic.	Chemistry.
P. M. Chemistry.	P. M. Laboratory Work.

SPECIAL FEATURES OF THE COURSES.

The prominence given to the Natural Sciences, and the practical element associated with the studies, render the first two years exceedingly valuable, as the groundwork of whatever more specific department may be pursued. Those who complete the course in Agriculture will have attained a good knowledge of Mathematics, French, German and English Literature, besides the studies in Natural Science that have a direct bearing upon agriculture. The study of Botany extends through nearly a year, commencing early in the Spring and extending late in the Autumn. General Chemistry and Physics continue through a whole year. Under Agricultural Chemistry will be considered composition of soils, relations of air and moisture to vegetable growth, chemistry

of farm processes, methods of improving soils, fertilizers, and other topics which properly come under this department.

This course, slightly modified so as better to adapt it to those wishing a thorough, practical education for other employments, is called the course in Science and Literature. This includes mental and moral science, logic and more of general literature. The student in Civil Engineering having laid a good foundation of general culture in literary studies, modern languages, mathematics and natural science, in his Junior year enters upon his engineering studies, embracing the theory and practice of constructing roads, railroads, bridges, canals, dams and other structures, and has thorough instruction and practice in mechanical and topographical drawing. The afternoons are devoted to field work and drawing.

With the same instruction in general studies, those who take the course in Mechanical Engineering study the elements of mechanism, machinery and mill work, steam engines, water wheels, estimates and specifications for machinery. They are instructed to draw working plans from descriptions, models and inspection of machinery, as well as to design machines.

The course in Chemistry includes general, analytical and agricultural chemistry. Under analytical chemistry is comprised the qualitative and quantitative analysis of minerals, alloys, earths, fertilizers and farm products. The students devote three hours a day to laboratory practice.

LABOR.

It is a peculiarity of the college, that it makes provision for labor, thus combining practice with theory, manual labor with scientific culture. Students in this institution are required to labor a certain portion of each day, not exceeding three hours, for five days in the week.

The labor is designed to be as much as possible educational, so that every student may become familiar with all the forms of labor upon the farm and in the gardens. In the lower class the students are required to work on the farm, and they receive compensation for their labor according to their industry, faithfulness and efficiency, the educational character of the labor being also taken into account. The maximum amount paid will be thirty cents for three hours labor.

MILITARY.

Thorough instruction is given in Military Science by a competent officer. The instruction extends through the whole college course, and embraces personal, squad, company and battalion drill. The students are enrolled in companies under their own officers. Arms are furnished by the State. The uniform is navy blue yacht cloth, sack coat and pants, without brass buttons or trimmings that attract attention.

LOCATION.

The college has a pleasant and healthful location, between the villages of Orono and Upper Stillwater, and about a mile from each. Stillwater river, a tributary of the Penobscot, flows in front of the buildings forming the western boundary of the college farm, and adding much to the beauty of the surrounding scenery.

The European & North American Railway, over which trains pass several times each day, has a station at the village of Orono. The college is within nine miles of the city of Bangor, and is consequently easily accessible from all parts of the State.

FARM AND BUILDINGS.

The college farm contains three hundred and seventy acres of land of high natural productiveness, and of great diversity of soil, and is therefore well adapted to the experimental purposes of the institution.

White Hall, the building first erected, affords excellent accommodations for a limited number of students. The lower rooms of this building are appropriated to general and class purposes.

Brick Hall contains forty-eight rooms. The boarding house connected with the college buildings is open to students. With these buildings, the institution furnishes desirable accommodations for one hundred and twenty-five students.

The chemical laboratory contains two apparatus rooms, a lecture room, a cabinet, a library and weighing room, a recitation room and rooms for analytical and other purposes, and is in all respects admirably adapted to the wants of the chemical and mineralogical departments.

APPARATUS.

The college is furnished with new and valuable apparatus for the departments of Physical Geography, Natural Philosophy and

Chemistry, and for surveying and civil engineering, to which additions will be made as the exigencies of the several departments require. Models have been obtained from the United States Patent Office, and others have been purchased, that serve for purposes of instruction.

LIBRARY.

The library already contains 2,640 volumes, some of which have been obtained by purchase, while others have been kindly given to the college. The volumes secured through the liberality of Governor Coburn, and the gifts of other friends, are a valuable addition to this department. It is earnestly hoped that so important an auxiliary in the education of students in the college will not be disregarded by the people of the State, but that liberal contributions will be made to the Library, not only of agricultural and scientific works, but also those of interest to the general reader.

READING ROOM.

The Reading Room is supplied with a number of valuable newspapers and periodicals. Grateful acknowledgment is herewith made for the following named papers, generously sent by the proprietors to the college:

Aroostook Times, Agricultural Gazette, Androscoggin Herald, American Sentinel, Bangor Weekly Courier, Camden Journal, Christian Mirror, Christian Register, Dexter Gazette, Dirigo Rural, Eastern Argus, Kennebec Journal, Lincoln County News, Maine Farmer, Maine Standard, New England Farmer, N. Y. Observer, Northern Border, North Star, Official Gazette U. S. Patent Office, Oxford Register, Patten Tribune, Piscataquis Observer, Somerset Reporter, Sunrise, York County Independent.

The following are furnished by subscription:

American Agriculturist, American Chemist, American Naturalist, American Journal of Science and Art, Appleton's Journal, Atlantic Monthly, Bangor Daily Whig and Courier, Bangor Daily Commercial, Boston Journal of Chemistry, Boston Daily Globe, Boston Statesman, Evening Post, Engineering Magazine, Entomologist, Galaxy, Gardener's Chronicle, Harper's Monthly, Harper's Weekly, International Review, Journal Royal Agricultural Society, England, Journal Franklin Institute, Leslie's Illustrated News, London Times, New York Tribune, New York World, Popular Science Monthly, Scribner's Monthly, Springfield Republican, Technologist, Toledo Blade.

CABINET.

Rooms have been fitted up with cases of Minerals, and specimens of Natural History, and several hundred specimens have been presented to the college. The valuable private cabinet of Prof. C. H. Fernald is placed in these rooms, and is accessible to the students. All specimens presented will be properly credited and placed on exhibition. Rocks illustrating the different geological formations, and minerals found within the State, are particularly solicited. Additions have been made during the past year.

