"There is one proposition of fundamental importance in this whole matter of industrial education: If the pursuits of agriculture and the mechanic arts are ever to take, in the estimation of men, the commanding position to which they are justly entitled, those who are educated for them must be *as thoroughly and completely educated*, as those who are trained for other pursuits and professions. I consider this truth, and the recognition of it, as absolutely vital to success. If a farmer or an artisan is *as well educated* as a lawyer, a physician, or a senator—if he has, I mean, as much knowledge, as profound a mastery of scientific and philosophical principles, as much self-knowledge and self-dependence, as much varied attainment, as much *brain power*, *thought power*, and *heart power*, he will be the *peer* of the latter, in influence and honor and usefulness and force, anywhere and everywhere and always—but if not, he will be inferior to the other in power and influence, and no device, or pretense, or declamation, or protest, or sophistry can make it otherwise. The difference will exist precisely as long as the causes that produced it; it is simply the difference between weakness and strength."—NEWTON BATEMAN.

TENTH REPORT

(Seven annual, three biennial)

OF THE

BOARD OF TRUSTEES

OF THE

ILLINOIS INDUSTRIAL UNIVERSITY,

URBANA, CHAMPAIGN COUNTY,

For the two years ending August 30, 1880.

SPRINGFIELD, ILL.:
H. W. ROKKER, STATE PRINTER AND BINDER.
1881.

"There is one proposition of fundamental importance in this whole matter of industrial education: If the pursuits of agriculture and the mechanic arts are ever to take, in the estimation of men, the commanding position to which they are justly entitled, those who are educated for them must be *as thoroughly and completely educated*, as those who are trained for other pursuits and professions. I consider this truth, and the recognition of it, as absolutely vital to success. If a farmer or an artisan is *as well educated* as a lawyer, a physician, or a senator—if he has, I mean, as much knowledge, as profound a mastery of scientific and philosophical principles, as much self-knowledge and self-dependence, as much varied attainment, as much *brain power*, *thought power*, and *heart power*, he will be the *peer* of the latter, in influence and honor and usefulness and force, anywhere and everywhere and always—but if not, he will be inferior to the other in power and influence, and no device, or pretense, or declamation, or protest, or sophistry can make it otherwise. The difference will exist precisely as long as the causes that produced it; it is simply the difference between weakness and strength."—NEWTON BATEMAN.

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ILLINOIS INDUSTRIAL UNIVERSITY,
URBANA, ILL., October 15, 1880.

HON. SHELBY M. CULLOM, *Governor of Illinois:*

In compliance with legal requisition, I have the honor to submit herewith the Tenth Report of the Board of Trustees of the Illinois Industrial University, for the two years ending August 31, 1880, with accompanying papers. Seven annual reports had been made when the law was changed requiring them to be biennially presented. Thirteen years have therefore passed since the founding of the University.

Very respectfully yours,

T. J. BURRILL,

Corresponding Secretary.

BOARD OF TRUSTEES.

UNDER LAW OF MAY 7, 1873.

EX OFFICIO.

His Excellency, Governor SHELBY M. CULLOM.
JAMES R. SCOTT, President State Agricultural Board.

TERM EXPIRES 1881.

*A. M. BROWN, Villa Ridge.
EMORY COBB, Kankakee.
D. GARDNER, Champaign.

TERM EXPIRES 1883.

R. B. MASON, Chicago.
T. T. FOUNTAIN, DuQuoin.
ALEXANDER McLEAN, Macomb.

TERM EXPIRES 1885.

J. J. BYRD, Cairo.
†JAMES C. CONKLING, Springfield.
S. M. MILLARD, Chicago.

OFFICERS OF THE BOARD.

EMORY COBB, Esq., President.
Prof. T. J. BURRILL, Corresponding Secretary.
Prof. E. SNYDER, Recording Secretary.
JOHN W. BUNN, Esq., Treasurer.

EXECUTIVE COMMITTEE.

EMORY COBB, Chairman.
D. GARDNER.
JAMES R. SCOTT.

S. W. SHATTUCK, Business Agent.
JAMES D. CRAWFORD, Librarian.

* Deceased. † Resigned.

FACULTY.

*JOHN M. GREGORY, LL. D.,
Regent, and Professor of Philosophy and Political Science.

THOMAS J. BURRILL, M. A.,
Professor of Botany and Horticulture, and Vice President.

SAMUEL W. SHATTUCK, M. A., C. E.,
Professor of Mathematics.

EDWARD SNYDER, M. A.,
Professor of Modern Languages.

DON CARLOS TAFT, M. A.,
Professor of Geology and Zoölogy.

JOSEPH C. PICKARD, M. A.,
Professor of English Language and Literature.

N. CLIFFORD RICKER, M. ARCH.,
Professor of Architecture.

JAMES D. CRAWFORD, M. A.,
Professor of Ancient Languages, and Secretary.

HENRY A. WEBER, PH. D.,
Professor of Chemistry.

GEORGE E. MORROW, LL. B.,
Professor of Agriculture.

†SELIM H. PEABODY, PH. D.,
Professor of Mechanical Engineering and Physics.

‡MRS. LOUISA ALLEN GREGORY,
Professor of Domestic Science, and Preceptress.

FREDERICK W. PRENTICE, M. D.,
Professor of Veterinary Science.

‖ FERNANDO A. PARSONS, M. L.,
Instructor in Book-keeping.

PETER ROOS,
Professor of Industrial Art and Designing.

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*Resigned June, 1880.
‡Resigned June, 1880.
†Elected Regent, *pro tem.*, August, 1880.
‖ Resigned March 22, 1880.

*MAJOR WILLIAM A. DINWIDDIE,
First Lieutenant, Second Cavalry, U. S. A.,
Professor of Military Science and Tactics.

WILLIAM T. WOOD,
Second Lieutenant, Eighteenth Infantry, U. S. A.,
Professor of Military Science and Tactics.

IRA O. BAKER, C. E.,
Assistant Professor of Civil Engineering and Physics.

MELVILLE A. SCOVELL, M. S.,
Assistant Professor of Agricultural Chemistry.

CHARES I. HAYES, B. S.,
Assistant in Horticulture and Botany.

CHARLES E. PICKARD, B. A.,
Assistant in English and Ancient Languages.

EDWIN L. LAWRENCE,
Head Farmer.

EDWIN A. KIMBALL,
Foreman of Machine Shop.

GEORGE A. WILD, B. S.,
Taxidermist, and Assistant in Natural History.

†CHARLES HILDEBRAND, PH. B., M. E.,
Instructor in Right-Line Drawing.

‡JEROME SONDERICKER,
Assistant in Engineering and Instructor in Drawing.

HENRY M. BEARDSLEY, B. L.,
First Assistant in Chemical Laboratory.

MRS. JENNIE HOLLISTER,
Teacher of Voice-Culture and Singing.

MISS JENNIE C. MAHAN,
Teacher of Instrumental Music.

CHARLES C. BARNES,
Second Assistant in Chemical Laboratory.

NELSON S. SPENCER,
Foreman of Carpenter Shop.

‖JAMES G. ALLISON,
Teacher of Book-keeping.

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*Relieved March 7, 1880.
‡Appointed June, 1880.
†For year ending June, 1880.
‖For fall term, 1880.

SUMMARY OF STUDENTS.

For the Year Ending June, 1880.

Resident Graduates...	Gentlemen	3	
	Ladies	5—	8
Seniors	Gentlemen	20	
	Ladies	6—	26
Juniors	Gentlemen	53	
	Ladies	17—	70
Sophomores	Gentlemen	52	
	Ladies	7—	59
Freshmen	Gentlemen	75	
	Ladies	29—	104
Preparatory	Gentlemen	109	
	Ladies	22—	131
Special	Gentlemen	10	
	Ladies	26—	36
Total			434

HISTORICAL SKETCH.

The Illinois Industrial University owes its existence to a grant, by the Congress of the United States, of 480,000 acres of public lands, and to the acceptance of this grant by the State of Illinois under conditions providing for the equipment and perpetual maintenance of the University. Donations valued at $400,000, to secure the location at Urbana, were made by Champaign county.

The public movements which gave rise to the University began about 1850, though the principles upon which it is founded had been long before the American people, and had been widely discussed. In this movement Illinois claims the proud preëminence of taking and keeping the lead.

The first important organized effort was the convention called for the purpose at Granville, in this State, November, 1851. Out of this convention and three succeeding ones sprang a memorial to the General Assembly of Illinois, presented January, 1853, asking that body to petition Congress "to appropriate to each State in the Union an amount of public lands not less in value than *five hundred thousand dollars*, for the liberal endowment of a system of Industrial Universities, one in each State in the Union, for the more liberal and practical education of our industrial classes in their various pursuits, for the production of knowledge and literature needful in those pursuits, and developing to the fullest and most perfect extent the resources of our soil and our arts, the virtue and intelligence of our people, and the true glory of our common country."

The author of this memorial, Professor J. B. Turner, of Jacksonville, has the distinguished honor of being the first to advance the great idea of the *national* endowment of industrial universities, and an illustrious Senator from Illinois, Stephen A. Douglas, soon afterward presented in Congress resolutions which our General Assembly had unanimously adopted. These exertions, thus early put forth in Illinois, "not only elicited approving responses from all quarters, but seemed also to kindle the slumbering thoughts and sympathies of the people into a blaze of enthusiasm, and to inaugurate at once, and with resistless power, the decade of splendid efforts throughout the Union, which received their triumphant culmination in the act of Congress of July 2, 1862."

This act, approved by President Lincoln, another illustrious Illinoisan, provided for the apportionment to each State accepting the grant, an amount of public land equal to thirty thousand acres for each Senator and Representative in Congress, to which the States

were respectively entitled under the census of 1860, for "the endowment, support and maintenance of at least one college, whose leading object 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, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

The Illinois Legislature promptly accepted the grant, thereby agreeing to maintain inviolate the capital fund arising from the sale of land, and further agreeing that no portion of such fund, nor the interest thereon, should ever be used for the purchase, erection or repair of buildings. The whole amount received for the lands constitutes an endowment which cannot be diminished.

The congressional grant made and accepted, there came the duty of planning and organizing the proposed University. All was new. Few persons, save the original advocates, had any definite conception of what should be undertaken, or how the beginning should be made. After many propositions, it was substantially agreed to create *one real* and *true University*, worthy alike of the great State founding it and the grand interests to which it should be dedicated. The name adopted, together with the discussions at the time, and upon the subsequent organization of the institution, indicate the intent and purposes of the founders. Some at first advocated the establishment in name and fact of an agricultural college; but, as may be seen by reference to the acts which finally passed Congress and the State legislature, this was to be only a part, though an essential and conspicuous part, of a magnificent institution, whose trustees should have power to do whatever "may be required to teach in the most thorough manner such branches of learning as are related to agriculture and the mechanic arts, and military tactics, without excluding other scientific and classical studies."

Next came the contest for the location. The General Assembly offered to receive proposals from counties desiring the institution. Champaign, McLean, Logan and Morgan entered into a spirited competition to secure the prize. The amounts offered by each of these counties grew during the struggle from about $100,000 to $400,000 in real estate, bonds and cash. It was the great topic of the time. Never were people more thoroughly aroused over any educational project, clearly showing the appreciation at this early day, by the citizens of the State, of the greatness of the proposed University. Champaign county triumphed, and the Institution was formally located, May 8, 1867, upon grounds within the municipal territory of Urbana, adjoining that of Champaign City.

Complying with law, Governor Richard J. Oglesby, March 1, 1867, appointed twenty-eight trustees, and called the first meeting at Springfield, March 12, 1867. The Governor, the Superintendent of Public Instruction, the President of the State Agricultural Society, and the Regent (President) of the University, were by law members, *ex officio*, of the Board of Trustees. The constitution of the Board, except as to individual members, remained the same until 1873, when, by legislative action, the number of appointed members was reduced to nine, and the Superintendent of Public Instruction and

the Regent of the University ceased to be *ex officio* members. Of the original Board only one, Hon. Emory Cobb, of Kankakee, is now a member, he having continuously served as a trustee from the beginning. Since 1873 Mr. Cobb has been consecutively chosen President of the Board. For his never tiring interest and zeal, for his liberal generosity, for his wise counsel and able management, the University owes much to Mr. Cobb. Among those first appointed who were for many years prominent and exceedingly valuable members of the Board, two, Hon. W. C. Flagg, of Moro, and Judge A. M. Brown, of Villa Ridge, were removed by death.

LIST OF THE TRUSTEES OF THE UNIVERSITY, WITH THEIR TIME OF SERVICE.

[The blanks in the second (year) column indicate unexpired terms of office.]

The Governor	(*Ex officio*)	1867 —
President Agricultural Society	(*Ex officio*)	1867 —
Lemuel Allen	Pekin	1867-1871
Newton Bateman, *ex officio*	Springfield	1867-1873
Alexander Blackburn	Macomb	1867-1873
Mason Brayman	Springfield	1867-1873
A. M. Brown	Villa Ridge	1867-1879
Edwin L. Brown	Chicago	1867-1870
Horatio C. Burchard	Freeport	1867-1870
J. C. Burroughs	Chicago	1867-1870
Emory Cobb	Kankakee	1867 —
J. O. Cunningham	Urbana	1867-1873
M. L. Dunlap	Champaign	1867-1870
Samuel Edwards	Lamville	1867-1873
*Willard C. Flagg	Alton	1867-1869
O. B. Galusha	Morris	1867-1873
M. C. Goltra	Jacksonville	1867-1873
John M. Gregory, *ex officio*	Champaign	1867-1873
D. S. Hammond	Chicago	1867-1869
George Harding	Paris	1867-1868
S. S. Hayes	Chicago	1867-1872
J. P. Hungate	Louisville	1867-1868
John S. Johnson	Warsaw	1867-1872
Luther W. Lawrence	Belvidere	1867-1873
Isaac S. Mahan	Centralia	1867-1872
L. B. McMurray	Effingham	1867-1873
J. H. Pickrell	Harristown	1867-1879
Burden Pullen	Centralia	1867-1873
Thomas Quick	Irvington	1867-1869
J. W. Scroggs	Champaign	1867-1872
C. H. Topping	Makanda	1867-1868
J. M. Van Osdell	Chicago	1867-1873
Clark R. Griggs	Urbana	1869-1872
Edward Kitchell	Olney	1869-1869
J. M. Pearson	Godfrey	1869-1872
Paul R. Wright	Cobden	1869-1873
J. L. Pickard	Chicago	1870-1873
James P. Slade	Belleville	1870-1875
L. L. Greenleaf	Chicago	1871-1872
R. B. Harrington	Pontiac	1871-1872
James R. Scott	Champaign	1871-1873
D. C. Wagner	Shannon	1871-1873
Wm. B. Anderson	Mt. Vernon	1871-1873
Geo. S. Bowen	Chicago	1871-1873
John J. Byrd	Cairo	1873 —
Darius Johnson	Pontiac	1873-1873
Hiram Buck	LeRoy	1873-1873
Robert Douglass	Waukegan	1873-1873
O. Huse	Evanston	1873-1873
Wm. Lindsay	Martinsville	1 73-1873
John L. Mansfield	Mansfield	1873-1873
John M. Eull	Quincy	1873-1873
Cyrus Hartwell	Hoopeston	1873-1873
Francis B. Haller	Vandalia	1873-1873
A. S. Proctor	Rome	1873-1873
A. E. Smith	Rockford	1873-1873
Daniel Gardner	Champaign	1873 —
Alexander McLean	Macomb	1877 —
T. T. Fountain	Du Quoin	1879 —
S. M. Millard	Chicago	1879 —
James C. Conkling	Springfield	1879-1879

*Reappointed 1875—Deceased 1878.

At the first meeting of the Trustees, John M. Gregory, LL. D., of Michigan, was elected Regent, and to him more than to any other are due the principles adopted for the organization of the University, and its development upon its present broad and liberal basis. The wisdom of these plans is shown in the success attained and in the preëminently hopeful outlook for the future. John W. Bunn, of Springfield, was elected Treasurer, and has ever since efficiently performed the duties of his office. Hon. W. C. Flagg, of Moro, was Corresponding Secretary from 1867 to 1875, when T. J. Burrill, the present incumbent, was elected. The duties of Recording Secretary have been performed by O. B. Galusha, 1867 to 1868; Jonathan Periam, 1868 to 1869; W. F. Bliss, 1869 to 1870; and by Edward Snyder since the last mentioned date. In 1873 S. W. Shattuck was elected Business Agent, and has since continously served in this capacity.