LITERARY SOCIETIES.

Flourishing societies have been organized by the students of the college, which hold weekly meetings for declamations, discussions, and other literary exercises.

PUBLIC WORSHIP.

All students are required to attend daily prayers at the college, and public worship on the Sabbath at some one of the neighboring churches, unless excused by the President.

EXPENSES.

Tuition is free to students residing within the State. Those from other States will be charged twelve dollars per term. Rooms are free; all bedding and furniture must be supplied by the students, who will also furnish their own lights. Board, washing, and fuel will be furnished at cost. The price of board will be two dollars and sixty cents per week, the fuel and washing fifty cents per week. These bills, with those for incidental expenses, are payable at or before the close of each term.

The terms are so arranged that the long vacation occurs in the winter, that students may have an opportunity to teach during that time. By means of the amount thus earned, together with the allowance for labor, the industrious and economical student can cancel the greater part of his college expenses.

GRADUATES.

CLASS OF 1872.

Benjamin F. Gould, C. E.....San Juan, California.
George E. Hammond, C. E.....Elliot.
Heddle Hilliard, C. E.....Grand Southern R. R., N. B.
Edwin J. Haskell, B. S.....Saccarappa, Haskell Silk Company.
Eber D. Thomas, B. S.....Grand Rapids, Mich.
George O. Weston, B. S.....Farmer, Norridgewock.

CLASS OF 1873.

Russell W. Eaton, C. E..Providence, R. I., D. M. Thompson, & Co.
George H. Hamlin, C. E ... .Orono, Maine State College.
Fred W. Holt, C. E.....Phœnixville Bridge Company, Penn.
Charles E. Reed, C. E..... ....Free Press, Detroit, Mich.
John M. Oak, B. S.... ....Merchant, Garland.
Frank Lamson Scribner, B. S.....Girard College, Philadelphia.
Harvey B. Thayer, B. S.....Garland.

CLASS OF 1874.

William A. Allen, C. E.....Portland, M. C. R. R.
Walter Balentine, B. S.... .....Wesleyan University, Conn.
William H. Gerrish, B. S.....Portland.
John I. Gurney, B. S .....Dorchester, Mass.
David R Hunter, B. S..... .....Farmer, Clinton.
Louise H. Ramsdell, B. S.....Teacher, Atkinson.

CLASS OF 1875.

Solomon W. Bates, C. E..... ...Boston, Mass.
Wilbur A. Bumps, C. E.....Dexter High School.
Samuel H. Clapp, C. E.....Comptonville, California.
Lewis F. Coburn, C. E.....Boothbay.
Charles F. Durham, C. E.....California.
Edson F. Hitchings, C. E.....Waterville.
Allen G. Mitchell, C. E.....Somerset R. R.
George M. Shaw, C. E.....Comptonville, California.
Edgar A. Work, C. E.....U. S. Military Academy, West Point.
Edmund D. Mayo, M. E.....Clear Water, Minn.
Albert E. Mitchell, M. E.....Philadelphia, Penn.
Minott W. Sewall, M. E.....Philadelphia, Penn.
Charles F. Colesworthy, B. S.....California.
Alfred M. Goodale, B. S.....Lewiston.
Whitman H. Jordan, B. S.....Dennysville.
Fred L. Moore, B. S.....California.
Luther W. Rogers, B. S .....Farmer, Stillwater.
Wesley Webb, B. S .....Farmer, Unity.

CLASS OF 1876.

Abbott, Edmund.....Winterport.
Allen, Charles Plummer.....Bangor.
Beckler, Eldridge Harlow.....Livermore Center.
Bisbee, Fred Milton.....Livermore Center.
Blanding, Edward Mitchell.....Bangor.
Brainard, Charles Marcellus.....California.
Buker, George Haskell..... ... .Castine.
Cowan, Florence Helen.....Orono.
Crosby, Oliver.....St. Paul, Minn.
Cyr, Vetal..... .....Fort Kent.
Dike, James Edward .....Sebago.
Dike, William Oliver.....Sebago.
Estabrooke, Horace Melvyn.....Maysville.
Farrington, Arthur Manly..... .....Orono.

Foss, George Obed..... Dexter.
Haines, William Thomas..... West Corinth.
Hamilton, Henry Fairfield..... Saco.
Haskell, Newall Prince..... New Gloucester.
Hubbard, Philip Wadsworth..... Philadelphia, Pa.
Jones, Samuel Messer..... Madison.
Lewis, Albert Augustus..... Orono.
Long, Herbert Augustine..... Machias.
Lothrop, Luther Ramsdell..... Boston, Mass.
Martin, Nelson Hussey..... Danforth.
Oak, Charles Edson..... Garland.
Parks, George Daniel..... Richmond.
Peirce, Hayward..... Frankfort.
Reed, Frank Radford..... Roxbury.
Reynolds, Henry Jones..... Dennysville.
Rogers, Charles Wilson..... Richmond.
Stevens, William Lewis..... Redwing, Minn.
Williams, John Howard..... Milo.

GENERAL STATEMENT.

Students are required to make their own beds, and sweep their own rooms.

Each student is required, at the commencement of his college course, to deposit with the Treasurer of the college, a bond for $100, signed by responsible securities, to secure the payment of his board bill and any incidental charges.

Strict conformity to college regulations and requirements, is the only condition of continued membership in the college.

Candidates for the next class should make early application.

CALENDAR.

1877—Feb. 6. Tuesday, Second Term commences.
June 21, 22. Thursday and Friday, Examinations.
" 23. Saturday, Prize Declamation by Sophomores.
" 24. Sunday, Baccalaureate Address.
" 25. Monday, Prize Essays by Juniors.
" 27. Wednesday, Commencement.
" 28. Thursday, Examination of Candidates for Admission.
Vacation of five weeks.
Aug. 7. Tuesday, Examination of Candidates for Admission.
" 8. Wednesday, Term commences.
Nov. 22, 23. Thursday and Friday, Examinations.
Vacation of eleven weeks.

SUMMARY OF

METEOROLOGICAL OBSERVATIONS

TAKEN AT THE

Maine State College of Agriculture and the Mechanic Arts,

FROM JANUARY, 1869, TO JANUARY, 1877.

BY PROF. M. C. FERNALD.

Latitude 44° 53′ 10″ N. Longitude 68° 38′ 57″ W. Elevation above the sea, 134 feet.

EXPLANATIONS, DEDUCTIONS AND REMARKS.

The hours of observation are the same as those formerly adopted by the Smithsonian Institution, viz: 7 A. M., 2 P. M, and 9 P. M.

The figures in the columns headed "Force or pressure of vapor," show the height at which a column of mercury is maintained by the weight of the moisture of the air.

The warmest day of the year 1876 was August 7th, when the mean temperature was 85°.3, and the coldest day was February 24th, when the mean temperature was 13°.4 below zero.

The highest temperature (96°.7) recorded during the year was on the 6th of August, and the lowest temperature (21°.5 below zero) on the 26th of December.

The range of temperature between the two extremes is 118°.2, or 5°.3 greater than the average range between the extremes for the last eight years.

The warmest day within the period covered by the tables was August 6th, 1876, when the mean temperature was 85° 3, and the coldest day January 26th, 1874, when the mean temperature was 15°.5 below zero. The highest temperature (96°.7) occurred on August 6th, 1876, and the lowest temperature (26°.5 below zero) on January 30th, 1873.

A comparison, as regards temperature, of the several months of 1876, with the mean temperature of corresponding months for eight years, is given below.

Months.	Mean temperature from 1869 to 1876, inclusive.	Mean temperature for 1876.	
January	16°.59	18°.72	2°.13 warmer.
February	18°.00	19°.02	1°.02 "
March	26°.50	27° 86	1°.36 "
April	39°.13	39° 36	0°.23 "
May	51°.58	50° 70	0°.88 colder.
June	62°.37	65°.27	2°.90 warmer.
July	67°.72	68°.45	0°.72 "
August	65°.63	67°.60	1°.97 "
September	56°.73	55°.05	1°.68 colder.
October	45°.94	43°.06	2°.88 "
November	31°.56	35°.77	4°.21 warmer
December	18°.41	13°.45	4°.96 colder.

The year 1876 (mean temperature 42°.03) averaged 0°.37 warmer than the mean temperature for the eight years above noticed.

In the summer of 1876 frosts occurred on the mornings of June 1st, 2d and 8th, and also on August 22d. The earliest autumnal frost was on the morning of September 11th, doing but little injury to vegetation. Heavy frosts occurred on the mornings of the 2d and 3d of October.

The earliest thunder shower of the season was on the 13th of May, and was accompanied with hail.

The rain-fall of 1876 (52.37 inches) was more by 7.88 inches than the average annual rain-fall for eight years; and the amount (123 inches) of snow greater by 19.25 inches than the average annual snow-fall for the same period.

The prevailing wind for the eight years under notice was from the northwest, although during the warm months the wind prevailed from the southwest and south. The relative direction and force of wind for this period are indicated approximately by the following numbers: N. W. and W., 4; S. W and S., 3; S. E. and E., 1; N. E. and N., 2. Gales of considerable violence occurred February 2d, 15th and 25th, March 14th, 15th and 21st, July 6th and 20th, and December 16th, 1876.

The auroras of 1876 were few in number. The most brilliant were on the evenings of April 19th and September 22d.

The principal lunar halos were on March 6th and 30th and April 28th.

The principal solar halos were on March 5th, June 8th, and September 17th. The halo of June 8th was especially remarkable. Two concentric bright bands with rainbow colors were formed around the sun; the inner ring with a radius of 22° and the outer ring with a radius of 46°. These bands or rings were cut by a parhelic circle with a radius of 46°, passing through the sun. The phenomenon continued from 11 A. M. to 1 P. M., the inner ring being the last portion to disappear. At times during the phenomenon portions of a third ring, with a radius of 90°, and concentric with the other two rings, were visible.

The barometer indicated the greatest and also the least pressure in the month of February; the range between the two extremes being no less than 2.325 inches. The least mean pressure was during the month of October, and the greatest during the month of August.

SUMMARY—1869.

MONTHS.	THERMOMETER IN THE OPEN AIR.											RAIN AND SNOW.		CLOUDS.	WINDS.				BAROMETER.			FORCE OR PRESSURE OF VAPOR IN INCHES.			RELATIVE HUMIDITY OR FRACTION OF SATURATION.		
	Mean of hottest day.		Mean of coldest day.		Highest temperature.		Lowest temperature.		Mean of maximum temperature.	Mean of minimum temperature.	Mean of three daily observations.	Amount of rain or melted snow in guage—inches.	Depth of snow—inches.	Mean per centage of cloudiness.	PER CENT. OF DIRECTION.				BAROMETER HEIGHT REDUCED TO FREEZING POINT.								
	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.							N. W. and W.	S. W. and S.	S. E. and E.	N. E. and N.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
		°		°		°		°	°	°	°																
January	5	37.5	22	-3.8	8	43.0	19	-16.0	25.44	10.74	18.37	2.542	10.75	.61	.46	.16	.03	.35	30.391	29.178	29.767	.293	.011	.092	100	26	78
February	13	37.4	2	7.7	13	44.0	25	-8.0	29.21	14.79	21.83	4.264	32.25	.58	.46	.25	.04	.25	30.254	28.858	29 706	.191	.020	.094	100	25	74
March	27	42.3	5	1.2	28	50.0	6	-22.0	32.62	12.51	22.99	3.356	10.42	.46	.54	.32	.07	.07	30.300	29.265	29.828	.236	.005	.099	100	29	67
April	21	48.1	4	25.8	28	60 5	5	18.5	46.78	33.33	39.51	2.392	1.75	.58	.51	.26	.09	.14	30.016	29.319	29.660	.377	.071	.179	100	27	73
May	26	67.6	4	37.8	25	80.3	1	30.0	58.72	41.55	51.33	2.950	.....	.63	.43	.25	.16	.16	30.030	29 088	39.630	.546	.112	.279	100	27	73
June	3	67.7	9	52.5	3	81.5	9	38.0	68.38	50.34	59.58	3.800	.....	.56	.41	.34	.23	.02	30.143	29.346	29.797	.574	.196	.405	100	35	80
July	11	74.2	1	57.5	11	87.2	2	45.0	76.07	56.69	66.66	1.620	.....	.46	.29	.53	.18	.00	30.137	29.291	29.735	.826	.286	.495	100	38	76
August	20	74.0	31	51.2	11	83.0	8	44.0	71.91	53.10	62.25	1.910	.....	.42	.48	.32	.08	.12	30.229	29.447	29.818	.730	.229	.406	100	34	72
September	8	69.5	28	41.7	5	80.5	29	35.0	68.86	50.67	59.55	3.670	.....	.55	.26	.39	.25	.12	30.243	29.316	29.979	.758	.154	.415	100	42	80
October	4	65.3	28	26.2	1	73.5	28	21.0	53.38	38.05	44.83	9.570	9.00	.54	.34	.29	.20	.17	30.167	29.176	29.746	.585	.095	.269	100	38	82
November	6	46.3	16	24.0	20	52.8	26	15.5	38.93	24.42	32.32	3.360	0.75	.62	.29	.28	.24	.19	30.174	28 883	29.740	.374	.057	.162	100	35	85
December	1	39.7	15	-0.2	1	53.0	9	-13 5	29.85	13.28	22.08	5.283	20.00	.55	.39	.12	.11	.38	30.519	28.891	29.949	.375	.009	.109	100	28	77
	July		Jan'y		July		March																				
Year	11	74°.2	22	-3°.8	11	87°.2	6	-22°.0	50°.01	33°.37	41°.77	44.717	84.92	.55	.41	.29	.14	.16	30.519	28.858	29.780	.826	.005	.250	100	25	76