The second meeting of the Trustees occurred May 8, 1867, at which most important work was done in preparation for the new Institution. The location was confirmed, the meaning and purposes of the law discussed and interpreted, the character of the University under the law determined, and plans adopted for its organization and development.

The first report of the Committee on Courses of Study and Faculty, made by J. M. Gregory, Newton Bateman, Mason Brayman, S. S. Hayes and Willard C. Flagg, at this meeting, is, in the light of the past and present, thirteen years after its reading, a marvelous document—a great hope justified, a remarkable prophecy fulfilled. The Trustees and their officers had much to contend against. It is not strange that in the newness and crudeness of the subject in the public mind, in the conflicting opinions of interested persons and parties, that there were unpleasant criticisms and injurious acts of antagonism. Commendations were numerous and inspiring; denunciations were likewise numerous and disheartening. These on both sides were sometimes wise, sometimes otherwise sometimes springing from a real, deep-seated interest in the great experiment, sometimes from a fervent desire to see certain things accomplished, without much appreciation of the difficulties involved or the obstacles in the way; sometimes arising from honest differences of opinion, sometimes from misrepresentations, and sometimes, it must be recorded, from personal prejudice and uncharitable assumptions. But, looking through all this, it is impossible for any one familiar with the present status of the University to read this first report upon its organization without recognizing in that the foundation and prediction of the Industrial University of to-day. By the adoption of this report it was thoroughly settled that the Institution was not to give instruction in the mere manual arts of agriculture and manufacture, to replace an apprenticeship only, but to be a true University of the highest order; having full *educational* courses, as broad and liberal as those of the best existing institutions, yet different in its purpose of training men for the mastery of the great branches of industry as opposed to providing an introduction to the study of law and theology. Classical studies were not to be omitted, but were to give place as leading branches to science and modern literature. The knowledge pertaining to practical life should be made prom-

inent, without in the least belittling or degrading the educational character of the instruction. It was not forgotten that man is more than the artisan, and that manhood has duties and interests higher and grander than those of the workshop and the farm; that leaders in the splended industries of the nineteenth century must possess wide attainments and thorough culture: that they must be able to to investigate and invent, and able, as well, to communicate through the press and by public speech, their knowledge, discoveries and matured plans for the promotion of the material and intellectual prosperity of the State.

The University was opened for students March 2, 1868, and during the term which followed there were enrolled seventy-seven names. At the opening of this term there were, besides the Regent, but two professors, Geo. W. Atherton and Wm. M. Baker. These were assisted, beginning April 20, by Thos. J. Burrill. The classes taught during this term were: Algebra (3 classes), Geometry, Natural Philosophy, History, Rhetoric, and Latin (3 classes).

The inaugural ceremonies took place Wednesday, March 11, 1868, at which Hon. S. W. Moulton, of Shelbyville, presided; Hon. Newton Bateman, of Springfield, delivered an address upon the history and progress of the initial efforts in behalf of the University, its character and prospects; Dr. J. M. Gregory, Regent of the University, delivered the inaugural address. This was a gala day for the friends of the new educational enterprise, and especially for the citizens of the county. The attendance upon the exercises was very great, and cordial interest and hearty enthusiasm enlivened and made memorable the day. A banquet, prepared by the citizens, was served in the building, and after dinner speeches and applause continued to testify to the high anticipation and hopeful appreciation of the institution that day inaugurated.

A record is here made of the date of appointment, position and term of service of those who have been and are (Oct. 1880) members of the Faculty of the University. Mention is not made of a large number who have been employed in the work of instruction, but who did not become members of the Faculty as designated by law. When no mention is made of the close of service, it is understood this has not occurred.

Dr. J. M. Gregory, elected Regent March, 1867, held this position until June 1880, when he presented his resignation, which took effect the September following. Soon after the opening of the University, Dr. Gregory also assumed the duties of Professor of Philosophy and History, continuing the same until his resignation. Wm. M. Baker and Geo. W. Atherton were elected to undesignated professorships November 27, 1867. The former was afterward assigned the chair of English Language and Literature, and the latter that of History and Social Science. Professor Baker was appointed Regent, *pro tem.*, July 7, 1869, serving until September following. His labors were terminated by his death April 16, 1873. "A genuine worker, and a noble christian man; history will embalm his memory among those who toiled faithfully for the good of the University and for mankind." Professor Atherton resigned January 1869, to accept a professorship elsewhere. T. J. Burrill, entering upon duty April 20, was elected, assigned Professor of Natural

History and Botany November 18, 1868; March 9, 1870, he became Professor of Botany and Horticulture; February 15, 1878, Dean of the College of Natural Science, and September, 1879, Vice-President of the Faculty. Willard F. Bliss was appointed Professor of Agriculture March 11, 1868, the day of the inauguration of the University, his term of office beginning September following. He resigned June, 1870. John W. Powell was elected March 11, 1868, Professor of Natural History, but he never entered upon service at the University, resigning the following year.

At the opening of the fall term, 1868, there were present, besides the first named above: A. P. S. Stuart, Samuel W. Shattuck and Edward Snyder, engaged by a committee charged with this duty. November 18, 1868, the first was formally elected Professor of Chemistry; the second, Assistant Professor of Mathematics and Instructor in Military Tactics, and the third, Assistant Professor of Book-keeping and German. Professor Stuart resigned in June, 1874. Professor Shattuck, March 9, 1870, and was made Professor of Civil Engineering and Instructor in Mathematics, and March 15, 1871, Professor of Mathematics. He was appointed Regent *pro tem.* March 25, 1873, serving as such until September following; was elected Vice-President of the Faculty February 15, 1878, again in September, 1878, and again in September, 1879, the last time declining the honor. Professor Snyder was elected March 9, 1870, Professor of Book-keeping and Instructor in Military Tactics, retaining also the instruction in German. His title afterward became changed to Professor of German and Military Tactics, then to Professor of Modern Languages and Military Tactics. The latter portion was dropped after the detail of a special military officer in January, 1878. He was elected Dean of the College of Literature and Science February 15, 1878. Solon W. Robinson was elected Professor of Mechanical Science and Engineering December, 1869, remaining the same until September, 1878. In February, 1878, he was elected Dean of the College of Engineering. James Belangee began duty as Teacher of Architectural and Mechanical Drawing October, 1869, continuing the work until June, 1871. J. Burkitt Webb was made Professor of Civil Engineering November, 1871; in June, 1878, he obtained leave of absence to go abroad, and, without returning, resigned the following year. Harold Hanson was Instructor in Architectural and Free-hand Drawing one year, beginning September, 1871. In April, 1871, Don Carlos Taft was engaged to teach a class in Geology, and at the close of the summer term was elected Assistant Professor of Geology and Zoölogy; March, 1872, he was appointed Professor of these sciences. Joseph F. Carey was elected in November, 1871, Professor of Ancient Languages, and continued in the office until the Department was abolished, June 7, 1873. Dr. Manly Miles had been elected, June 8, 1870, Professor of Agriculture, to serve six months in the year; this engagement was not fulfilled. On July 1, 1875, he entered upon the duties of Professor of Agriculture and Agricultural Chemistry, but resigned one year thereafter. Dr. F. W. Prentice was employed February, 1873, as Lecturer on Veterinary Science, made Professor of same June, 1879, and one year thereafter, the additional professorship of Physiology was assigned him. Joseph C. Pickard was appointed Professor of English Language and

Literature September, 1873. N. Clifford Ricker entered upon duty as Instructor in Architecture the date last mentioned, became Assistant Professor June, 1874, and Professor of Architecture June 8, 1875. He was elected Dean of the College of Engineering September, 1878. James D. Crawford was appointed Instructor in Ancient Languages, September, 1873, the same and Librarian June, 1874, and Professor of Ancient Languages and Librarian June, 1875. Henry A. Weber, employed September, 1874, to give instruction in Chemistry, became Professor of that science June 8, 1875. C. W. Silver was appointed Instructor in Agricultural Chemistry September 9, 1874, serving one year. Miss L. C. Allen was appointed, June 10, 1874, to begin duty September following as Instructor in Domestic Science and Preceptress. March, 1879, she was accorded the title of Professor of Domestic Science and Preceptress. Soon after, without change of title as conferred by the Board, she accepted that of Mrs. Gregory. Her resignation as Professor was offered June, 1880. F. A. Parsons was made Instructor in Book-keeping September, 1874, retaining the position until February, 1880, when he resigned. G. E. Morran became Professor of Agriculture September, 1876, and Dean of the College of Agriculture February, 1878. Peter Roos was appointed Teacher of Industrial Designing and Drawing September, 1876, taking charge of the School of Art and Design then established. He served but one year upon this appointment, but in September, 1879, was elected Professor of Industrial Art and Designing. Peter Baumgrass was made Instructor of Industrial Art and Designing September 11, 1877, and Professor of Drawing and Painting June 4, 1878, serving one year thereafter. Major Wm. A. Dinwiddie was detailed from the United States army and entered upon service as Professor of Military Science and Tactics January, 1878. He was relieved March, 1880. Ira O. Baker, having served as assistant in Engineering and Physics from September, 1874, was elected Assistant Professor of Civil Engineering June, 1879, and one year thereafter was made Professor of the same. Melville A. Scovell was appointed Instructor in Agricultural Chemistry June 4, 1878, Assistant Professor June, 1879, and Professor of the same science September, 1880. Dr. Selim H. Peabody had been offered the chair of Mechanical Science and Engineering March 11, 1868, but did not accept the appointment. In October, 1878, he was elected Professor of Mechanical Engineering and Physics, and entered upon the duties of his office the 10th day of that month; resigning February 1, 1880, he was again appointed to the same professorship, and made Regent *pro tem.* August 15, 1880. Lieut. W. E. Wood, detailed from the United States army, entered upon the duties of Professor of Military Science and Tactics March 29, 1880.

THE ORGANIZATION AND EQUIPMENT OF THE UNIVERSITY,

WITH SOME ACCOUNT OF ITS WORK.

BUILDINGS AND GROUNDS.

The domain occupied by the University and its several departments embraces about 623 acres, including stock farm, experimental farm, orchards, gardens, nurseries, forest plantations, arboretum, ornamental grounds, and military parade ground.

The University buildings, fifteen in number, include a grand main building for public use, one large and two small Dormitory buildings, a spacious Mechanical building and Drill hall, a large Chemical laboratory, a Veterinary hall, a small Astronomical observatory, three dwellings, two large barns, and an ample green-house.

The Mechanical building and Drill hall is of brick, 126 feet in length and 88 feet in width. It contains a boiler, forge and tank room; a machine shop, furnished for practical use, with a steam engine, lathes, and other machinery; a pattern and finishing shop; shops for carpentry and cabinet work, furnished with wood-working machinery; paint room and rooms for models, storage, etc. In the second story is the large Drill hall, 124 by 80 feet, sufficient for the evolutions of a company of infantry, or a section of a battery of field artillery. It is also well supplied with gymnastic apparatus. One of the towers contains an armorer's shop and military model room, an artillery room and a band room. The other contains a printing office and editor's room.

The large Dormitory building is 125 feet in length and five stories in height. This was so badly damaged by storms in the spring of 1880 that it is not fit for use. It afforded 80 private rooms for students. Two smaller Dormitory buildings contain eight rooms each. The new Chemical building, erected in 1878 at a cost, including furniture, of $40,000, contains five laboratories, and is one of the best and largest in the United States.

PROPERTY AND FUNDS.

Besides its lands, buildings, furniture, library, etc., valued at $470,000, the University owns 25,000 acres of well-selected lands in Minnesota and Nebraska. It has also endowment funds invested in State and county bonds amounting to $319,000, besides other property and avails, valued at $33,000. The State has appropriated $25,000 to the Agricultural Department for barns, tools, stock, etc.; $25,000 to

the Horticultural Department for houses, green-house, barns, drainage, tools, trees, etc.; $25,000 for Mechanical and Military building, machinery, etc.; $127,000 toward the erection of the main building, and furnishing the same; $10,500 for chemical apparatus; $25,000 for Library; $5,000 for the apparatus of a Physical laboratory; $3,000 for a Veterinary hall, stable and apparatus; $40,000 for Chemical building, besides smaller amounts for agricultural experiments, etc.

ORGANIZATION OF THE UNIVERSITY.

The Institution is a University in the American sense. It embraces four Colleges, which are subdivided into Schools. A School is understood to embrace the course of instruction needful for some one profession or vocation. Schools that are cognate in character and studies, are grouped in the same College. The following are the Colleges and Schools:

I. COLLEGE OF AGRICULTURE.

II. COLLEGE OF ENGINEERING.

School of Mechanical Engineering. School of Architecture.
School of Civil and Mining Engineering.

III. COLLEGE OF NATURAL SCIENCE.

School of Chemistry. School of Natural History.
School of Domestic Science.

IV. COLLEGE OF LITERATURE AND SCIENCE.

School of English and Modern Languages. School of Ancient Languages.

V. ADDITIONAL SCHOOLS.

School of Military Science. School of Art and Design.

Vocal and Instrumental Music, Elocution, Telegraphing and Photography are also taught, but not as parts of the regular courses.

COLLEGE OF AGRICULTURE.

SPECIAL FACULTY.

The Regent,	Professor Prentice,
Professor Morrow, Dean,	Professor Scovell,
Professor Burrill,	C. I. Hays.

OBJECT OF THE COLLEGE.

The aim of this College is to educate scientific agriculturists and horticulturists. The frequency with which this aim is misunderstood, demands that it shall be fully explained. Many, who look upon agriculture as consisting merely in the manual work of plowing, planting, cultivating and harvesting and in the care of stock, justly ridicule the idea of teaching these arts in a college. The practical farmer who has spent his life in farm labors, laughs at the notion of sending his son to learn these from a set of scientific professors. But all this implies a gross misunderstanding of the real object of agricultural science. It is not simply to teach *how* to plow, but the reason for plowing at all—to teach the composition and nature of soils, the philosophy of plowing, of manures, and the adaptation of the different soils to different crops and cultures. It is not simply to teach *how* to feed, but to show the composition, action and value of the several kinds of food, and the laws of feeding, fattening and healthful growth. In short, it is the aim of the true Agricultural College to enable the student to understand thoroughly all that man can know about soils and seeds, plants and animals, and the influences of light, heat and moisture on his fields, his crops, and his stock; so that he may both understand the reason of the processes he uses, and may intelligently work for the improvement of those processes. Not "book farming," but a knowledge of the real nature of all true farming, of the great natural laws of the farm and its phenomena—this is the true aim of agricultural education. Agriculture involves a larger number of sciences than any other human employment and can not be regarded as an unfit end of a sound collegiate training.

The steady aim of the Trustees has been to give to the College of Agriculture the largest development practicable, and to meet the full demand for agricultural education, as fast as it shall arise. Agricultural students are especially invited to the University.

APPARATUS AND EQUIPMENTS.

The College has, for the illustration of practical agriculture, a stock farm of 410 acres, provided with a large stock barn fitted up with stables, pens, yards, etc., and an experimental farm of 180 acres, furnished with all necessary apparatus. It has fine specimens of neat cattle, short horns and Jerseys, with several breeds of swine, to illustrate the problems of breeding and feeding. The Experimenal

Department exhibits field experiments, in the testing of the different varieties and modes of culture of field crops, and in the comparison and treatment of soils. It includes experiments in Agriculture and Horticulture, under the direction of the Professors of Agriculture and of Horticulture, and experiments in feeding animals of different ages and development, upon the various kinds of food. In common with similar departments in the several Agricultural Colleges of the country, it attempts to accumulate knowledge preparatory to the development of an agricultural science.

The barn on the stock farm has north and west fronts of 80 feet each. Each limb, or L, is 40 feet wide. It is of the kind known as the side-hill barn. The barn on the experimental farm is of less size, but is fitted up with great convenience, and is supplied with a mill for grinding feed, run by a large wind-mill.

A Veterinary hall and stable has been provided, and a clinic is held to illustrate the lectures on Veterinary science. The Department has Dr. Auzoux' celebrated complete model of the horse, in 97 pieces, exhibiting 3,000 details of structure; also *papier-machè* models of the foot and teeth of the horse at different ages.

Surveying and Drainage are illustrated by field practice with instruments, and by models. Agricultural Chemistry is taught by lectures and laboratory practice, in the analysis of soils, fertilizers, foods, etc.

Upon the grounds devoted to the use of the College, there are: 1. An apple orchard planted in 1869, containing about 1,000 varieties, with pears, cherries, grapes and small fruits. 2. A nursery of young trees, in which students have regular work in grafting, etc. 3. A forest-tree plantation of the most useful kinds of timber. 4. An arboretum, in which hardy indigenous and exotic trees are planted as fast as they can be secured; it now contains nearly 100 species. The ornamental grounds which surround the University building occupy about twenty acres, kept in neat and attractive style. These, with the adjuncts of trees and flowering shrubs, lawn and beds of of flowers and foliage plants, walks of different material and styles of laying out, illustrate the class-room work in landscape gardening. A green-house contains a collection of plants of great value, to the classes in floriculture and landscape gardening and furnishes practice in hot-house and green-house management.