SUMMARY—1870.

MONTHS.	THERMOMETER IN THE OPEN AIR.											RAIN AND SNOW.		CLOUDS.	WINDS.				BAROMETER.			FORCE OR PRESSURE OF VAPOR IN INCHES.			RELATIVE HUMIDITY OR FRACTION OF SATURATION.		
	Mean of hottest day.		Mean of coldest day.		Highest temperature.		Lowest temperature.		Mean of maximum temperature.	Mean of minimum temperature.	Mean of three daily observations.	Amount of rain or melted snow in guage—inches.	Depth of snow—inches.	Mean per centage of cloudiness.	PER CENT. OF DIRECTION.				BAROMETER HEIGHT REDUCED TO FREEZING POINT.								
	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.							N. W. and W.	S. W. and S.	S. E. and E.	N. E and N.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
		°		°		°		°	°	°	°																
January	23	40.6	14	-9.7	23	44.2	14	-14 2	30 92	13.05	22 35	5.615	26.00	.57	.38	.26	.12	.14	30.578	29.249	29.913	.284	.020	.108	100	26	80
February	15	39 6	4	-6.6	19	47.0	4	-17.0	26.59	8.36	18.22	4.296	15.00	.57	.43	.12	.21	.24	30.409	28.902	29 692	.323	.016	.093	100	47	80
March	30	42.2	11	6.2	30	52.5	12	-5.8	35.01	21.09	27.90	2.114	10.50	.47	.44	.04	.08	.44	30.343	29.190	29.761	.227	.020	.104	100	18	65
April	28	57.4	4	34.3	28	70.0	16	25.5	52.78	34.61	43.51	3 553	2.00	.57	.18	.24	.19	.39	30.402	29.390	29.850	.443	.068	.206	100	13	73
May	29	65 0	9	39.8	29	81.0	5	31 0	62.26	41.48	51.87	1.960	.....	.44	.31	.40	.10	.19	30 211	29.347	29 791	.604	.102	.264	100	20	68
June	25	74.7	9	56.7	25	89.5	10	51.0	75 34	57.24	65.74	2.070	.....	.53	.19	.58	.13	.10	30 023	29.455	29 813	.703	.253	.479	100	30	76
July	24	82.2	1	58.5	24	94.0	2	48.0	79.03	58.35	68.88	1.780	.....	.40	.26	.58	.10	.06	29.980	29.543	29.758	.878	.228	.499	97	28	71
August	10	77.8	27	54.6	9	88.0	27	39.8	77.52	55.60	66.69	3.210	.....	.41	.34	.42	.13	.11	30 136	29 488	29.805	.805	.217	.470	100	31	72
September	4	68.4	12	48.3	4	78.0	13	35.0	67.26	47.64	57.76	2.230	.....	.37	.41	.34	.03	.22	30 273	29.392	39 928	.725	.170	.363	100	29	70
October	12	60.1	27	31.0	2	70 0	27	21 0	56.24	38.91	47.25	5 530	1.50	.50	.30	.55	.05	.10	30.414	29.116	29.840	.527	.096	.271	100	31	79
November	3	52.0	30	23.6	3	56.8	30	21.0	42 80	30.61	36 58	5.608	5 50	.55	.47	.28	.07	.18	30.240	29.194	29.702	.436	.068	.173	100	38	77
December	2	36.9	24	3.4	2	44.0	24	-8.3	30.54	18 50	24.43	3.010	18.25	.61	.47	.17	.02	.34	30.320	29.175	29.645	.226	.028	.114	100	42	80
	July		Jan'y		July		Feb'y																				
Year	24	82°.2	14	-9°.7	24	94°.0	4	-17°.0	53°.02	35°.45	44°.26	40.976	78.75	.50	.35	.33	.10	.22	30.587	28.902	29.791	.878	.016	.279	100	13	74

SUMMARY—1871.