Among the more notable may be mentioned a variety of palms, specimens of coffee, tea, banana, sugar cane, custard apple, orange, rubber tree, maranta, fig, aloe, pine-apple, pepper, New Zealand flax, camphor, cinchona, encolyplus, tamarind, cactus, acacia orchis.

Aside from the general library, museums and cabinets, the College has collections of soils, seeds, models of implements, photographs and engravings, a series of colored plaster casts of fruits prepared at the University; *models clastiques* of fruits and flowers from Paris; collections of specimens of woods, of beneficial and injurious insects; numerous dry and alcoholic specimens, etc. The herbarium is rich in specimens of useful and noxious plants, including many of the fungous parasites destructive to cultivated plants.

INSTRUCTION.

The full course occupies four years and includes special agricultural, horticultural and veterinary studies. The first are designated: Elements of Agriculture, Agricultural Engineering and Architecture, Animal Husbandry, Rural Economy and General Farm Management, and History of Agriculture. The special horticultural studies are: Elements of Horticulture, Pomology and Forestry, Floriculture, Plant Houses and their Management, and Landscape Gardening. The veterinary studies are: Anatomy and Physiology of Domestic Animals, Veterinary Medicines, Principles and Practice of Veterinary Science, Veterinary Sanitary Science, etc. During the spring term there is a clinic at the infirmary, where numerous cases of diseased animals are presented and treated before the class free of charge to the owners. Instruction is usually given by lectures and illustrations from the College grounds and collections. The diversified farm crops, the living animals and plants, the collection of machinery, the buildings and appointments, are all useful in making instruction practical and possible. For those whose time is limited, a one year's course of technical study is provided. Special horticultural studies may also be chosen for one year's work.

COLLEGE OF ENGINEERING.

SPECIAL FACULTY.

The REGENT,
Professor RICKER, Dean,
Professor SHATTUCK,
Professor PEABODY,†
Professor WEBER,
Professor BAKER,
Professor ROOS,
CHARLES HILDERBRAND.

SCHOOLS.

Mechanical Engineering, Architecture,
Civil and Mining Engineering.

SCHOOL OF MECHANICAL ENGINEERING.

OBJECT OF THE SCHOOL.

This School seeks to prepare students to invent, design, construct and manage machinery for any branch of manufactures.

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†Regent *pro tem.*, Aug. 15, 1880.

APPARATUS AND EQUIPMENTS.

The Machine shop is a substantial brick structure, erected in 1871, for the purposes of this School, with that of Architecture and Military Tactics. It has a sixteen-horse power engine, and the machine tools most needed, including a planer, two engine and three plain lathes, drilling machines, etc. There is a pattern shop, a blacksmith shop, and the requisite amount of vices and bench-room. A collection of models and machines serves to illustrate peculiar structures and methods of applying force.

INSTRUCTION.

The elementary course in Mechanics begins with the second term of the Freshman year, following a term of elementary plane drawing, and continues to the end of the year. The student begins in the pattern-shop, and is taught to produce simple forms of wood, and wood-turning. From this work he goes to the Blacksmith shop, where he practices drawing, squaring, bending, welding, and otherwise fashioning iron. Returning to the Machine shop, he learns to cut off, center and drill wrought and cast iron. He gives much time at the bench in finding surfaces and forming shapes with the cold chisel and the file. His next lessons are at the hand lathe in turning iron and brass, and afterward at the engine lathe and the planer in turning, cutting screws, and in facing up various forms. In all this work he is under the constant supervision of a watchful master, who holds him strictly to correct methods, and makes him accountable for accurate results.

The object of this work is to teach correct ideas of the use and care of tools, and the development of forms, and the only result sought is accurate workmanship. The pieces when finished may go upon the scrap pile, or into the melting pot, if not wanted for samples.

In the second year the student is employed upon some form of actual construction. The interest pertaining to doing a new thing is increased by giving that new thing a recognized utility. Some form of machine is chosen, such, for example, as the need of the shop itself may require. The subject is taken into the drawing-room, its purposes and requirements are fully discussed, and the steps of the design are worked out. If at all complex, the whole class works upon the same drawings until the design has crystalized into definite shape. Then the parts are assigned to individuals. One takes a wheel, another a piece of the frame, or if the item be large, two persons work together upon it; detail drawings are made and offered for inspection. If found satisfactory, the drawing is taken to the pattern shop and the pattern is made, which must also undergo rigid inspection before it can go forward to the foundry. Thence the rough casting goes to the Machine shop, and receives such finishing, by such methods and with such tools as the case may require. Thus the Sophomore class of 1879-80 have built the heavier parts of a large drill press. The standard of this machine is 84 inches high; its circular table, 25 inches in diameter, swings on the main pillar, and is raised and lowered by rack motion; it will be adapted for automatic or hand feed; its spindle will

have a quick return motion; it has the usual fast and loose pullies and back gears for use in boring large openings. In all respects the machine will be first-class. Having furnished class instruction to the class of last year, it is now doing a similar service to the present class, which will finish it during the present term. When complete all the work upon it will have been done by the students of the University, except the cutting of the gears, for which the shop has, as yet, no suitable machinery. The building of a milling machine will furnish useful instruction to classes yet to come.

The students of higher classes have a greater proportion of theoretical work, which their practical training will the better enable them to appreciate and profit by, with drawing and as much construction as time will permit. The commercial work which comes to the shop gives paid employment to the older pupils, whose elementary and practical courses have prepared them for such work. There is usually as much such work as the students have time for.

As in the other schools, the time required to complete this full course is four years; the student taking, with the above, literary and scientific studies sufficient to keep him busily occupied during this time.

PHYSICS.

This subject is connected, in the professorship, with the foregoing; hence introduced in this place.

THE LABORATORY.

The apparatus has cost about five thousand dollars. Much of it is adapted for investigation, rather than illustration. The room is over the chapel, and like it is 60 feet by 80 feet; a transverse petition divides it equally. The northern part is used as a lecture room, and is capable of seating 350 persons, if necessary. The southern room is the laboratory, a beautiful apartment, having abundant light from the east, south and west. In the center of this room a case for apparatus has been enclosed, 16 by 20 feet, the upper part being made useful by a gallery. This case is glazed on three sides; the lower part affords abundant opportunity for the display of pieces of interest, while the gallery gives place for many things not less useful, though less attractive. Between the apparatus room and the lecture room is a space designed, primarily, as an ante-room for the lecture room, and having its floor on a level with the lecture platform. This room communicates, both above and below, with the apparatus room in its rear, and by ample sliding doors with the lecture room in front. Even if the lecture room is occupied, preparation may be made in the ante-room for a succeeding exercise, and at the time for change the required apparatus may be transferred in an instant, through the broad doorway. The ante-room, when closed, becomes a dark room, admirably adapted to such experiments as require total absence or perfect control of light. The ante-room and apparatus room occupy the center and on one side of the laboratory, leaving a space on the remaining three sides in which 50 students could work together, if occasion should require. Here are arranged the several forms of apparatus required for the experiments.

INSTRUCTION.

The study of physics occupies two college terms, in which there are each week five recitations from a text-book, one lecture, and four hours of laboratory practice. In the latter, a series of about forty experiments are performed by each student, two working together according to a programme arranged for the purpose. Besides the written directions for the method of procedure, the student has the aid of the Professor and his assistants, when needful. Careful notes and calculated results are required, on paper of a given size. Professor Peabody, now in charge of this work, speaks as follows of its needs:

The new laboratory leaves little to be desired as to convenience of arrangement,—and convenience means an increased product, as every manufacturer knows. It is, however, matter of great regret, and a serious want in our facilities of instruction, that this department has not received the entire time of one competent professor. There is no place where the genius of a fertile brain has greater scope to exert itself, in developing and applying old methods, and inventing new ones; there is no place where we may do so much honest and needful work, and have so little to show for it. A lecture of an hour may mean unremitting labor for a week; it always means many hours of preparation and other hours of removal. It takes the housewife hours to prepare a dinner that is eaten in half an hour, and she spends hours more in placing her utensils in order for the next time of need. The help of a competent assistant is also beyond value.

SCHOOL OF CIVIL ENGINEERING.

OBJECT OF THE SCHOOL.

The School is designed to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable students to enter intelligently upon the various and important duties of the engineer.

INSTRUCTION.

The instruction is given by lectures, text-books and reading, to which are added numerous problems and practical exercises, as serving best to explain completely subjects and fix them in the mind. Models and instruments are continually used, both in lectures and by the students themselves.

COURSE OF STUDIES.

The studies taught in this School, as belonging specially to it, are as follows: Projection Drawing, Ornamental Drawing and Lettering, Topographical Drawing and Mapping, Descriptive Geometry, Land

Surveying, Topographical Surveying and Levelling, Road and Railroad Engineering, Geodetic Surveys, Practical Astronomy, Descriptive Astronomy, Analytical Mechanics, Bridge Analysis and Designing, Bridge Construction, Foundations and Stone Work. Students of this school pursue studies in other schools of the University. Arrangements are making for an advanced or post-graduate course in Civil Engineering, which will include the following special subjects: Advanced Bridges, Tunnelling, Water Supply Engineering, Harbor and River Improvements, Arches and Stone Work, Drainage and Sanitary Engineering, Practical Astronomy, Theory of Least Squares.

APPARATUS.

For Field Practice.—The School has an equipment of instruments for instruction in Engineering in field work, including chains, tapes, compasses, plane tables, transits, stadias, levels, base rods and comparing apparatus, barometer for barometical levelling, sextants, engineer's transits arranged for astronomical observations, an observatory which is provided with an equatorial telescope, an astronomical transit, a zenith telescope, a chronometer, and a set of meteorological instruments.

For the Lecture Room.—Models for illustrating the subjects of Descriptive Geometry, Astronomy, Roof and Bridge Trusses, Arches and Stone Work, and Railroad Superstructure. The School has a collection of students' manuscripts and drawing, and of authentic designs of bridges, roofs and engineering structures. It has also a complete set of maps of both the Coast and Lake Surveys. The College of Engineering has received the very large and excellent collection of lithographs of the lectures and drawings used in the Governmental Polytechnical Schools of France. The students of this School are steadily growing in favor with those seeking engineering services. During the past summer the demand was greater than the supply. Nearly all of the graduates are filling positions of responsibility and trust in their profession.

Students in Mining Engineering have all the facilities of the School of Civil Engineering, but instead of pursuing the special studies not closely related to their course, they have instruction in Metallurgy and Analysis of Coal, Mineral Waters, etc. The Geological and Mineralogical cabinets are well furnished with useful specimens, and the Metallurgical and Assaying laboratories have stamp-mill, furnaces, and other apparatus required for practical instruction in this department.

SCHOOL OF ARCHITECTURE.

OBJECT OF THE SCHOOL.

The School prepares students for the profession of Architecture. For this a thorough knowledge of scientific principles applied to building, ability and correct taste in design, and a technical knowledge of the various building trades, with skill in the use of tools, are necessary, and are prominent objects of the course of instruction.

INSTRUCTION.

The work of the School of Architecture, in imparting instruction and its aims and methods, may be classified under four heads:

1. The imparting of technical information.
2. Training in the use of the tools and methods employed in the building trades.
3. Training in the use of drafting instruments and materials.
4. Training in the art of original design.

1. Technical Information—Is given as to the materials and methods employed in the various building trades; a knowledge of the preparation of legal papers, contracts, agreements, specifications and estimates of cost; also a knowledge of the various architectural styles and their most prominent examples. This knowledge is almost wholly imparted by lectures, as few text-books are available, and they are illustrated by engravings, photographs and sketches, with references to work in the library. The lectures are concise, written with a type-writer on transparant paper, and are then copied by the "blue" process. In this way each student can obtain a complete copy at much less cost than he can write it out for himself. The text is read more easily than manuscript, being in print. The lectures can be made as full and complete as desired, instead of being limited by the time of delivery, as is usually the case. Illustrations are also drawn on transparent paper and printed in the same way.

2. Training in the use of Tools.—The object of this is two-fold.

1. To give the student such knowledge of a trade, that if he meet with reverses in life, he will still have a means of honestly earning a living, or that he may do the work which is often required about a residence or a farm.
2. To teach the student practically the methods of construction which are in use in building, the proper use of the tools, and above all, to know how work should be done, and the difference between good and bad work, so that he may know that good materials have have been used and that the work has been well done. The special object of this is to prepare a student for taking charge of the construction of a building, as superintendent or architect, rather than

to fit him merely for working at a trade. One year of honest work in the classes in shop practice proves sufficient to attain this result.

3. Training in the use of Drafting Instruments.—This study develops manual skill, cultivates habits of neatness and accuracy, ascertains the peculiarities of the materials and colors employed, and presents methods of finishing drawings and of distinguishing the different materials when these are required to be shown. The system of instruction is progressive. It commences with accurate line-drawing, then takes up shading in ink, sepia, line, and finishing in full color. About one-half the time is spent in making sets of the working drawings which are required for a building, from copies, from small sketches, and, when the student has become more proficient, from a small plan and a sketch in perspective, which is usually taken from one of the architectual journals.

4. Training in the art of Design.—Correct taste and the power of designing, necessary to make the indispensable things of life beautiful, form the keystone in the education of the architect. After a student can make a good set of drawings from a sketch, or small perspective, a programme of conditions and requirements for a small building is given to him. This is followed by others, increasing in difficulty as he acquires power, and ending with the most difficult structures which an architect is called upon to erect, except public buildings, which are reserved for the post-graduate course. In studying these problems, sketches at a small scale are first made and changed until satisfactory, great attention being paid to arrangement and convenience of plan. From these the student prepares a full set of working drawings neatly colored and shaded. Working drawings, similar to those made in architect's offices, are preferred to fine drawings, though as much time as can be spared is given to this branch of the art.

APPARATUS AND EQUIPMENTS.

The facilities for instruction at the School of Architecture are: 1. An excellent library. 2. The use of a fine art gallery, containtaining casts of sculptures, ornaments, and many photographs of buildings. (See School of Art and Design). 3. A good and rapidly increasing collection of models illustrating construction. 4. Tools and materials and instruction furnished in shop practice free of charge. 5. American, English, French and German architectural periodicals are regularly taken in the library.

The new Chemical laboratory was designed by the Professor of Architecture, assisted by student of the course. Many other pieces of work for the University have originated in the same way. A school house at Rankin, Ill., was designed by an undergraduate student. It has given good satisfaction. Graduates are becoming well established as architects in several western cities.

BUILDER'S COURSE.

The trustees allow persons desiring to fit themselves for master builders to take a course of a single year, pursuing such technical studies of the course in architecture as they may be prepared to enter upon with profit, and as will be most advantageous to them.

COLLEGE OF NATURAL SCIENCE.

SPECIAL FACULTY.

The REGENT.
Professor BURRILL, Dean,
Professor WEBER,
Professor PEABODY,
Professor TAFT,
Prof. L. ALLEN GREGORY,
GEORGE A. WILD,
C. I. HAYS.

SCHOOLS.

School of Chemistry. School of Natural History.
School of Domestic Science.

SCHOOL OF CHEMISTRY.

This School aims to impart such knowledge of Chemistry as will enable the student to apply the principles of the science to the related arts, and to fit him for the field of original research, or for the practical business of the druggist, pharmacist and practical chemist.

INSTRUCTION.

Text-book instruction in the principles of Chemistry and Chemical Physics occupy six weeks of the first term of the first year. Afterward the recitations alternate with laboratory practice. During the next three years each student is expected to work two hours daily in the laboratory, five days in the week. In order to graduate, each is required at the close of his course, to make an original investigation, and present a thesis.

Students who pursue Chemistry as a part of other courses work at least two consecutive hours daily during such time as their specialty may require.

The special Chemical course requires for its completion four years' of study. Associated with this there have been established a four years' course in Pharmacy and three years' courses in Agricultural Chemistry and Metallurgy.

APPARATUS

The facilities offered for obtaining a practical knowledge of Chemistry are believed to be unsurpassed by those of any other institution in the West. A large Laboratory building, 75x120 feet, and four stories in height, was erected 1877–8, at an expense, including furniture, of $40,000. It is excellently lighted, heated and ventilated and contains the following apartments: One large lecture room, with seating capacity for two hundred students; one small lecture room for advanced students; a large laboratory for qualitative analysis, containing one hundred and four desks; a large laboratory for quantitative analysis, etc., containing sixty-four desks; a pharmacy, with collection of specimens for *materia medica* and of officinal preparations made by students; a room for gas analysis; an assay room; store rooms, and a photographic gallery and other apartments.

A large amount of practical work has been done in the laboratory during the last two years by professors and students, such as analyses of different varieties of corn, wheat, oats and other grains, potatoes, beets, baking powders, foods for adulterations, well and cistern water, river water for State Board of Health, soils, milk of different breeds of cows, etc. Much attention has been paid to the production of sugar from Sorghum cane.

SCHOOL OF NATURAL HISTORY.

The aim of this School is to give a liberal scientific education. It acquaints the student as far as possible with what is known in respect to the structure of the earth and to the origin and distribution of its organic products; teaches him to collect and preserve specimens and arrange them for study, and to conduct original investigations.

The special studies of the course are: Botany and Vegetable Physiology, three terms, after one of preparatory study; Anatomy and Physiology; Zoölogy, two terms; and one term each of special Entomology; Osteology and Taxidermy; Geology and Palæontology, three terms; Physical Geography and Meteorology; Mineralogy; Astronomy, and Microscopy. The course occupies four years.

INSTRUCTION.

The methods of instruction vary according to the subjects taught, the time given to them, the facilities at hand and the aims of the

instructors. It is the constant endeavor to make the course thoroughly practical and useful from an educational stand-point as well as to give the kind of knowledge necessary for the mastery of the material world.

APPARATUS AND EQUIPMENTS.

The Botanical laboratory has a growing herbarium, containing about eleven hundred species of flowering plants out of the fifteen hundred known in Illinois, a large number of flowering plants from other States and countries of the world, and a considerable collection of flowerless plants. Among these the Ferns and Fungi are the most important. There are compound microscopes and apparatus sufficient for use in the classes, so that during certain portions of his course every student has ample practice with them. Collections of woods of fruits, dry and alcoholic, of plaster casts, of microscopic preparations, of charts and drawings, make up, together with the greenhouse and its specimens and the library, the facilities for the study of Botany and Vegetable Physiology. A considerable collection of insects, especially of those inhabiting our own State, aids in the study of Entomology. Most prominent, however, in the equipments of the School is the

NATURAL HISTORY MUSEUM.

The room for the Natural History collections is on the first floor of the west wing of the main building. From north to south it is seventy-six feet long; it is sixty feet wide and sixteen feet high. On the west side are six large windows, and on the south, three, which ordinarily afford abundant light.

Wall Cases.—Covering the entire wall on the east, and the spaces between the windows on the south and west, are two stories of wall cases; they are separated by a gallery on the three sides of the room, which is reached by iron stairs at the northeast and northwest corners. These cases, with continuous shelving, are eight feet high, provided with glazed doors.

Floor Cases.—There are also on each side of the room, opposite the spaces between the windows, five upright glazed cases, for the reception of such large specimens as could not be accommodated in the wall cases. The two extreme ones on either side are 10 feet 8 inches by 6 feet; and the three middle ones are 10 feet 8 inches by 3 feet 6 inches; all 8 feet high.

Table Cases.—Directly opposite the windows, so as not to obscure the light, and between the floor cases on each side of the room, are table cases, glazed at top, sides and ends, for the reception of shells, minerals or any small specimens. All this work, of wood and iron, was done at the University shops, and chiefly by the students of the architectural and mechanical classes.

A large case, 15 feet by 6 feet, and uniform with the rest, is nearly complete, to occupy the south end of the room for the preservation of archæological specimens, Indian relics, and whatever else may be deemed worthy or instructive, in teaching the progress of civilization.

Arrangement of Contents.—On either side of the central space are arranged the large casts of Ward's collection of remarkable fossils. Directly in front, towards the south end, stands the gigantic *Megatherium.* Largely covering the north wall hang the slabs of the immense Saurian reptiles. The remainder of this remarkable collection of casts of fossils, numbering in all three hundred and twenty-six, are arranged in the lower wall cases at the south end of the room, and on the tops of the floor cases.

This most valuable set of casts was presented to the University, when it had almost no cabinet, by Hon. Emory Cobb, President of the Board of Trustees.

The entire east side wall cases are occupied by small mammals, birds and skeletons; the mammals beginning on the north below, and occupying about one-third the length of the room. The birds follow, arranged at present according to the system of Dr. Cones. These occupy the remaining east cases below, and about two-thirds of the north part of the gallery. The remaining third is filled with skeletons of such animals as can be accommodated there.

On the south in the gallery, beginning at the east end, the first case contains the articulates; the second, the reptiles; the third, the fishes; the fourth, the radiates.

The floor cases on the west side contain the large ruminants (elk, deer, moose, mountain sheep and antelopes). On the east a mounted buffalo, with its skeleton and skeletons of other large mammals. Part of the table cases contain sea, land and fluviatile shells, of about 1,700 species. The rest contain minerals and fossils. The cases on the west wall, below and above, are appropriated to geological specimens, rocks and fossils.

Almost the entire collection of mounted specimens has been put up at the University, and chiefly by the students themselves, many of whom are very expert. The skins have been bought or donated, and skilled labor applied at home. Thus all the large ruminants and the smaller mammals are home products. The birds, also, excepting six or eight, are products of the University. By this means half or more of the expense has been saved.

In Osteology, where specimens are usually expensive, many fine and valuable skeletons have been mounted, at a comparatively small expense. The bones of the larger animals are macerated for six to twelve months; neatly cleaned, bleached, and properly fastened together by wires. These are called "artificial skeletons." Small mammals, birds, fishes and reptiles have their bones carefully scraped, leaving the joints connected by their natural ligaments; hence, these are called "ligamentous skeletons." In the description of the Museum, the amount of work done in this direction will be appreciated.

The Museum is peculiarly fortunate in its collections in Zoölogy, possessing, in mounted specimens or skeletons, nearly all the ruminants of North America, except the musk ox; and representatives of all Orders of mammals, except *Proboscidæ*; exhibiting 50 species by 80 mounted specimens, with numerous skeletons. In birds, it represents all the families of North America, having 240 species represented by over 300 specimens. Its fishes are about 300. Its articulates and radiates have recently received valuable accessions from the Smithsonian Institute.

If this Museum falls short of expectation, it may be pleaded in excuse, that it was the last of the departments to receive legislative aid; it dates such help only three years ago (1877), and hence has just been commenced. But it is the pride of the Institution that the appropriation made ($3,000), having been chiefly expended for the raw material, the application of home industry, and careful, intelligent economy, have produced a collection of valuable, typical specimens, that could not be purchased for more than double that sum. And it stands a fit monument to the industry and skill developed by the practical system which aims to utilize its home resources, and has so far succeeded in the accomplishment of so desirable and honorable a result.

All donations, which are preserved as specimens in the Museum, have the contributor's name placed upon the label, *as donor*. Also, a book is kept, in which these names are entered, alphabetically, with specimen contributed.

For contributions valued at more than fifty dollars, there is a special bulletin hanging in the Museum upon which the names of such contributors are written, with a statement of the donation and its valuation.

SCHOOL OF DOMESTIC SCIENCE.

This is the first School of Domestic Science of high grade, and with a complete course, organized in the United States, if not the first in the world.

OBJECT OF THE SCHOOL.

It is the aim of the School to give to earnest and capable young women a liberal and practical education, which shall fit them for their great duties and trusts, making them the equals of their educated husbands and associates, and enabling them to bring the aids of science and culture to the all-important labors and vocations of womanhood.

This School proceeds upon the assumption that the housekeeper needs education as much as the architect, the nurse as well as the physician, the leaders of society as surely as the leaders of senates,

the mother as much as the father, the woman as well as the man. We discard the old and absurd notion that education is a necessity to man, but only an ornament to woman. If ignorance is a weakness and a disaster in the places of business, where the income is won, it is equally so in the places of living, where the income is expended. If science can aid agriculture and the mechanic arts to use more successfully nature's forces, and to increase the amount and value of their products, it can equally aid the housekeeper in the finer and more complicated use of those forces and agencies, in the home where winter is to be changed into genial summer by artificial fires, and darkness into day by costly illumination; where the raw products of the field are to be transformed into sweet and wholesome food by a chemistry finer than that of soils, and the products of a hundred manufactories are to be put to their final uses for the health and happiness of life.

The purpose is to provide a full course of instruction in the arts of the household, and the sciences relating thereto. No industry is more important to human happiness and well-being than that which makes the home. This industry involves principles of science, as many and as profound as those which control any other human employment.

SPECIAL STUDIES.

The special studies of this course, which requires the usual four four years of college work, are as follows:

Food and Diatetics, two terms; Domestic Hygiene; Household Æsthetics; Household Science; Domestic Economy; Usages of Society; Home Architecture; Landscape Gardening.

HEALTH AND PHYSICAL TRAINING.

A spacious Gymnasium for young women has been fitted up in the Library wing, and instruction in calisthenics is given to two or more classes daily. Lectures on health, and its conditions, and on other important topics, will be delivered to these classes, at suitable intervals, and great pains will be taken to secure, to the utmost possible extent, physical vigor, robust health, and a graceful carriage, and to prepare young women to take enlightened care of their own health, and the health of others under their charge.

COLLEGE OF LITERATURE AND SCIENCE.

SPECIAL FACULTY.

The REGENT,

Professor SNYDER, Dean,	Professor BURRILL,
Professor PICKARD,	Professor TAFT,
Professor CRAWFORD,	Professor WEBER,
Professor SHATTUCK,	CHAS. E. PICKARD.

SCHOOLS.

English and Modern Languages.
Ancient Languages and Literature.

OBJECT OF THE SCHOOLS.

The object of the Schools in this College is to furnish a sound and liberal education to fit students for the general duties of life, and especially to prepare them for those business pursuits which require a large measure of literary and scientific knowledge and training. They meet the wants of those who wish to prepare themselves for the labors of the press as editors or publishers, for teachers in the higher institutions, or for the transaction of public business.

Students in the Agricultural and other Technical Schools, desiring to educate themselves as teachers, writers, and professors, in their special departments, require a knowledge of the ancient, as well as the modern languages, to give them a full command of all the instruments and facilities required for the highest proficiency in their studies and proposed work. The University seeks through these Schools to provide for this important part of its mission—the furnishing of teachers to the industrial schools of the country, and investigators and writers for the arts.

INSTRUCTION.

The plan of instruction embraces, besides the ordinary text-book study, lectures and practical exercises in all the departments, including original researches, essays, criticism, proof-reading and other work intended to illustrate the studies pursued, and to exercise the student's own powers. It is designed to give to all the students voice culture and a training in elocutionary practice.

A prominent aim will be to teach the right use of books, and thus to prepare the student for self-directed investigation and study, which will extend beyond the curriculum of his school and the period of his graduation. With this view, constant use of the already ample and continually enlarging stores of the library will

be required and encouraged. As a further aid in this direction, members of the advanced classes are usually selected to act as assistant librarians. In this service they are able to obtain much valuable knowledge of various departments of literature and science, of prominent authors, and to the extent and scope of their writings. Of special value, as an incentive to, and the means of practice in, English composition, should be mentioned THE ILLINI, a semi-monthly paper edited and published by the students of the several Colleges, each of which is appropriately represented in its columns. A printing office has been provided in the Mechanical building, and is furnished with all requisite material.

THE LIBRARY.

This is a general collection of books and papers for the use of all departments of the University, but it is in some sense the special equipment of the Schools of Language and Literature. It contained, September 1, 1880, twelve thousand five hundred and fifty volumes, an increase in the two years, since the last report of the Trustees of the University, of one thousand four hundred and forty volumes. There are also between one and two thousand pamphlets. The number of the latter varies, since the more valuable ones are bound, from time to time.

The library receives regularly, at present, eighty periodical publications, divided as follows:

Agricultural, etc	21
Natural Science	17
Engineering, etc	18
All other	24

Of the last class, the most are free contributions, including the papers of Champaign and some of the adjoining counties.

The amount expended in the library has been fifteen hundred dollars a year, for the two years, being the State appropriation for the library.

The fine Library hall is used as a reading room, from which, however, students are not allowed to take books, except by special permission. It is open five days in the week, from eight A. M. to five P. M., and Saturdays, from two to five P. M.

The use of the library is urged upon students in all the classes; and any person is welcome to consult the books, under the same conditions as are imposed upon students.

GENERAL STUDIES.

Mathematics, History, Philosophy and Logic, are more or less included in all the courses of study in the University, but they may be appropriately mentioned here.

PURE MATHEMATICS.

The completion of this course requires two years of study.

Advanced Geometry.—Applications of Algebra to Geometry; Transversals; Harmonic Proportions, etc. *Trigonometry.*—Analytical and Plane. Relations between the functions of an arc; Formation and use of tables; Solution of plane triangles. *Analytical Geometry.*—Construction of equations; Discussion, in a plane, of the point, right-line, circle, ellipse, parabola and hyperbola; Higher plane curves, cycloid, cissoid of Diocles, etc. *Differential Calculus.*—Differentials of algebraic and transcendental functions; Maclaurin's Theorem; Taylor's Theorem; Maxima and Minima of functions of one variable; Equations of tangents, normals, sub-tangents, sub-normals, etc.; Differentials of lines, surfaces of volumes. *Integral Calculus.*—Integration of elementary forms and of rational fractions; Rectification of plane curves; Quadrature of plane areas and surfaces of revolution; and Cubature of solids of revolution.

Advanced Algebra.—Binomial Theorem; Properties and summation of series; Exponential quantities, Logarithms; General theory and methods of solving equations. *Analytical Geometry.*—Loci in space; Surfaces of the second order. *Differential Calculus.*—Differentials and Maxima and Minima of functions of two or more variables; Osculatory curves; Radius of curvature; Evolutes, involutes and envelopes; Discussions of algebraic and transcendental curves and surfaces; Tangent and normal planes; Partial differentials of surfaces and volumes. *Integral Calculus.*—Integration of transcendental and irrational differentials; Differentials of higher orders; Differential equations; Rectifications, quadrature and cubature in general. *Spherical Trigonometry.*—General Formulas; Solution of Spherical Triangles. *Calculus of Variations* will be taught to advanced students.

HISTORY AND SOCIAL SCIENCE.

The historical studies are designed to afford a general view of the history, social organization and progress of the race. They embrace also the history of the arts and sciences, and of civilization, the principles of civil polity and law, the philosophy of history, and the principles of political economy and constitutional law. The instruction is given chiefly by lectures, with readings of specified authors, and the study of historical geography and chronology.

The course occupies six terms in the third and fourth years of the University courses.

PHILOSOPHY AND LOGIC.

The studies of this department are taught chiefly by lectures, with readings of specified authors, and written essays. These studies require much maturity of powers, and are therefore confined to the fourth year of the course.

Mental Philosophy. Analysis and classification of mental phenomena; theories of perception, consciousness, imagination, memory, judgment, reason. Mental Physiology, or connection of body and mind; healthful conditions of thought, growth and decay of mental and moral powers. Philosophy of education. Theory of conscience; Nature of moral obligation, moral feeling. The right. The good. Practical ethics; Duties. Formation of character. Ancient Schools of Philosophy; Modern Schools of Philosophy. Influence of Philosophy on the progress of civilization, and on modern sciences and arts.

Principles of Logic; conditions of valid thinking; forms of arguments; fallacies and their classification. Inductive and scientific reasoning; principles and methods of investigation. Practical applications of logic in the construction of argument, in the detection and answer of fallacies, and in the formation of habits of thinking, and the common judgments of life.

SCHOOL OF ENGLISH AND MODERN LANGUAGES.

English Language and Literature.—In the arrangement of the studies the endeavor is to present a thorough and extended drill in grammatical and philological study, and in the authors and history of the English language, affording a training equivalent to the ordinary studies of the classical language. This drill extends through three years of the course, but may be shortened according to the ability and preparation of the student.

The first two terms of the first year are given to a general survey of the whole field of British and American Literature from the middle of the sixteenth century to the present time. All the really representative writers come into notice, and representative specimens from the writings of each are carefully read in class. Moreover, each student is required each term to read the entire work of some classic author, making choice from a prescribed list. Frequent exercises in writing abstracts or original compositions on themes assigned are also required. The study of Rhetoric occupies the third term.

During the second year some four or five of the great masters are studied, their work analyzed, the shaping forces of their times, and their influences upon succeeding times are investigated. Lectures are given from time to time on Poetry—epic, lyric, dramatic, etc. Writing and reading required as in first year.