MONTHS.	THERMOMETER IN THE OPEN AIR.											RAIN AND SNOW.		CLOUDS.	WINDS.				BAROMETER.			FORCE OR PRESSURE OF VAPOR IN INCHES.			RELATIVE HUMIDITY OR FRACTION OF SATURATION.		
	Mean of hottest day.		Mean of coldest day.		Highest temperature.		Lowest temperature.		Mean of maximum temperature.	Mean of minimum temperature.	Mean of three daily observations.	Amount of rain or melted snow in guage—inches.	Depth of snow—inches.	Mean per centage of cloudiness.	PER CENT. OF DIRECTION.				BAROMETER HEIGHT REDUCED TO FREEZING POINT.								
	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.							N. W. and W.	S. W. and S.	S. E and E.	N. E and N.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
		°		°		°		°	°	°	°																
January	16	37.6	23	-14.9	16	42.0	23	-20 6	21.74	5 08	13 34	2.597	13.50	.57	.47	.16	05	.32	30 585	29 263	29 988	.236	.006	.084	100	17	80
February	25	42.1	5	-6.8	25	47.2	5	-16.7	30 42	10 99	19.90	2.532	14.00	43	.55	.27	.11	.07	30 348	29.025	29.766	.234	.013	.092	100	38	72
March	12	51.4	24	24.8	12	58 7	29	17.0	41.02	28 35	34 65	4.108	8 00	.59	.39	.37	.07	.17	30.282	29.128	29.788	.354	.053	.159	100	27	76
April	21	52.7	6	30.9	21	66.5	1	22 6	48.02	33.97	40.85	4.010	1 00	.65	.35	.21	.12	.32	30 193	29 269	29.704	.335	.052	.187	100	34	73
May	30	76 0	5	36 3	30	88.6	5	33 0	59.73	41.43	50 65	3.480	1.50	.48	.47	.43	.03	.09	30 167	29.136	29 763	.545	.089	.240	100	17	63
June	3	75.4	16	52.9	3	87.8	16	44.0	72.01	51.82	61.99	2.580	.....	.45	.45	.51	.02	.02	29.990	29.302	29.708	.638	.203	.396	100	31	72
July	14	72 8	17	59.3	13	85.0	1	47.0	77.48	57.78	67.05	2.130	.....	.46	.27	.49	.14	.10	30 111	29.392	29.771	.671	.272	.482	100	31	75
August	4	73.9	20	58.2	4	85 0	22	42 0	75 85	56.08	65 83	3 850	.....	37	.39	.41	.14	.06	30.247	29.420	29 788	.956	.244	.471	100	35	74
September	3	69.5	30	44.8	3	80 0	15	28.8	64.11	44.53	54.70	1.100	.....	35	.41	.30	.14	.15	30.270	29.453	29.885	.644	.095	.326	100	20	76
October	11	62 8	19	34.4	10	72.5	21	25 3	55 95	38.84	47.68	7 500	.....	.56	.29	.40	.20	.11	30 362	29.404	29 858	.644	.107	.272	100	39	76
November	1	43.0	30	3.4	1	53.0	30	0.0	34.53	22.95	29.00	3.580	15 00	.48	.58	.07	.10	.25	30.299	29.150	29 728	.403	.031	.132	100	44	78
December	4	40.4	21	-9.8	25	47.5	22	-11.5	24 87	8.16	17 43	4.163	27.50	.59	.40	.33	.07	.20	30.534	29.000	29.794	.277	.024	.090	100	42	84
	May		Jan'y		May		Jan'y																				
Year	30	76°.0	23	-14°.9	30	88°.6	23	-20°.6	50°.44	33°.33	41°.92	41.630	80.50	.50	.42	.33	.10	.15	30 585	29.000	29.795	.956	.006	.244	100	17	75

SUMMARY—1872.

MONTHS.	THERMOMETER IN THE OPEN AIR.											RAIN AND SNOW.		CLOUDS.	WINDS.				BAROMETER.			FORCE OR PRESSURE OF VAPOR IN INCHES.			RELATIVE HUMIDITY OR FRACTION OF SATURATION.		
	Mean of hottest day.		Mean of coldest day.		Highest temperature.		Lowest temperature.		Mean of maximum temperature.	Mean of minimum temperature.	Mean of three daily observations.	Amount of rain or melted snow in guage—inches.	Depth of snow—inches.	Mean per centage of cloudiness.	PER CENT. OF DIRECTION.				BAROMETER HEIGHT REDUCED TO FREEZING POINT.								
	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.							N. W. and W.	S. W. and S.	S. E and E.	N. E and N.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
		°		°		°		°	°	°	°																
January	13	32 8	7	-2.4	23	38.2	7	-9 2	24.99	9 54	17.45	2.182	16 00	.54	.48	.23	.05	.24	30.446	29.264	29.712	.201	.028	.087	100	49	82
February	25	31.6	23	2.2	21	40.0	3	-9.8	28.99	7.13	17.89	1.703	13.50	39	.53	.15	.09	.23	30 382	29.140	29.708	.226	.025	.082	100	28	76
March	27	33.5	6	-8 0	26	44.0	7	-16.5	29.01	10 00	19,30	5.234	38.00	.51	.52	.13	.05	.30	30.202	28 988	29.702	.191	.025	.086	100	32	76
April	30	49.2	1	27.4	20	63.0	7	20.0	48.72	31.49	40.26	1.928	3.00	.49	.48	.31	.05	.16	30 200	29.219	29 731	.302	.070	.162	100	25	66
May	27	60.2	5	41.5	19	71.8	11	34.0	60.08	44.10	52.13	3.920	.....	.67	.19	.32	.12	.37	30 162	29.244	29.745	.416	.098	.280	100	23	73
June	30	78.5	2	49.0	30	90 6	4	37.3	73.28	56.22	64.30	4.470	.....	.55	.27	.34	.19	.20	30.040	29.449	29 772	.750	.210	.459	100	36	77
July	16	79.5	27	61.1	16	90.0	26	49.0	78.54	59 19	68 69	2.680	.....	.47	.34	.42	.13	.11	30.047	29 531	29 736	.793	.256	.517	100	33	74
August	9	76 8	30	54.3	9	90.3	29	45 2	76 32	59 46	67.63	6 230	.....	.45	.30	.36	.18	.16	30 075	29.277	29.823	.750	.236	.530	100	28	79
September	8	72.2	3	52.5	8	84.3	5	41 4	66 16	51.38	58.70	3 550	.....	.56	.27	.30	.27	.16	30 172	29.409	29 829	.688	.234	.403	100	39	81
October	7	60.5	28	33.3	7	66.0	29	23 0	53.78	37 39	45.75	6.010	.....	.47	.23	.34	.12	.31	30.423	29.279	29 838	.500	.108	.254	100	36	80
November	12	44.6	30	20.4	12	47 0	21	12 4	39.35	28 18	33 77	7.055	10 00	.64	.29	.25	.20	.26	30.252	28.712	29.770	.323	.068	.163	100	41	83
December	3	34.5	25	-11.8	6	38.4	25	-23.0	21 07	4.52	13 39	3 615	32.50	.59	.55	.23	.11	.11	30.363	29.056	29.822	.196	.011	.077	100	44	78
	July		Dec.		June		Dec.																				
Year	16	79°.5	25	11°.8	30	90°.6	25	-23°.0	50°.02	33°.22	41°.60	48.577	113.00	.53	.37	.28	.13	.22	30 446	28.712	29.766	.793	.011	.258	100	23	77

SUMMARY—1873.