In the senior year attention is given to old English; to the Anglo-Saxon, for which the way has been prepared by the study of both English and German; to Philology; to the Philosophy of English Literature, and to Æsthetics. Essays, forensics and orations are required.

French and German.—The modern languages taught in this school are confined to one year of French and two years of German. Abundant practical exercises are given both in composition and translation, and the diligent student gains the power to read with ease scientific and other works in these languages, and may, with a little practice, write and speak them with correctness. A constant attention is also given to the Etymologies common to these languages and the English, and thereby a large advantage is gained by the student in linguistic culture. "He who knows no foreign tongue," said Goethe, "knows nothing of his own."

In the first year, the student passes over a complete grammar and reader, acquiring a knowledge of the technicalities of the idiom, and a sufficient vocabulary for the use of books of reference within the course. The second year is devoted to a critical study of the languages and philological analysis, and to a course of select classic reading, composition and conversation.

SCHOOL OF ANCIENT LANGUAGES AND LITERATURE.

In the School of Ancient Languages and Literature, the methods of instruction, without swerving from their proper aim, to impart a sufficiently full and critical knowledge of the Latin and Greek languages and writings, will make the study of these tongues subservient, in a more than usual degree, to a critical and correct use of the English. With this view, written translations, carefully prepared, with due attention to differences, equivalences and substitution of idioms, and the comparison and discrimination of synonyms, will form part of the entire course.

The study of Latin and Greek composition will constitute a weekly excercise through the first year, and will be continued, to some extent, through the course. Essays, historical and critical, will be required from time to time, in connection with the works, and a free use of the library is urged. It is intended that each student completing the course in Ancient Languages shall have a clear knowledge of the history of Greek and Latin Literature, and of the principal authors in both languages. As an aid to the appreciation of the literature of the two peoples, Greek and Roman history will form an important part of the course, and will be taken up in the beginning of the course, illustrating the works read. In the first term of the third year Ancient History is taken up as a separate study, and especial attention is then given to the history of Greece and Rome, and the nations with whom they come in contact.

ADDITIONAL SCHOOLS, NOT INCLUDED IN THE FOUR COLLEGES.

SCHOOL OF MILITARY SCIENCE.

By the law of Congress, and of the State, the University is required to teach Military Tactics to its students. All able-bodied male students of the classes of the first and second years are enrolled in the companies of the University Battalion, and receive instruction from one to three hours each week.

The military organization of the University ranks in the State Militia as the University Battalion, Illinois National Guard.

CLASS IN MILITARY SCIENCE.

A class is taught in Military Science and Art, as far as is requisite for officers of the line. From this class are selected the officers of the several companies, for which they act as drill sergeants and instructors. The military instruction is now under the charge of Lieut. Wm. T. Wood, an experienced officer of the regular army of the United States. A full supply of arms and ammunition is furnished by the War Department, including 300 cadet rifles and accoutrements, two pieces of field artillery, 1,000 fixed cartridges and 1,000 blank cartridges annually for target practice, with 200 rounds for artillery.

Commissions.—The Governor of the State is accustomed to commission as Captains in the State Militia, such graduates of the University as have completed the studies of the Military Classes, and have obtained the requisite experience in command in the University Battalion. In order to obtain the commission, the student must be approved by the Faculty, and pass satisfactorily an examination in Military Science and Tactics before a committee appointed by the Faculty of the University. It is expected that in order to get the required experience in command, the members of the military class of the third or junior year will serve as commissioned officers of the several companies of the Battalion.

Gymnasium. — The Drill hall is furnished with a full set of gymnastic apparatus, and classes in gymnastic exercises are organized in the fall and winter terms under careful leaders. Fee 50 cents.

SCHOOL OF ART AND DESIGN.

The School of Art and Design, begun in 1876, occupies a large, well appointed apartment in a wing of the main University building. Light is admitted from three sides and managed at will by curtain partitions. The necessary tables, desks, easels, etc., are provided for large classes of students. In the centre is a room of glazed sash for the convenient storing of copies and of examples of class work as well as the exhibition of objects requiring protection. In an adjoining smaller room there is a valuable collection of paintings and sketches, the property and mostly the work of the Professor in charge of the School. Students have access to this room.

The importance of having in the Illinois Industrial University a practical course of art instruction, was duly recognized by the authorities of the University. The exhibits made by the different art schools, both foreign and American, at the Philadelphia Exposition, revealed the fact that the most useful results had been attained by a mode of teaching quite different from that commonly practiced in our schools. During the years 1876 and '77, by direction of the Trustees, the classes in industrial drawing and designing were formed into a regular school, called the School of Art and Design. Its object was stated to be to assist in the general college work, and to furnish a thorough artistic education to those who should wish to pursue industrial or fine arts as a specialty, either as designers, teachers or artists. Such work as tends directly or indirectly to aid the general student is here briefly stated:

1. To develop the power of observation, that the eye may become susceptible to the beauties of the surroundings in nature, so as quickly to perceive and understand the laws of harmony, perspective, shades and color, and to realize complex forms, such as are found in plants, insects, etc.
2. The training of the hand to delicacy, and skill in the use of mediums or implements wherewith to accomplish what the mind directs.
3. To familiarize the student with classical forms of objects, and ornamentation, so as to distinguish different styles, and to cultivate a correct taste.

A two years' elementary course embraces such studies as are especially important to various professions, and therefore meets the wants of the several colleges having free-hand drawing in their courses; besides, it qualifies for entering the higher course in Designing or Fine Arts.

The advanced course, instead of being arranged for a definite length of time, requires a more specific amount and quality of work. An important feature is the opportunity that students have for fitting themselves as practical teachers. Those who have acquired sufficient knowledge are frequently called upon to assist beginners. Lessons are prepared, which, after being criticised and approved, are delivered before the class. This inspires the student with confidence, makes a thorough review of a subject, and stimulates him to do his very best.

As soon as the student fairly appreciates decorative forms, he is taught to combine them artistically, so as to form original designs suitable for some practical purpose. The instruction is by lectures, illustrated by rapid drawings upon the board. Each student also receives individual attention after the lecture; this prevents any error passing unnoticed.

With very few exceptions, the students in attendance have proved themselves earnest workers, and many have exhibited marked talent; a number of ladies and gentlemen have produced some good work in oil colors and crayon. This last branch of art might be carried to a high state of success, even without special encouragement. It is, however, not so important to the industries of the State as the branch in designing.

ART GALLERY.

There is no more attractive place for great numbers of visitors at the University than its large and finely arranged Art Gallery, in the west wing of the main building, on the third floor. The cost has been about three thousand dollars, but this sum has been so expended that a display is made equal to that obtained by many times the outlay in many kindred collections. There are no paintings, for the limited means would not permit their purchase, nor could the results of the sum expended prove nearly so interesting and instructive by thus dividing it. The gallery owes its existence, in the first instance, to Dr. John M. Gregory, who originated the scheme, and, aided by the liberality of the citizens of Champaign and Urbana, selected and purchased the art objects. The larger portion of these were secured in Paris, France. To secure the needful means, lectures were given, whose proceeds went for this purpose; a subscription was taken up among citizens, including members of the Faculty, and other ways resorted to for raising the amount. The University furnishes the room; otherwise, the State has been at no expense for the valuable and beautiful gallery. The following figures show the liberality of the donors; many contributed smaller amounts:

Six each gave	$100 00	Eight each gave	$50 00
Thirty-five each gave	25 00	One gave	40 00
Two each gave	20 00	Twelve each gave	10 00

The hall is 61×78 feet. The wall is tinted a dark maroon color, making a beautiful background for the white casts. The arrangement is such that a view is obtained, on entering, of nearly every thing in the room, the first sight being impressive, and ordinarily eliciting exclamations of surprise from the hundreds of visitors passing the threshold.

Statues.—There are sixteen full-sized statues, among which are the Laocoön Group, Venus de Milo, Venus de Medicis, Diana de Gabies, Faun of Praxiteles, Gibson's Venus, Dying Slave of Michael Angelo, etc. Of the reduced size statues, there are forty-two, including the Apollo Belvidere, Diana the Huntress, Achilles, Minerva, Dying Gladiator, etc. There are ninety-two full-sized busts, representing famous persons of all ages, from Homer to many now living. Among

these, we find ten Roman Emperors, Hippocrates, Socrates, Demosthenes, Cicero, Lord Bacon, Dr. Johnson, Gladstone, Washington, Webster, Douglas, Lincoln, etc. There are twenty-eight busts of smaller size from the best artists.

Bas-Reliefs.—Forty-two pieces. We name, as among the prominently noticeable ones, the Architrave of the celebrated Ghiberti gates in the Baptistery at Florence, Garden of Eden, Cain and Abel, Assyrian Sculpture excavated in 1848, Lion Hunt, Four Seasons, etc.

Medallion Beads.—Large size, twenty-seven; smaller, four hundred and ninety. These have their names stamped upon them.

Engravings.—There are fifty-four beautiful engravings from paintings, by Raphael, Landseer, David, Hessig, Turner, Hogarth, etc.

Photographs.—Two hundred and thirty-two. Roman views, views of Venice, Switzerland, of noted paintings, of bas-reliefs, etc.

Portraits.—Four hundred and seven lithographs of eminent personages, mostly French, with name, date and other information marked on each.

DEGREES AND CERTIFICATES.

The law provides that "on recommendation of the Faculty, the Trustees may authorize the Regent, as President of the University, to issue diplomas to such persons as shall have completed satisfactorily the required studies, and sustained the examination therein, conferring such Literary and Scientific Degrees as are usually conferred by universities for similar or equivalent courses of studies, or such as the Trustees may deem appropriate." Approved May 11, 1877.

In accordance with the law, the following system of Degrees has been adopted by the University:

1. All studies will remain as heretofore, free. Each student may choose and pursue such studies as he may desire, subject only to such conditions, as to preparation, times of study, and number of studies, as may be necessary to secure efficiency in classes and economy in teaching.
2. But students who wish to be candidates for any degree must complete fully the course of studies prescribed for such degree.
3. Students not candidates for any degree will be enrolled as special students, and will receive at the close of their attendance, if not less than a year, the certificates provided by law, with statement of work done and of credits attained.
4. It is designed that the requirements for all the Bachelors' Degrees shall be, as nearly as possible, equal in amount and value.
5. The Degree of Bachelor of Science, B. S., will be given to those who complete either of the courses of study in the Colleges of Engineering, Agriculture, or Natural Science. The name of the School will be inserted after the degree.
6. The Degree of Bachelor of Letters, B. L., will be given to those who complete the course in the School of English and Modern Languages.

7. The Degree of Bachelor of Arts, B. A., will be given to those who complete the course in the School of Ancient Languages.

8. The Masters' Degrees, M. S., M. L., and M. A., and the equivalent degrees of C. E., M. E., etc., will be only given to those who have pursued and passed examinations on a year of prescribed post-graduate studies, and presented an accepted thesis, or after a term of successful practice with a thesis.

EXPENSES.

The tuition is free in all the University classes.

The matriculation fee entitles the student to membership in the University until he completes his studies, and must be paid before he enters. Amount $10 00
The term fee for incidental expenses is, for each student... 7 50
Room rent in University Dormitory, each student per term ..... $2 50 to 6 00

Each student in the Chemical and Physical laboratories, and in the Draughting and Engineering classes, is required to make a deposit varying from 50 cents to $8, to pay for chemicals and apparatus used, and for any breakages or damages.

All bills due the University *must be paid before the student can enter* classes.

The following are the estimated maximum and minimum annual expenses, exclusive of books and clothing, of a residence of thirty-six weeks at the University.

	Minimum.	Maximum.
Term fees and room rent for each student	$28 50	$34 50
Table board in boarding houses and clubs	72 00	144 00
Fuel and light	10 00	15 00
Washing, at 75 cents per dozen	13 50	27 00
Total annual amount	$123 00	$220 50
Board and room in private houses, per week	$4 00	$6 00

CONNECTION OF THE UNIVERSITY WITH THE PUBLIC SCHOOLS OF THE STATE.

The law of the State requires candidates for admittance to the University to pass an examination upon the studies usually taught in the public schools. To meet the necessities arising from a want of the higher departments of the common schools in many places, the Trustees provided for the temporary establishment of preparatory classes, but the high schools are now becoming so numerous and doing such excellent work that it has been decided to discontinue all the University work properly belonging to them. This is to be done June, 1881. In the meantime arrangements have been made to receive students from certain schools without examination. The Faculty designate one or more high schools in each county of the State, whose certificates

of examination, in the branches required of candidates for the University are received in lieu of the usual entrance examination. These must be graded, or high schools of good reputation, and of sufficiently extended course to prepare students for the University. The principal teachers of the schools selected will be authorized to prepare questions and conduct examinations of any of their students desirous of entering the University, but the papers must be sent to the University for final decision. The following schools have been selected so far, as:

EXAMINING HIGH SCHOOLS.

West Rockford, Buda, Maplewood, Sterling, 2nd Ward, S. Belvidere, Geneseo, Belvidere, Lanark, Gibson City, Belleville, *Rochelle, *Peru, *Shelbyville, *Sycamore, *DeKalb, *Dwight, *Macomb, Kinmundy.

ACCREDITED HIGH SCHOOLS.

The Faculty, after personal examination, appoint Accredited High Schools, whose graduates may be admitted to the University without further examination. These must be schools of first-rate character, whose courses of instruction include all the studies required for admission to some one of the Colleges of the University. On application, a member of the Faculty is sent to examine the school making the application, as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. If the report is favorable, the name of the school is entered on the published list of high schools, accredited by the University. The *graduates* of these schools are admitted to any of the Colleges for which their studies may have prepared them. The appointment continues as long as the work of the School is found satisfactory. Annual reports are asked from these Schools. The following are now on the list:

Princeton, Lakeview, Champaign West, Decatur, Salem, Champaign East Side, Urbana, Elmwood, Oak Park, Chicago, Central, Chicago S. Division, Chicago N. Division, Chicago W. Division, Hyde Park, Marengo, Blackstone, Kankakee, Mattoon E. Side, Springfield, Monticello, Warren.

Any one wishing schools placed on either of these lists should make application to the Regent of the University.

* These schools are candidates for the rank of Accredited Schools.

PAPERS

PREPARED FOR THIS REPORT

BY

MEMBERS OF THE FACULTY

AND THE

HEAD FARMER.

FARM EXPERIMENTS.

BY G. E. MORROW, LL. B., PROFESSOR OF AGRICULTURE.

While the leading object of the agricultural colleges of the country is expressly declared, by the law under which they received their main endowment, to be "to teach such branches of learning as are related to agriculture and the mechanic arts," it is generally recognized that the trial of experiments related to agriculture is a highly important, although subordinate work. By no persons is the importance of this work more appreciated than it is by the professors of agriculture in these colleges, and by few persons are the difficulties in the way of receiving satisfactory results more clearly seen.

Two or three of these difficulties may be briefly stated.

First—The difficulty in controlling the conditions in field-feeding, and kindred experiments. The peculiarities of adjacent plats of soil, or of different animals, or of different seasons, often cause results, the publication of which serves only to confuse or mislead. To be reasonably certain of correct results, large numbers of experiments must be tried, or they must be continued for a long series of years.

The yields of two plats of land, side by side, and with the same treatment and fertilization, sometimes vary much more than do the yields of two plats designed to show the effect of different culture or fertilization. Like results are found in experiments with animals. Thus, in one experiment tried by the writer, a pig of one breed gained 37 lbs. in a given time, while a pig of another breed gained 49½ lbs. in the same time—showing marked superiority for the second breed; but, in the same experiment, a pig of the second breed gained only 39 lbs., while one of the first breed gained 49½ lbs.—showing almost equal superiority for the first breed. Comparing the two pigs of each breed, and the gain was almost exactly the same; showing, so far as this experiment went, that the breeds were equally valuable. In another experiment, a Devon steer gained 340 lbs., while a Shorthorn gained but 235 lbs.; but another Shorthorn gained 355 lbs., while a second Devon gained but 215 lbs.; and in each case the smallest gains were made under conditions which at first blush would be considered most favorable. A lot of cattle gained 1,815 lbs., in a given time; in a second period of equal length, and under the same conditions except as they were affected by the weather, the gain was only 525 lbs.

These illustrations might be many times multiplied, and much more striking ones given. Enough have been named to make clear one great difficulty, and to explain the reluctance of many who make experiments to gratify a common demand for immediate results.

A second difficulty in the work at the agricultural colleges, is the lack of sufficient time and money at the disposal of those in charge of the work. A contrast may well illustrate this point.