MONTHS.	THERMOMETER IN THE OPEN AIR.											RAIN AND SNOW.		CLOUDS.	WINDS.				BAROMETER.			FORCE OR PRESSURE OF VAPOR IN INCHES.			RELATIVE HUMIDITY OR FRACTION OF SATURATION.		
	Mean of hottest day.		Mean of coldest day.		Highest temperature.		Lowest temperature.		Mean of maximum temperature.	Mean of minimum temperature.	Mean of three daily observations.	Amount of rain or melted snow in guage—inches.	Depth of snow—inches.	Mean per centage of cloudiness.	PER CENT. OF DIRECTION.				BAROMETER HEIGHT REDUCED TO FREEZING POINT.								
	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.							N. W. and W.	S. W. and S.	S. E and E.	N. E and N.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
		°		°		°		°	°	°	°																
January	17	37.8	30	-4.9	17	43.1	30	-26.5	23.52	4.75	15.01	4.090	22 00	.56	.38	.21	.09	.32	30.680	29.148	29 882	.275	.009	.086	100	44	83
February	28	31.4	2	-2.7	7	39.5	2	-14.0	24.84	5 69	16.23	2.965	28.00	.48	.47	.20	.04	.29	30 290	28 960	29.690	.174	.020	.079	100	41	76
March	30	38.3	24	12 6	29	46 2	5	-5.6	34 21	19.19	27 22	4.700	31.00	.54	.36	.29	.14	.21	30 311	28 838	29.682	.288	.028	.118	100	27	76
April	30	46.6	19	34.2	30	61.6	17	26.0	46.22	32.82	39.58	2.590	5.00	.58	.42	.10	.20	.28	30.060	29.205	29 717	.230	.088	.164	100	24	68
May	28	68.2	14	42.8	28	81.2	7	31.5	62.03	41.89	52.03	1.960	.....	.43	.41	.38	.04	.17	30.084	29.291	29 802	.663	.088	.245	97	20	62
June	26	72.7	4	47.1	26	86.5	3	36.0	71 57	48 78	60.74	1 320	.....	.40	.35	.32	.15	.18	30 142	29.296	29.770	.673	.115	.356	100	22	68
July	30	75.5	18	62.1	26	92.0	7	47.0	78.80	58.60	68.45	3 260	.....	.47	.34	.50	.11	.05	30.110	29.492	29.801	.748	.191	.497	100	26	71
August	3	73.4	24	55.3	3	88.0	28	35 0	74 50	52.95	63.65	1.810	.....	.41	.30	.33	.08	.29	30.141	29.621	29.878	.778	.197	.420	99	23	72
September	5	68 6	22	46 9	5	82.5	18	31 2	66 47	44.80	55 50	4.740	.....	.38	.34	.41	.13	.12	30 258	29.413	29.864	.690	.170	.346	100	31	76
October	6	58.9	30	34.0	11	70.0	18	24.5	56.87	37.73	47.40	6.560	.....	.46	.20	.40	.16	.24	30 308	29 180	29 863	.500	.099	.264	100	31	78
November	2	43.0	30	5.2	3	53.2	30	-4.0	31.64	18.30	25 17	5.050	24.00	.55	.54	.18	.06	.22	30.332	28.432	29.689	.232	.039	.109	100	42	75
December	4	46.5	1	-3 5	4	50.3	2	-26 0	28.45	9.87	20.12	1.735	14.00	.59	.41	.24	.05	.30	30.680	29.108	29 893	.343	.014	.099	100	31	80
	July		Jan'y		July		Jan'y																				
Year	30	75° 5	30	-4°.9	26	92°.0	30	-26°.5	49°.93	31°.28	40°.93	40.780	124.00	.49	.38	.30	.10	.22	30 680	28 423	29 794	.778	.009	.232	100	20	74

SUMMARY—1874.

MONTHS.	THERMOMETER IN THE OPEN AIR.											RAIN AND SNOW.		CLOUDS.	WINDS.				BAROMETER.			FORCE OR PRESSURE OF VAPOR IN INCHES.			RELATIVE HUMIDITY OR FRACTION OF SATURATION.		
	Mean of hottest day.		Mean of coldest day.		Highest temperature.		Lowest temperature.		Mean of maximum temperature.	Mean of minimum temperature.	Mean of three daily observations.	Amount of rain or melted snow in guage—inches.	Depth of snow—inches.	Mean per centage of cloudiness.	PER CENT. OF DIRECTION.				BAROMETER HEIGHT REDUCED TO FREEZING POINT.								
	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.							N. W. and W.	S. W. and S.	S. E. and E.	N. E and N.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
		°		°		°		°	°	°	°																
January	8	48.3	26	-15.5	8	54.4	27	-19.0	27.49	10.12	19.28	4.570	25.00	.56	.40	.21	.14	.25	30.623	29.381	29 988	.400	.019	.112	100	41	86
February	14	38.7	2	-15.1	14	46.0	2	-26.0	26.00	8.50	17.50	5.500	40.00	.48	.58	.23	.05	.14	30.719	29.254	29.924	.285	.012	.086	100	26	77
March	4	45.1	24	5.4	19	50.0	1	-5.4	35.78	19.41	27.56	3.400	14.00	.48	.57	.31	.04	.08	30.279	28 983	29.645	.319	.027	.112	100	24	67
April	15	47.9	1	13.9	15	60.0	1	1.0	40.50	26.16	33.30	3.760	30.00	.57	.35	.32	.08	.25	30.260	28 984	29.764	.351	.031	.133	100	26	67
May	28	64.9	1	35.8	28	78.3	2	31.0	61.35	41.71	51.88	4.740	.....	.45	.29	.43	.12	.16	30.200	29.110	29.708	.602	.096	.255	100	19	64
June	28	71.6	12	48.1	28	82.8	2	41.2	69.71	51.06	60.17	4.930	.....	.65	.31	.35	.04	.30	30.004	29.323	29.692	.685	.177	.391	100	26	74
July	15	76.3	3	54.1	15	86.3	3	50.0	75.44	58.29	66.73	2.100	.....	.54	.23	.54	.12	.11	30.045	29.432	29 799	.794	.304	.515	100	41	80
August	11	72.4	26	54.7	11	82.0	27	40.3	72 75	53.69	63.17	5.390	.....	.43	.36	.44	.06	.14	30.167	29 373	29 826	.662	.250	.447	100	34	77
September	10	68.4	22	50.2	10	83.3	23	34.2	67.73	48.69	58.38	4 370	.....	.53	.26	.41	.10	.23	30.321	28.981	29 921	.573	.240	.402	100	34	83
October	11	54.2	23	37.3	26	65.7	23	28.0	57.46	37.30	47.91	1.140	.....	.44	.28	.50	.04	.18	30.341	29.355	29.851	.427	.104	.254	100	26	75
November	5	47.5	22	13.8	5	54.7	23	5.2	41.32	24.62	32.66	3.060	10.00	.49	.46	.37	.07	.10	30.406	29.024	29 922	.353	.057	.158	100	39	80
December	3	38.7	15	-4 0	3	44.7	16	-19.1	26.67	7.01	17.63	1.980	13.00	.57	.36	.20	.11	.33	30.606	29.319	29.858	.254	.009	.093	100	45	81
	July		Jan'y		July		Feb'y																				
Year	15	76°.3	26	-15°.5	15	86°.3	2	-26°.0	50°.18	32°.21	41°.35	44.940	132.00	.52	.37	.36	.08	.19	30.719	28.981	29.825	.794	.009	.246	100	19	76