The writer had the pleasure and profit of visiting, in 1879, the home of Dr. J. B. Lawes, Rothamsted, England. At this place agricultural experimentation has been carried on for more than 40 years. For 25 years past, it may be said the farm work on a large farm had been held subordinate to the experimental work. From one to four chemists are kept constantly employed; they have two or three assistants; a botanist, with assistants, is often engaged; two or three persons find constant employment in calculating and tabulating results. The large force of farm laborers is, as needed, held in readiness for work on the experimental plats. The direct annual cost of the work is, in round numbers, $10,000, and the additional, indirect cost is about $5,000 annually. With all these facilities, a comparatively limited range of experimental work has been attempted; and sometimes a series of years has passed without any public report being made, on some points, in even this range of subjects. The writer may be pardoned for saying, that as to one crop with which experiments have been tried for about 30 years, Dr. Lawes said to him that they had been able to learn but little about it as yet.

A comparison of such an experimental station as this with the opportunities of men whose first duty is to their classes, to whom they must deliver daily lectures, and of institutions whose funds are barely sufficient to provide for the necessary teaching force, will better present the difficulty named than would any extended argument.

With this is presented a compilation of some of the experiments which have been tried at the University farms with a single grain crop, Indian corn. These experiments have been conducted by Messrs. Flagg, Lawrence, Johnson, Prof. Miles, and the writer. Some lessons are plainly taught by them; as to many other points, they give partial or contradictory answers.

It is purposed to continue and extend experiments with this, as well as other grain crops, and also in feeding animals; and much gratification is felt in the hopeful indications now to be seen of receiving coöperation in this work, by many of the agricultural colleges of the country.

EXPERIMENTS IN CORN CULTURE.

YIELDS OF ADJACENT PLATS.

Several experiments have been tried to determine the comparative fertility of adjacent plats of ground under similar treatment.

In 1871, 1872 and 1873 this experiment was tried on a piece of prairie land on the Experimental farm. The tract has a slightly varied topography, but not more of this than is usually found on the prairie land of the vicinity. The tract was divided into plats of one-twentieth of an acre each. It was planted so as to give four rows to the rod. Yellow dent corn was planted each year, giving good ordinary cultivation. The first year drought and chinch bugs greatly injured the crop. The year 1873 was also unfavorable. Only ears of fair size were counted.

The accompanying tables give the results. On each full plat there should have been 128 hills and 512 stalks and ears. The figures in each plat show: 1, number of hills matured; 2, number stalks matured; 3, number ears eight inches long or over; 4, pounds of corn.

YIELDS OF ADJACENT CORN PLATS.

	1871.						1872.							
12½	57	62	60	60	63	60	64	64	64	63	64	64	12½	Hills.
	208	218	195	190	199	197	239	265	244	216	230	227		Stalks.
	112	122	93	95	62	90	214	219	209	194	213	200		Ears.
	38	36½	24½	28	18½	21	103	105	114	109	109	101		Wt. of ears.
12	125	124	125	121	122	124	123	125	128	128	128	100	12	
	460	455	456	417	381	403	489	498	496	494	479	492		
	318	272	280	225	162	174	442	431	446	411	423	423		
	120	105	91	65	52	51½	233	235	232	238	212	243		
11	123	127	126	128	125	127	123	127	129	129	126	112	11	
	479	491	475	444	411	415	470	468	477	428	461	462		
	394	361	380	294	259	223	450	419	461	374	402	433		
	177	157	157	116	89	78	237	345	251	205	247	254		
10	94	130?	125	125	121	121	127	128	127	127	126	127	10	
	350	498	469	479	412	423	503	488	519	490	449	482		
	288	364	363	306	242	263	461	448	468	408	402	436		
	148	149	145	121½	86	98	210	250	248	233	231	226		
9	112	118	130?	120	119	116	124	128	127	125	126	127	9	
	377	419	427	393	400	376	486	449	465	423	444	471		
	270	298	285	267	220	217	425	419	437	378	397	412		
	103	113½	103	93	75	75½	221	241	253	246	233	237		
8	133?	115	126	115	113	118	128	127	128	126	127	128	8	
	380	348	388	371	372	397	477	453	464	409	460	490		
	230	215	260	239	201	201	432	446	437	382	402	417		
	57	74½	69½	80	63	63½	202	219	243	225	233	236		
7	107	120	126	128	116	119	127	128	127	125	123	127	7	
	329	392	422	427	402	376	488	504	489	439	487	482		
	200	218	200	247	185	169	438	457	446	353	400	408		
	73	72	60½	63½	56½	44½	235	240	254	246	229	212		
6	116	116	117	116	112	105	128	128	128	127	128	128	6	
	380	365	386	390	348	303	501	490	516	457	486	502		
	207	216	204	199	144	105	440	457	468	351	400	431		
	72	69	68	61½	44½	31	244	244	244	241	220	215		
5	111	101	119	118	116	108	126	127	128	128	126	128	5	
	323	308	388	403	355	328	490	490	491	471	474	504		
	181	170	192	202	130	123	429	439	443	430	401	444		
	54½	46	57½	56	37	33	231	[illegible]	237	259	216	201		
4	120	113	110	119	114	114	125	128	128	127	126	127	4	
	368	359	337	384	335	348	461	497	501	559	479	495		
	186	170	137	191	130	100	411	424	432	415	415	422		
	69½	42	27½	41	32	30	235	225	207	217	242	203		
3	122	117	124	125	106	118	126	128	128	127	127	127	3	
	358	398	408	403	324	355	486	518	502	477	507	499		
	187	235	197	202	143	177	425	449	438	360	438	461		
	63	71	61	47½	39	55	235	234	227	239	219	233		
2	113	127	124	126	112	120	128	128	128	128	128	128	2	
	354	437	432	418	349	365	506	505	510	404	477	483		
	195	231	218	217	159	173	430	430	436	344	413	439		
	66	74	57	51	41½	52½	216	222	225	223	230	222		
1	125	126	126	123	120	111	127	128	127	128	128	128	1	
	415	457	458	420	400	351	479	496	492	515	353	459		
	285	286	319	255	220	196	435	431	453	342	413	407		
	100	101	112	83	66	72½	216	224	235	233	246	256		
	A	B	C	D	E	F	A	B	C	D	E	F		

YIELDS OF ADJACENT CORN PLATS.

	1873.						
12½	62	63	62	62	64	64	Hills.
	176	195	186	221	175	170	Stalks.
	133	139	142	140	144	128	Ears.
	72	72	73	70	8	64	Weight of ears
12	128	127	128	128	128	127	
	388	383	395	381	377	392	
	303	308	310	319	322	342	
	132	195	179	165	134	173	
11	126	126	126	127	126	128	
	337	358	377	356	351	344	
	291	316	318	309	305	322	
	163	198	185	189	182	188	
10	126	127	126	126	123	127	
	386	382	372	381	379	350	
	325	344	344	340	328	305	
	182	219	212	192	201	157	
9	127	128	128	128	126	125	
	361	384	361	382	382	350	
	308	363	331	318	335	318	
	197	212	189	195	215	170	
8	126	128	126	125	128	128	
	352	392	406	388	373	375	
	301	332	329	334	287	236	
	174	201	192	203	190	139	
7	127	125	128	126	126	128	
	389	382	388	369	371	384	
	294	317	328	301	315	308	
	167	197	188	189	183	163	
6	126	125	126	128	123	127	
	392	398	391	361	380	372	
	293	329	321	303	332	355	
	172	203	193	191	200	165	
5	124	128	127	128	125	124	
	365	371	386	401	358	350	
	296	314	321	325	300	284	
	128	184	137	185	153	150	
4	124	128	127	128	125	124	
	338	391	367	374	360	337	
	293	283	293	292	269	289	
	154	179	138	*128	134	157	
3	124	125	128	128	127	110	
	343	356	363	379	356	342	
	276	272	284	294	282	288	
	143	158	147	161	151	164	
2	123	127	128	126	127	111	
	375	379	384	368	387	309	
	296	294	311	308	319	263	
	156	159	133	164	149	156	
1	125	124	124	125	124	116	
	354	358	356	378	381	324	
	278	287	288	316	303	284	
	134	158	169	180	169	155	
	A	B	C	D	E	F	

By comparing the tables for the three years it will be seen that there were very great differences in the yield. The average yield per acre for the whole tract was 21.33 bushels in 1871; 66.00 in 1872, and 48.38 in 1873. The average weight of the ears in the three years was: .33, .50, and .56 of a pound.

The totals as to other points were:

	Hills, No.	Stalks, No.	Ears, No.	Ears, Wt.	Per cent. barren stalks.
1871	8,936	29,631	16,746	5,600	.43
1872	9,489	36,128	31,669	17,319	.12
1873	9,426	27,685	22,967	12,799	.17

In an experiment in 1879, with 26 plats, each of which should have had 1,456 stalks, the average number of ears produced was 1,189; a loss of about 18 per cent.

In 1880 the percentage of barren stalks in a plat, planted in rows four feet apart, and in hills two feet apart, was a little less than 7.

In 1876, on a tract adjoining that on which these experiments were tried, seven plats, of one-fifth of an acre each, selected from different parts of a tract of four acres, gave the following yields, in pounds: 895, 990, 1,130, 1,070, 870, 1,125, 940; showing a difference per acre of from 71.87 bushels to 84.54 bushels. In 1877, four of these plats gave the following yields: 825, 680, 535, 850. No manure was applied in either year to these plats. The percentage of decrease of the crop of 1877, compared with that of 1876, varied as follows: 27, 33.5, 39.7, 24.5.

In 1879, a set of experiments were tried, on the tract used in the first experiments, which showed equally marked variations.

In 1880, the yields of a number of rows of corn on a small plat were carefully determined, the result showing much less variation than in either of the former cases. The yields in pounds were: 63, 63, 67, 60, 63, 60, 60.5, 65, 62.5, 60, 60, 64.5, 65, 63. The greatest variation here is but one-thirteenth.

The tract on which these results were obtained had closely planted rows of forest trees, about twelve feet high, growing on both north and south sides—the corn rows running east and west. The influence of the trees was plainly shown on the two rows nearest each row of trees, the corn being planted within four or five feet of the trees. On the south, the yields were: 40, 53, 63 lbs.; on the north, 36, 56, 63 lbs. On each side, the third row gave the full average yield.

EXPERIMENTS WITH MANURES FOR CORN.

In 1876, 20 plats, each 4 by 8 rods, or of one-fifth of an acre, were planted with corn, in rows four feet apart, by two feet in the rows. Immediately after planting, fertilizers were applied on 13 of the plats, leaving 7 plats in different parts of the field with nothing. It was harrowed soon after the fertilizers were applied. June 10, it was cultivated, and again June 24, when it was thinned to two stalks to the hill. July 3, cultivated and hoed, and cultivated and laid by July 14. This was all one way, north and south. October 28, 29 and 31, the crop was gathered and weighed, allowing 80 pounds of ears to the bushel; the result is given in the table below, increasing both the amount of fertilizers and yield five times, to make them of one acre each.

The land had never been manured and had never been in grass. It had been in corn most of the time for 25 or 30 years.

Plats.	Conditions.		Cost per acre.	Bushels per acre.
1	20 loads barn manure		$15 00	83.12
1	30 " " "	$15 00		
	275 lbs. nitrate soda	11 37	26 37	80.62
1	20 loads barn manure		15 00	76.56
1	200 lbs. Sulph. ammonia	11 50		
	200 " Nitrate "	30 00	41 50	75.62
1	595 " Potash (40 per cent.)	20 80		
	200 " Sulph. ammonia	11 50		
	200 " Muriate "	31 46	63 78	75.62
1	595 " Potash	20 82		
	275 " Nitrate soda	11 37	32 19	.....
1	200 " Gypsum		3 00	68.75
1	595 " Potash		20 82	67.50
1	500 " Nitrate soda		22 50	65.62
1	595 " Potash	20 82		
	100 " Sulph. ammonia	5 75		
	100 " Nitrate "	15 00	41 57	65.32
1	595 " Potash	20 82		
	550 " Nitrate soda	24 75	45 57	64.06
1	350 " Super phos. lime		7 52	63.12
7	Nothing		.....	62.60
1	595 " Potash	20 82		
	300 " Super phos. lime	7 52	28 34	62.50

Highest plat without fertilizer	71.87 bu.
Lowest " " "	54.37 "
Average of plats without fertilizer	62.60 "
" " " with barn yard manure	79.84 "
" " all plats	70.32 "

In 1877, these plats were again planted with corn, as before, to test effect of the commercial fertilizers on second crop. On three of the seven plats unmanured the year before, fertilizers were applied, as noted in accompanying table, which gives the yields for each year. The season was unfavorable, and each plat yielded less than in 1876; the per cent. of decrease varying from 1 to 42, the average being 28.4.

The average decrease on the four plats on which no manure was put in either year was over 31 per cent. The greatest decrease, 42.4 per cent., was on the plat on which salt was applied at the rate of 500 pounds per acre; applied broadcast on surface when corn was well up.

EXPERIMENTS IN CORN FERTILIZATION.

Plat.	Fertilizer, 1876.	Fertilizer, 1877.	Yield, '76.	Yield, '77.	Per cent decre'se
1	Potash 119 lbs., super phosphate lime 70.	Nothing	1,000 lbs.	695 lbs.	30.5
2	Nothing	Salt 100 lbs	895 "	515 "	42.4
3	Potash 149 lbs., sulph. ammo. 20, muriate ammo. 20	Nothing	1,045 "	725 "	31.2
4	Nothing	B.Y.manure, 4 l'ds plowed under	990 "	770 "	21.2
5	Nothing	Nothing	1,130 "	825 "	27.0
6	Gypsum 40 lbs	"	900 "	570 "	36.7
7	Nothing	"	1,070 "	680 "	33.5
8	Potash 119	"	1,080 "	795 "	26.4
9	Potash 119, nitrate soda 55	"	1,075 "	885 "	18.1

Experiments in Corn Fertilization.—*Continued.*

Plat.	Fertilizer, 1876.	Fertilizer, 1877.	Yield, '76.	Yield, '77.	Per cent decr'se
10	Nothing	Nothing	870 lbs.	535 lbs.	39.7
11	Potash 119, nitrate soda 110	"	1,025 "	1,015 "	1.0
12	B. Y. manure, four loads	"	1,335 "	920 "	31.1
13	B. Y. manure, four loads	"	1,220 "	790 "	35.5
14	Nitrate soda 110 lbs	"	1,050 "	755 "	28.1
15	Nothing	"	1,125 "	850 "	24.5
16	Sulph. ammonia 40, muriate ammo. 40	"	1,210 "	820 "	32.2
17	B. Y. manure 4 loads, nit. soda 55	"	1,290 "	880 "	31.8
18	Nothing	B.Y.manure, 4 l'ds on surface	940 "	735 "	21.8
19	Super phosphate lime 70 lbs	Nothing	1,010 "	710 "	29.8
20	Sulphate ammonia 40, muriate ammo. 40	"	975 "	705 "	27.7

In 1880, three half-acre plats were selected from this same tract of land—they having been in corn in the intervening years without manure. Corn was planted in rows so as to have four to each rod, and with design of having two stalks each two feet in the rows. The "stand" was not good. One half-acre plat received two two-horse loads of barn-yard manure, and gave 20 bu. 15 lbs. of corn; one plat received 100 lbs. superphosphate of lime and gave 17 bu. 45 lbs. corn; the third plat had no manure and gave 16 bu. 30 lbs. of corn.

Superphosphate of lime was applied to the other plats of corn in 1880, with slight benefit in one case, and with no appreciable effect in another.

EXPERIMENTS IN MODES OF CULTURE.

In 1879 a set of experiments in corn culture were planned and carried out by E. F. Lawrence, head farmer, whose report of results is subjoined in full:

No.	Variety.	Conditions.	No. of ears.	Weight pounds	Bushels p'r acre
1	Thomas	Fall plowed, manure plowed in	1,290	830	85.10
2	"	Fall plowed, manure on surface in spring	1,383	780	80.00
3	Golddrop	Same as No. 1	1,219	710	72.82
4	"	Same as No. 2	1,171	720	73.84
5	Thomas	Trench plowed in fall, no manure	1,203	690	70.77
6	"	Common plowed in fall, no manure	1,250	700	71.79
7	Chester Co	Same as No. 5	1,255	690	70.77
8	"	Same as No. 6	1,255	660	67.69
9	Thomas & Murdock	Spring plowed, manure plowed in	1,170	720	73.84
10	" "	Spring plowed, manure on surface	973	690	70.77
11	Murdock	Same as No. 9	1,099	720	73.84
12	"	Same as No. 10	1,035	640	65.64
13	Thomas & Murdock	Trench plowed in spring, no manure	1,242	770	78.96
14	" "	Common plowed in spring, no manure	1,104	600	61.54
15	Murdock	Same as No. 13	1,295	670	68.72
16	"	Same as No. 14	1,175	550	56.41
17	Thomas, small	Plowed in spring, manure on surface in spring	1,078	550	56.41
18	" large	Same	1,110	600	61.54
19	" small	Plowed in fall, manure on surface in fall	1,188	700	71.79
20	" large	Same	1,300	720	73.84
21	"	Plowed in fall, manure on surface in spring	1,251	740	75.89
22	"	Plowed in fall, no manure	1,250	720	73.84
23	"	Same as No. 21	1,143	710	72.82
24	"	Same as No. 22	1,201	660	67.69
25	"	Replowed in spring, manure on surface	1,211	800	82.00
26	"	Replowed in spring, manure plowed in	1,082	710	72.82
	Average		1,189		71.19

Plats from one to twenty inclusive were timothy sod; plats twenty-one to twenty-six, wheat stubble.