SUMMARY—1875.

MONTHS.	THERMOMETER IN THE OPEN AIR.											RAIN AND SNOW.		CLOUDS.	WINDS.				BAROMETER.			FORCE OR PRESSURE OF VAPOR IN INCHES.			RELATIVE HUMIDITY OR FRACTION OF SATURATION.		
	Mean of hottest day.		Mean of coldest day.		Highest temperature.		Lowest temperature.		Mean of maximum temperature.	Mean of minimum temperature.	Mean of three daily observations.	Amount of rain or melted snow in guage—inches.	Depth of snow—inches.	Mean per centage of cloudiness.	PER CENT. OF DIRECTION.				BAROMETER HEIGHT REDUCED TO FREEZING POINT.								
	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.							N. W. and W.	S. W. and S.	S. E. and E.	N. E and N.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
		°		°		°		°	°	°	°																
January	29	25.9	20	-5 9	31	32.6	20	-22.5	17.23	-1.56	8.22	2 00	19.70	.47	.70	.06	.04	.20	30 397	29 212	29 938	.144	.015	.056	100	50	79
February	24	39.3	7	-8.3	24	46.0	14	-20.0	23.59	3.82	13.44	3.80	8 50	.45	.60	.19	.10	.11	30 349	29 101	29.778	.267	.014	.082	100	44	79
March	27	36.9	1	4.7	27	45 2	1	-3.5	31.89	15.28	24.54	4.47	33.60	.52	.39	.26	.07	.28	30 550	29.271	29 909	.201	.025	.101	100	34	71
April	25	47.0	20	18.4	24	58.0	21	14 6	44.79	28 50	36.69	3.85	4.50	.51	.52	.22	.09	.17	30.300	29.194	29.745	.276	.068	.141	100	24	64
May	25	70.3	2	39.5	25	85.4	6	32 2	61.22	41.78	52 07	3.31	.....	.45	.33	.41	.11	.15	30 239	29 243	29.772	.661	.122	.257	100	24	67
June	24	73.4	13	51.5	28	85 0	14	39.6	70.88	51.31	61.18	4.85	.....	.52	.25	.47	.17	.11	30.123	29.318	29 812	.717	.214	.407	100	31	74
July	5	74.0	18	60.8	5	85.0	19	50 3	77.00	57.58	66.83	2.11	.....	.45	.35	.52	.04	.09	30.074	29 440	29.748	.729	.254	.490	99	34	75
August	29	74.8	2	59 9	29	87.8	24	45.3	78.28	58.33	68.20	2.32	.....	.43	.25	.57	.16	.02	30 213	29.685	29.893	.844	.246	.557	100	35	81
September	3	68 2	29	40.8	1	81.8	29	26.2	63.75	43.51	54.17	5.10	.....	.51	.40	.42	.09	.09	30 301.	29.242	29.789	.648	.118	.323	100	35	78
October	4	55.7	29	31 9	4	62.8	14	21.7	51 52	34 52	43.61	4 75	.....	58	.38	.23	.11	.28	30.274	29 039	29.802	.421	.097	.229	100	29	78
November	13	39.3	30	-9 8	13	51.7	30	-16 2	35.02	19.08	27.17	3.87	14.50	.53	.73	.10	.06	.11	30 526	28.939	29.814	.275	.014	.129	100	39	81
December	23	41.6	20	-8.0	23	50.2	20	-23.0	26.67	9 17	18.78	1.51	13.00	.51	.62	.20	.02	.16	30 539	28 963	29.768	.217	.015	.091	100	32	80
	Aug.		Nov.		Aug.		Dec.																				
Year	29	74°.8	30	-9°.8	29	87°.8	20	-23°.0	48°.49	30°.11	39°.58	41.94	93.80	.50	.46	.30	.09	.15	30 550	28.939	29.814	.844	.014	.239	100	24	76

SUMMARY—1876.