Plats seventeen and nineteen were planted with seed selected, small ears, weighing one-half pound each on an average. Plats eighteen and twenty were planted with seed selected, large ears; twenty-four ears weighing twenty-two pounds.

Plats five and seven, "trench plowed in fall," were not well trenched. The ground was dry and the trenching did but little good. The plow did not work well. Plats thirteen and fifteen, "trench plowed in spring," the same plow worked well.

On all the spring plowing of sod, from nine to sixteen, a poor stand was made, and was replanted May 21st with Murdock corn. Plats eleven and twelve made a total failure of first planting, which was "Chester Co. Mammoth."

Each plat contained 13-100 of an acre. The rows were three feet eight inches apart, and a full stand would have been two stalks in a hill and hills two feet apart in the row. There should have been 1,456 stalks in each plat and the same number of ears, had each stalk given an ear.

The first planting was May 3d.

The manure used was common barn-yard manure and $2\frac{1}{2}$ loads to each plat, or at the rate of ten cords to the acre.

The first conclusion arrived at is that the corn was too thick on the ground. On an average there were 18 per cent. less ears gathered than would have been had there been a full stand and one ear to each stalk; and 10 per cent. less ears than stalks. From other experiments and this one, I am satisfied that rows four feet apart, and two stalks every two feet, or an equivalent, will give the best results. These rows were 3 feet 8 inches apart.

Fall plowing is shown to be decidedly best. This arose partly from the fact that a poor stand was obtained on the spring plowing; but this also should go to the credit of fall plowing, as we are liable to the same trouble another season as the present.

Fall manuring was best from the fact that there was not sufficient rain in the spring and summer to place the manure in condition to be taken up by the plant, and much of it, applied in the spring, may now be seen in the soil.

Comparing 5 and 7 with 6 and 8 gives 1.07 bushels per acre in favor of trench plowing in the fall. As has been seen, this trenching was mostly a failure.

Comparing 13 and 15 with 14 and 16 gives 12.87 bushels in favor of trench plowing in spring. I should expect best results from trench plowing in the fall, and think this result would have shown such had the plowing been equally good.

The effect of manure is much less than has been shown in former experiments. This is supposed to result from the lack of moisture to make the manure available.

Of the varieties the "Thomas" is shown to be best. This should be called "Thomas' Improved." It has been raised on the farm for the past nine years. After crossing it with the "Galtra," a large, late, deep-grained variety, and then with great care selecting the seed for three years, it has become, as I think, the best large or medium variety in this section.

It was found that it took 128 ears of this corn to make 75 pounds, the amount taken for a bushel. As showing that this corn was too thick and the ears too small, 75 pounds was taken from a wagon, as it run from a 40 acre field, that gave a yield of 70 bushels to the acre. This 75 pounds counted out 98 ears, 30 less than the average of this experiment. The same, after being kiln-dried, was shelled and gave 57½ pounds of dry corn and 12½ pounds of cobs.

The conclusion of the whole is that there are many things in the simple operation of corn raising not yet understood, as there are results here shown, that, with most careful study while the corn was growing and after it was gathered, I am entirely unable to account for.

DIFFERENT MODES OF PLANTING.

Several experiments have been tried to compare effects of planting in hills and drills, wide and close planting, etc.

In one case, with rows four feet apart, three plats were planted with the intention of having one kernel, each nine inches; other plats with one kernel, each twelve inches. The three with kernels nine inches apart gave 600, 500, 520 pounds, a total of 1,620 pounds. The three with kernels twelve inches apart gave 545, 540, 550 pounds, a total of 1,635 pounds.

In another experiment, continued three years, acre plats were planted in hills 3, 3½, 4 and 4½ feet apart each way; other acres, in drills with kernels one foot apart, in rows at each of the distances apart given above. The hills were so planted as to give an equal number of kernels in each row with that in the drilled rows.

The results in two of the three years were so affected by extraneous causes as to be almost valueless. The result in one year was as follows:

Distances.	Hills.		Drills.	
	Stalks.	Bushels.	Stalks.	Bushels.
3 feet	5,481	69.57	5,502	60.25
3½ feet	4,662	67.43	4,716	69.27
4 feet	4,160	75.70	5,192	62.41
4½ feet	3,654	56.14	3,668	56.85
Total of four plats	17,947	268.84	18,078	257.79

In another experiment, with rows 3 feet 10 inches each way:

Plat 1, with 4 to 6 stalks, produced	850 lbs.
" 2, thinned to 2 stalks in a hill	660 "
" 3, " 3 " "	850 "
" 4, " 4 " "	83 "
" 5, with 4 to 6 stalks, and hilled up with plow, produced	850 "

The results in field planting lead to the opinion that, for the ordinary Dent varieties grown in this region, rows four feet apart, with the equivalent of one kernel for each foot in the row, is probably the best distance. The corn planters in use on the farm make the rows 3 feet 8 inches apart. For convenience in culture, planting in hills is preferable to drill planting.

EXPERIMENT IN CULTIVATION.

In one experiment, in 1877, a plat which had produced a crop of potatoes the previous year, was planted with corn, one-third being trench-plowed to a depth of about eleven inches, one-third plowed about five inches deep, and one-third having surface smoothed with cultivator and harrow, without plowing. The yield of the three plats, in order described, were, 1,145, 1,070, 1,040 pounds.

In another experiment, a set of plats plowed at different depths, from three to seven inches, gave a yield of 72 bushels 15 pounds, while on equal area plowed deeper, from nine to eleven inches, yielded 88 bushels 35 pounds.

In a third experiment, the results were as follows:

Eight rows harrowed	199.50 lbs.
" plowed 2 inches	284.70 "
" " 4 "	339.50 "
" " 6 "	372.40 "
" " 8 "	312.90 "
" " 10 "	290.80 "
" " 10 " and subsoiled	560.00 "
" " 10 " and trenched	413.00 "

In one case four rows of Dent corn were given good cultivation with ordinary corn cultivator. Four adjacent rows had no cultivation, save enough hand hoeing of the surface to destroy the weeds. The latter gave 500 pounds, the former 525 pounds corn.

In another trial four rows, with deep cultivation, gave 244 pounds; four, with shallow cultivation, gave 280 pounds.

EFFECTS OF FREQUENT CULTIVATION.

In an experiment to compare common with frequent cultivation of corn, a plat was planted June 14. One-half, in alternate strips of four rows, was cultivated six times during the month of July; the other half three times. The result was as follows:

	Pounds.
Four rows, cultivated 3 times	229.60
" " " 6 "	292.60
" " " 3 "	259.70
" " " 6 "	329.70
" " " 3 "	331.80
" " " 6 "	329.70
" " " 3 "	315.00
" " " 6 "	299.60
" " " 3 "	276.50
" " " 6 "	269.50
" " " 3 "	261.80
" " " 6 "	395.80
" " " 3 "	276.50
" " " 6 "	284.90
" " " 3 "	291.90
" " " 6 " only 3 rows	211.40
Averages of rows cultivated 6 times	263.97
" " " 3 "	243.88

Frequent cultivation gave an increase in yield of something over 8 per cent. In another experiment of the same nature the increase was a little over 5 per cent.

INCREASING NUMBER OF EARS PER STALK.

In 1870 a plat of land was planted with a yellow dent corn, locally known as Thomas corn. This variety usually produces but one ear to each stalk. This plat was planted with seed from stalks which had produced two ears each; one-half the plat with kernels taken from the upper ears, the other from the lower ears. The first half gave 526, the second 512 pounds of corn. There was no appreciable difference in the quality of the corn, nor in the comparative number of ears produced.

In eleven rows counted there were 1,014 stalks. Of these, 765, or 74.55 per cent., produced one ear each; 190, or 18.73 per cent., produced two ears each; and 68, or 6.70 per cent., were barren. All ears, large and small, were counted. There was an evident increase in the percentage of two-eared stalks. The corn was planted in rows four feet apart; two kernels in hills two feet apart.

This and kindred experiments will be reported. Numerous tests show that the number of rows on the ears, the length and thickness of ears or kernels, the color, in fact all qualities of corn, can readily be changed by selection in a very few years.

TESTS OF VARIETIES.

At different times large numbers of varieties of corn have been tested on the University farms. During 1880 about twenty varieties were grown. Many named varieties differ but slightly from each other. Sometimes they are doubtless practically identical, the different names having been applied in the several localities in which they are grown. The most prized varieties on the farms are two yellow Dent—the Thomas, a rather large variety, and the Murdock, a smaller and earlier variety.

Among other varieties now being tested, which promise well, are a large Dent from the Miami Valley, in Southern Ohio, and a smallish eared white Dent, seed of which was obtained at Anna, Illinois. This variety has a large, tall stalk, and produces three or four ears to the stalk, the kernels being unusually deep and the cob noticeably small. It is a late maturing variety, and this is the most serious objection noticed.

Blount's White Prolific corn has been grown for three years, but has not given the results recorded elsewhere. The yields have not been noticeably large, and the habit of producing several ears to the stalk has not been well sustained. In few cases have more than three ears been found on one stalk. The cob of this variety seems harder than that of most Dent varieties.

It is noticeable that the Flint varieties, commonly grown in New England, while ripening early, and proving thoroughly well adapted for late planting, have not given as large yields as are reported of them in the regions where they form the chief crop.

EFFECTS OF CLIMATE ON VARIETIES.

While selection has much to do with the time of ripening and other characteristics of varieties grown in any one locality, it is well known that there are certain characteristics which are pretty constantly found to vary with the climate To observe some of these peculiarities, varieties of Dent corn, furnished by Prof. Lacy, of the University of Minnesota, at Minneapolis, and by Wm. Lyraght, of Belleville, Wisconsin, were planted in the same plat with the white Dent, furnished by Rev. J. M. Faris, of Anna, Illinois, Blount's Prolific and other varieties longer grown on the Experimental farm. The planting was done May 12–14. The more southern varieties made much larger growth, and were considerably later in time of tasseling. The Minnesota, Wisconsin and a New England Flint variety showed the first tassels, from July 5 to 7. Blount's Prolific and the "Anna" corn did not show tassels until from July 16 to 18. The northern varieties were fully ripened by August 20. The "Anna" corn was not fully matured before October 15.

SHRINKAGE AND PER CENT. OF COB.

As shown in the report of Prof. Scovell, Agricultural Chemist, the average shrinkage of ten ears of each of six varieties of yellow Dent corn, gathered October 6, 1879—when all was fairly matured except one variety—and kept in a warm room until February 28, 1880, was 12.1, 16.8, 17.4, 22.5, 22.8, and 33 per cent. The percentage of cob at same date, taking varieties in same order, was 12.3, 16, 12.6, 15, 11 and 14.4—the average being 13.7 per cent. In another trial, in 1880, of corn well dried in a warm room, the average percentage of cob in specimen ears of fourteen Dent varieties was a little over 14. The varieties were from 10 to a little over 20 per cent. The weight of the cob varied from one ounce to two and one-fourth ounces.

FARM LEVELING INSTRUMENT.

By I. O. Baker, C. E., *Professor of Civil Engineering.*

It is a well known fact that the eye, unaided by instruments, can not determine the lay of the ground with precision sufficient for drainage purposes. In many cases, there is no doubt that the slope is sufficient, and in these cases it is easy to keep on the safe side. On the other hand, where there is but slight fall, some kind of an

engineering instrument is absolutely necessary, and, in some rare cases, it may be necessary to employ a professional engineer to determine the matter; but, usually, any intelligent farmer can, with an instrument similar to the one hereafter described, make a survey sufficiently accurate for drainage purposes.

An ordinary carpenter's level is frequently used, by sighting over the top. To this is objected: 1st, that the top surface is not necessarily level when the bubble is in the middle; 2d, that it is very difficult to tell when the bubble is exactly in the middle; and, 3d, that it is almost impossible to tell when a point is exactly in range with the top face. The object of this article is to suggest some improvements to the carpenter's level, which will make of it a valuable farm level. If a level is purchased for this purpose, the one which shows the greatest movement of the bubble for a slight difference in level is the best.

To meet the first objection, drive two nails into the side of a barn, almost as far apart as the level is long, leaving the heads to project about an inch. They should be as nearly in a horizontal line as can be determined by the eye. Bring the level up from below to contact with the nail heads, and then, with a pencil, carefully mark the position of the center of the bubble. To find the position of the exact center of the bubble, mark the positions of the two ends, and by measurement determine a point half-way between them. Turn the level end for end; repeat the above process, and mark the position of the center of the bubble again. Half way between the two positions of the center is the point at which the center of the bubble should be, when the top is level. Mark this point with a knife on the brass plate above the level; or better, mark it lightly on the glass with a file.

To meet the second objection, make light scratches, at equal distances, on both sides of the center, as found last above. It is best to have three or four on each side, say a sixteenth of an inch apart. These will aid in telling when the bubble is in the middle.

To meet the third objection, it is necessary to attach sights to the level. The simplest way of doing this, is to attach a piece of tin or sheet iron to one end of the level by two screws through a slot, allowing it to project, say one-fourth of an inch, above the top face of the level. The projecting edge of the metal should be straight. To the opposite end of the level fasten a similar piece, with a small hole in it. The hole should not be larger than one-thirty-second of an inch, and should be as far from the top face of the level as the edge at the other end. Since it is quite difficult to do this, a method of adjusting the sights more accurately will be given presently. The instrument will be very much improved, if a small tube, stopped at one end with a piece of tin, having a hole in it, be substituted instead of the strip of metal with a hole in it, as above. This tube can be fastened to the top of the level. The size of the tube is immaterial. Blacking the inside of the tube adds to the comfort of observing.

To successfully use the level, some support is necessary. The instrument can be supported by boring a hole in the bottom of the level and placing it on a light rod or stick, after the manner of a

Jacob's staff; or it may be used on an ordinary carpenter's trestle, with a wedge or screw under one end; or a regular tripod can easily be made, as follows: From a two-inch board, saw a triangle, 10 or 12 inches on each side. Procure three pieces for legs, an inch thick, two inches wide at one end and tapering nearly to a point at the other, and four and a half or five feet long. Bore holes through the wide ends of the legs and bolt the corners of the triangular block with half-inch bolts and thumb nuts. In the middle of the top of the triangular block, fasten a piece one inch thick, two inches wide, and as long as the level, by a screw through the middle, so that it can turn in any direction. On the sides of the last mentioned piece fasten little strips, to keep the level from falling off. A short bolt or long screw through one end of this strip, for raising or lowering the level, completes the instrument. The cost in time or money is insignificant, nor do these improvements injure the carpenter's level for its ordinary purposes. A rod can easily be marked off into feet, inches, and fractions, to measure differences of level with. A piece of white paper, held by hand, will do for the target.

To adjust the sights more accurately than by the method previously described, either of two methods may be used:

First Method.—This method is applicable when a sheet of still water can be obtained. Set the instrument quite close to the edge of the water, level it approximately by moving the legs and thus level it accurately by the screw under one end of the level. Near the instrument drive a stake until the head is even with the surface of the water; drive another further away, say 100 feet. Hold the rod on the first stake, sight, and note the reading. Do the same for the other stake. If the readings are the same, the sights are correct. If they are not, move one or the other sight up or down until the two readings are the same.

Second Method.—If a sheet of still water is not at hand, drive two stakes in the ground and place the instrument between them. Level the instrument right at the rod and note the reading for each stake. The difference of these readings is the true difference in level of the stake, whether the sights are correct or not. Set the instrument over one of the stakes and level it. With the rod, measure from the top of the stake to the line of the sights, and make note of the distance. Hold the rod upon the other stake, sight with the instrument and note the reading. If the difference of the last two readings is the same as that of the first two, the sights are correct; if it is not, move the sight until the last difference is the same as in the first case.