MONTHS.	THERMOMETER IN THE OPEN AIR.											RAIN AND SNOW.		CLOUDS.	WINDS.				BAROMETER.			FORCE OR PRESSURE OF VAPOR IN INCHES.			RELATIVE HUMIDITY OR FRACTION OF SATURATION.		
	Mean of hottest day.		Mean of coldest day.		Highest temperature.		Lowest temperature.		Mean of maximum temperature.	Mean of minimum temperature.	Mean of three daily observations.	Amount of rain or melted snow in guage—inches.	Depth of snow—inches.	Mean per centage of cloudiness.	PER CENT. OF DIRECTION.				BAROMETER HEIGHT REDUCED TO FREEZING POINT.								
	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.							N. W. and W.	S. W. and S.	S. E. and E.	N. E and N.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
		°		°		°		°	°	°	°																
January	1	44 6	30	0.2	19	49 1	25	-14.4	27.15	9 98	18.72	3.92	23.00	.40	.61	.16	.10	.13	30 439	29.109	29.831	.307	.023	.099	100	38	81
February	7	38.1	24	-13.4	15	45 6	24	-19 7	27 80	8.99	19.02	8 39	25 50	.41	.60	.22	.05	.13	30 783	28.458	29.838	.242	.016	.086	100	28	74
March	7	47.1	19	10.7	7	55.2	19	0.0	35.33	19.35	27 86	8.20	18.00	.58	.42	.18	.15	.25	30 265	29 005	29.792	.278	.035	.123	100	23	74
April	14	46.6	5	31 2	13	57 0	2	23.1	46 31	29.78	39.36	1.65	9 00	58	.38	.17	.10	.36	30.209	29.278	29.762	.288	.054	.160	100	22	67
May	28	69.2	1	37.7	27	84.0	1	29 6	59.72	39.90	50.70	3.73	.....	.55	.36	.34	.14	.16	30 319	29.196	29.826	.517	.089	.256	100	21	69
June	28	74.9	5	51.8	28	86.6	1	35 3	75.32	54 90	65.27	2.56	.....	.61	.23	.64	.07	.06	30 156	29.353	29.830	.816	.227	.494	100	35	80
July	18	79.0	26	54 6	18	90.0	27	47.6	78.19	59.80	68.45	5.80	.....	.45	.35	.52	.12	.01	30.045	29.350	29.776	.833	.306	.545	100	38	78
August	7	85 3	21	55.8	6	96.7	24	39.8	78 38	55 62	67.60	0.91	.....	.32	.60	.33	.05	.02	30.170	29.583	29 872	.935	.209	.501	98	32	73
September	1	63.8	28	48.5	1	72.4	17	34.5	64.44	42.86	55.05	4.28	.....	.47	.33	.36	.09	.22	30.353	29.288	29.827	.598	.177	.342	100	35	79
October	24	55 8	15	31.2	4	63 3	31	24.9	51.74	33.54	43.06	3.91	4.00	.48	.51	.34	.04	.11	30.090	29.265	29.759	.472	.094	.215	100	31	74
November	3	50.0	30	16.1	1	56 0	30	12 0	41.81	30 05	35.77	4 35	.50	.58	.33	.05	.06	.56	30.317	29 320	29.808	.375	.063	.174	100	35	79
December	14	28 9	17	-11.6	4	40.4	26	-21.5	22.64	3 05	13.45	4.67	43.00	.48	.42	.31	.01	.26	30.398	28 689	29.769	.146	.014	.073	100	41	82
	Aug.		Feby		Aug.		Dec.																				
Year	7	85° 3	24	-13°.4	6	96°.7	26	-21°.5	50°.74	32°.32	42°.03	52.37	123.00	.49	.43	.30	.08	.19	30.783	28.458	29 808	.935	.014	.256	100	21	76

SUMMARY FROM 1869 TO 1876, INCLUSIVE.

MONTHS.	THERMOMETER IN THE OPEN AIR.										RAIN AND SNOW.		CLOUDS.	WINDS.				BAROMETER.			FORCE OR PRESSURE OF VAPOR IN INCHES.			RELATIVE HUMIDITY OR FRACTION OF SATURATION.		
	Mean of hottest day.		Mean of coldest day.		Highest temperature.		Lowest temperature.		Mean of maximum temperature.	Mean of minimum temperature.	Mean of three daily observations.	Amount of rain or melted snow in guage—inches.	Depth of snow—inches.	Mean per centage of cloudiness.	PER CENT. OF DIRECTION.				BAROMETER HEIGHT REDUCED TO FREEZING POINT.								
	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.	Day.	Temperature.							N. W. and W.	S. W. and S.	S. E. and E.	N. E. and N.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
	July	°	Jan.	°	July	°	Mar.	°	°	°	°															
1869	11	74.2	22	-3.8	11	87.2	6	-22.0	50.01	33.37	41.77	44.72	84 92	.55	.41	.29	.14	.16	30.519	28.858	29.780	.826	.005	.250	100	25	76
1870	July 24	82.8	Jan. 14	-9.7	July 24	94.0	Feb. 4	-17.0	53.02	35.45	44 26	40.98	78 75	.50	.35	.33	.10	.22	30.578	28.902	29.791	.878	.016	.279	100	13	74
1871	May 30	76.0	Jan. 23	-14.9	May 30	88.6	Jan. 23	-20.6	50.44	33.33	41 92	41.63	80.50	.50	.42	.33	.10	.15	30.585	29 000	29.795	.956	.006	.244	100	17	75
1872	July 16	79 5	Dec. 25	-11.8	June 30	90.6	Dec. 25	-23.0	50.02	33.22	41.60	48.58	113.00	.53	.37	.28	.13	.22	30.446	28.712	29.766	.793	.011	.258	100	23	77
1873	July 30	75.5	Jan. 30	-4 9	July 26	92 0	Jan. 30	-26.5	49.93	31.28	40.93	40.78	124.00	.49	.38	.30	.10	.22	30.680	28 423	29.794	.778	.009	.232	100	20	74
1874	July 15	76.3	Jan. 26	-15.5	July 15	86.3	Feb. 2	-26.0	50.18	32.21	41.35	44.94	132.00	.52	.37	.36	.08	.19	30.719	28.981	29.825	.794	.009	.246	100	19	76
1875	Aug. 29	74.8	Nov. 30	-9.8	Aug. 29	87.8	Dec. 20	-23.0	48.49	30.11	39.58	41.94	93.80	.50	.46	.30	.09	.15	30.550	28.939	29.814	.844	.014	.239	100	24	76
1876	Aug. 7	85.3	Feb. 24	-13 4	Aug. 6	96.7	Dec. 26	-21.5	50.74	32.32	42.03	52.37	123.00	.49	.43	.30	.08	.19	30 783	28.458	29 808	.935	.014	.256	100	21	76
	1876		1874		1876		1873					Mean.	Mean.													
Eight years	Aug. 7	85°.3	Jan. 26	-15°.5	Aug. 6	96°.7	Jan. 30	-26°.5	50°.35	32°.66	41°.66	44.49	103 75	.51	.40	.31	.10	.19	30.783	28.423	29.797	.956	.005	.251	100	13	75