Cheap leveling instruments can be bought in the cities; but it is claimed that the farmer can make the one described above with little or no expense, and have an instrument less liable to get out of adjustment, and as accurate as the cheap instruments sold as "farm drainage levels." One made by the writer for a farmer has been in constant use on the farm and has proven itself a very valuable instrument. In using the instrument, first see that it is in adjustment; secondly, if possible, set it half way between the points whose difference of level is to be determined; and thirdly, avoid sight longer than 250 or 300 feet.

WATER FOR STOCK.

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By E. L. Lawrence, *Head Farmer.*

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[On many farms in Illinois, to get the adequate supply of water for stock in convenient places is a problem of much interest. Where running brooks, not liable to dry up in summer, exist, these, in part, solve the question, but only in part, because they are not always where wanted. Dependence is therefore more or less placed upon wells. To save great labor in hand pumping, windmills are erected at much expense, notwithstanding their liability to be injured or destroyed by storms.

Water being required for pasture lots on the farm of the Industrial University, the attempt was made to supply it from wells, located high enough above low portions of the lots to permit the use of a long siphon, by which the water should run *up* and out of the well in a steady stream to the point required. Aside from the collection of air in the tubing, there is no probability of this getting out of order as is the case with the windmill; there is no machinery to wear out and there is no cessation of action. The first expense, of course, depends upon the depth of the well, and the distance the water is to be carried. In many cases, however, this is much less than the original cost of the windmill. The two trials made have proved eminently successful. The account of these follows.] T. J. B.

With the view of obtaining water by means of the siphon, for stock supply, the following experiments were made:

First, in July, 1878, under the following conditions: Well 9 feet deep to bottom, depth of water from 2 to 4½ feet, size of pipe used, ½ inch. Distance from well to tank, 700 feet. Pipe laid 2½ feet below the surface. Highest point where pipe is laid, above bottom of well, 9 feet. An excavation of 2 1-2 feet was made for place to set the tank, and one side planked over, with tile laid underneath connecting with a previously laid drain, 100 feet further down the slope, with a pipe connecting with the pipe to carry off the overflow from the tank.

The cost of this I give as follows:

Tank holding 12 barrels	$9 75
700 feet ½ inch gas pipe @ 3c	21 00
Digging and filling 700 feet of ditch	9 00
Excavating for tank, fitting pipe, etc	15 00
Total	$54 75

To remove the air from the pipe a common cistern pump, costing $3.00 was used. The result of this may be briefly stated. Whenever there is 4 feet or over of water in the well, the flow is

uninterrupted and continuous; thus from October, 1879, to May, 1880, it never stopped, and never froze during the winter. When the water in the well falls below 4 feet, it is necessary to use the pump to remove air from the pipe that accumulates at the summit. With 3 feet in the well, the pump must be used for about ten minutes, about once a week, and oftener if the water falls below that point.

The second trial was made about three-fourths of a mile from the first, in October, 1879. In this case the conditions are as follows: Length of pipe, 1,000 feet. Fall from surface of water in well to bottom of tank, 5 feet. Size of pipe used, 1 inch. Here, instead of going over the hill, as in the first instance, we went around it, and for several rods dug down from 5 to 6 feet to lay the pipe, so that no point is higher than where it leaves the well.

This will supply water at all times for 100 head of cattle; and cost $119. I think it worth $500.

To ascertain the flow of water in a pipe, see "Haswell's Engineers' and Mechanics' Pocket-book," edition of 1864, page 172, as follows: Let l represent length of pipe, d, diameter, h, height, and v, velocity in feet per second.

The statement will be: $2500 \times h \div \left(l \times \frac{13.88}{d}\right) = v^2$

BLIGHT OF PEAR AND APPLE TREES.

By T. J. Burrill, M. A., *Professor of Botany and Horticulture.*

The destructive disease of the pear tree, known as Fire Blight, and the prevalent Twig Blight of the apple tree, as well as the injury to the trunk usually called Sun Scald, in one or both trees, are but varieties of the same malady. The same cause is at the bottom of these, and other forms of the disease; and other trees and plants similarly suffer. The blight of the quince is identical with that of the pear and apple tree. The Yellows of the peach, if not caused by the same agent, is certainly produced by a closely allied parasite. The Lombard poplars are dying all over our country from, first, (at least in many cases,) the work of an insect, followed by the microscopic living things which are here charged with the destruction of so many fruit trees. The butternut tree has been considered almost worthless from the liability to a disease of the trunk similar in every respect to the so-called Sun Scald of the apple. The twigs of the aspen poplar blight just as we observe the disease in the shoots of the apple, and from the same or very similar cause. The disease is much more progressive in some seasons of the year than others; but it is not confined to spring, summer, autumn or winter. During warm days of winter certain

progress has been observed, though closer watching is required to detect the equally fatal work of the destroyer. Meteorological conditions may have some effect, but thunder showers have little or no influence upon the progress of the disease.

The direct cause of the serious and hitherto mysterious malady is a minute organism belonging to the lowest order of Fungi, (or, as some say, Algæ,) best known as *Bacteria*. Similar organisms are called "Disease Germs," and are supposed to cause deadly maladies in animals and man. That plant diseases are also produced by them had not been intimated until the facts presented in this paper were made known by the writer.* A short historical account of the disease and the literature upon it, without the least claim to fullness or completeness, is presented, introductory to a special account of the investigations and experiments by which the true cause of the difficulty was discovered and proved.

HISTORICAL SKETCH.

The peculiar disease called Fire Blight of the pear, and the same thing with a somewhat different appearance in the apple, hence known by other names, has been known in the United States over one hundred years. During some periods the injury has been inconsiderable; at others very great. Pear trees have especially suffered, and on account of this disease alone this favorite fruit is scarcely planted at all in many great sections of the country. Practical horticulturists have considered the risk too great to run, except upon the smallest scale without thought of profit. Apple trees are less frequently killed outright, though it often happens, especially when the trunk is the seat of the disease. More often only the young wood of the current year's growth dies. The quince is not less injured than the pear. The peculiar disease of the peach tree, called the Yellows, seems to have been somewhat later observed and described; but it has no doubt existed from the time peaches were first cultivated in America. The first notice gaining publicity was in the Atlantic States, southward from New Jersey. The spread of the disease is more clearly traced in new regions from the contagion of the old, than is the case with that of the pear and apple.

No topic has been more fully discussed in the meetings of horticulturists, and none has a fuller literature in the periodicals devoted to rural affairs. Theory after theory has advanced as to cause and cure, only to be overturned by subsequent observation and experience. Insects were charged with the mischief, and one or more species, actually causing at times death of the limbs, have been described as the true cause or causes of the disastrous disease. These publications becoming well known, satisfied unskilled observers, and hundreds of authoritative statements have barely sufficed to convince many persons to this day of the error. But it is sufficient to say that no competent entomologist now attributes the devastating blight of these trees to the direct work of insects.

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*See especially "Anthrax of Fruit Trees," in Transactions of the American Association for the Advancement of Science, 1880. The present paper is in part a transcript of this.

Downing argued*—and his teachings were widely accepted—that the difficulty originated in the freezing of the sap, and its subsequent corruption in the tissues, hence the name Frozen Sap blight. But the disease occurs when no such conditions are possible, as in the case of seedlings of one summer's growth. Careful observations upon older trees have not supported the conclusions reached by this eminent author. Others believed they had traced the origin of the disease to the absence of essential elements in the soil, and numerous, indeed, have been the proposed remedies based upon this idea. As in other cases, some of the experimental trials seemed for a time to substantiate the conjecture, and forthwith a cure was heralded over the land. The published literature upon this notion alone would fill a volume, but if brought together would very soon furnish its own refutation. Many of the speculations were carefully based upon known facts of vegetable physiology, but most of them have been crude and wide of truth. Again the organic debility of the tree has been considered the cause of its sickness and death. The artificial methods of propagation and treatment were supposed to have wrought injurious constitutional changes, affecting the structure or the vitality of the tree, and death ensued either as a direct consequence, or through inability to withstand the ordinary vicissitudes of plant life. It is a hard matter to prove or disprove such a theory as this; the facts, if there are any, are too subtle for exact observation; but we know that seedlings are as liable to blight as nursery varieties, and that the same varieties are subject to the disease in one location and not in another. Unless specific and well grounded facts can be cited, such theories are worthless, and worse than worthless, for, by covering up our ignorance with apparently learned words, we prevent true observation and research by ourselves and by others.

Finally, when all visible or tangible agents were given up, and the clash of theories and speculations showed how utterly inadequate they were to account for the phenomena observed, the idea of destruction by Fungi was advanced. This, too, was a mere speculation. These vegetable parasites were known to cause some diseases of plants. Microscopes came into use, and revealed the minute creature in the very act of parasitical warfare upon their suffering hosts. To be sure, there was a supposition a long time current that previous to, and necessary to, the attack of these enemies, there must be some constitutional or other weakening of the vitality of the plant; but really little was known of fungous parasitism. The supposed offenders were only seen by expert microscopists, and these were rarely vegetable physiologists. It is not to be wondered at that gross mistakes were made, and that announcements by really scientific investigators proved as unreliable as the hap-hazard crudities of previous writers. I here give a short sketch of the more important publications upon this portion of our subject. It will be readily seen that, notwithstanding all that had been said about the fungous origin of the blight of the pear, very little was really known about it. So, of course, of the disease in the apple and other trees, and certainly so of the Yellows of the peach.

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* Fruits and Fruit Trees of America, 2nd ed., p. 646.

In 1863, Dr. Salisbury,* of Ohio, published an illustrated account of his microscopical investigations, concluding that blight was due to a fungus which he identified as belonging to a well known class of parasites living externally upon the epidermal surfaces of plants. Among these, the European mildew of the grape vine, that of the hop plant, of cherry leaves, of verbenas, etc., are properly classed. Dr. Salisbury named the fungus found by him *Sphærotheca pyri.* Now, it is a fact that such a fungus parasite is not uncommonly found upon the pear, the apple, and other trees, and it certainly is to be credited with its own peculiar injury to the trees; but the fungus was not at the time specifically new to botanists, and has no connection with the deadly blight. Yet this paper is frequently quoted as an important one, and pardonably so, by those not better informed, for the results were apparently based upon direct and skillful investigation. It is the only instance in the whole literature of the subject where claim is made to the identification of the specific parasite causing the disease. Though it has been fully and clearly known for years that this claim was worthless, the attention thus called to the subject has been of much value. The fungus had been previously named, so that there is nothing left except the history of the investigation, to connect the publication with the disease as it is now known.

Dr. Hull,* of Illinois, in 1868 and 1870, gave accounts of observations and experiments proving, as he supposed, the accuracy of the fungoid theory. One of his statements is of especial interest in this paper. He had received through the mail a blighted apple twig, and remarks: "We cut from it several small slices of bark, going deep enough to include a thin slice of wood; with this we inoculated several succulent pear shoots, by tieing in the pieces of bark as in budding. * * * After a lapse of thirty-four days, * * * we found them all blighted." He also adds that the conditions of the weather were not the most favorable for it, though a warm drouth was prevailing, and he believed "a humid condition of the atmosphere is also required." There are other statements by observers that blight is communicable from infected to healthy trees, but there does not seem to have been any carefully conducted experiments upon which such statements are based. In 1868, Dr. Hull thought he had induced disease similar, at least, to fire blight, by grinding in water fibres of fungi found upon decaying roots of living pear trees, and inoculating with the resulting mixture. The direct contagion of the yellows of peaches has been more definitely known. The spread of the disease gradually through an orchard from the point of infection has been frequently observed, if we may trust the accounts given. The first introduction to an uninfected region of country has been more conclusively traced; but here, again, accurate experiments to ascertain the nature and specific action of the contagion have not been made. Theoretically, fungi have been accounted the destroying agents, but with no better evidence than the want of other explanation, and, at most, a mushroon-like smell of freshly exposed roots

* Transactions Ohio State Agricultural Society, 1863, p. 450.
Transactions Illinois State Horticultural Society, 1868, p. 35, 1870, p. 220.

and the earth about them. After a series of careful microscopical investigations of diseased specimens of peach limbs, leaves and roots, a thoroughly competent authority,* looking for any of the hitherto known parasitic fungi, tells us none such can be found to which the yellows may be attributed.

Returning again to the blight of pear trees, it is worthy of record that in an address before the American Pomological Society, at St. Louis, 1866, Thomas Mehan, of Pennsylvania, gave his reasons for theoretically holding that the disease is caused by fungi. He has steadfastly adhered to this opinion, and has year by year pointed out, through the columns of the Gardener's Monthly, and elsewhere, the fallacy of other explanations, together with the apparent evidence supporting this. At his instance, Dr. J. Gibbons Hunt, of Philadelphia, examined, by the aid of the best microscopical equipments, blighted limbs of pear sent to him for this purpose. He reported the discovery of a fungus which, according to him, caused the blackening of the branches. In his communication he says: †"It attacks the bark and outside of leaves and young fruit first, causing changes in the cells in these locations, resembling much those pigmentary cell-changes which differentiate the negro from the so-called white man. The cell contents, normally transparent, are changed into extremely minute pigment granules, which fill the cells and give that characteristic color and smell which mark the disease. Moreover, minute drops of viscid, offensive liquid come out on the surface. * * * From the cambium layer the fungus travels towards the interior of the stem, through the medullary rays chiefly, and here I find those round bodies which, in our hasty ignorance, we often call spores. The ducts which ascend the stem are often obstructed with similar bodies and aggregated pigment granules. This is all I know about the subject. I cannot venture to name the fungus."

I have thus quoted at some length this account, for, according to my observations, it is the nearest approach to the solution of the cause of the difficulty, founded upon direct observation, that had up to this time been made. Still, it seems impossible to admit the correctness of the interpretations here given. The coloration of the diseased parts does not come from pigment granules, or from anything which can be mistaken for them. As for the round bodies which might be called spores, in the interior of the stem, obstructing the ducts, etc., I can only say nothing similar has been found by myself. The "offensive liquid" seems to have escaped careful examination.

In 1876, Thomas Taylor exhibited drawings at the Centennial Exposition, Philadelphia, showing ‡"the effects of the chemical changes which take place in the interior structure of the tree, under the attacks of the fungus to which this disease is due." Unfortunately, I do not remember how nearly these drawings represented what I have observed. They have not been published; neither has the author made any claim of having seen the "fungus to which this disease is due."

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* Byron D. Halsted, in Transactions of American Association for the Advancement of Science, 1880.

† Gardeners' Monthly, 1875, p. 245.

‡ Report of Department of Agriculture, Washington, D. C., 1876, p. 75.

In 1877, the writer presented to the Illinois State Horticultural Society the results of microscopical observations, in which account occurs the first published statement of which I have any knowledge, of the minute moving organisms now known to be always present in the portions of trees suffering from the diseases of which we write. I quote: *"The cambium of the blighted branch, when trouble first shows itself and for some days thereafter, is filled with very minute, moving particles. * * * Not unfrequently, a thickish, brownish, sticky matter exudes from affected limbs, sometimes so abundant as to run down the surface or drop from the tree. This proves to be identical with that noticed in the cambium, and unquestionably has the same origin. The sticky, half-fluid substance thus exuding is entirely made up of these minute, oscillating particles." In a subsequent discussion, 1878, in the same Society, I am credited with the following: †"If we remove the bark of a newly affected limb and place a little of the mucilaginous fluid from the browned tissues under our microscope, the field is seen to be alive with moving atoms, known in a general way as *bacteria*. * * * A particle of this viscous fluid, introduced upon the point of a knife into the bark of a healthy tree, is in many cases followed by blight,—but, with me, not in every instance. * * If we look once more to the affected branch, we find the disease spreads more or less rapidly from the point of origin, and upon examination the moving, microscopic things are discovered in advance of the discolored portions of the tissues, but not very far ahead—an inch, perhaps. [They are now known to advance sometimes several feet ahead of the blackened parts.] Does it not seem plausible that they cause the subsequently apparent change? It does to me, but this is the extent of my own faith; we should not say the conclusion is reached, and the cause of the difficulty ascertained. So far as I know, the idea is a new one, that *bacteria* cause disease in plants, though abundantly proved in the case of animals."

This meagre sketch of the literature of our subject omits much more than it includes; but it is believed that every item of special bearing upon the essential point of this paper has been noticed. After all the investigations that had been made, and all that had been said—a kind of ferment, in itself—editors were obliged to answer inquiries as follows, quoted from the American Agriculturist: ‡"We are obliged to reply, as we have many times in the past, that the 'cause' of the blight is not known. It is supposed to be due to fungi,—but this has not been demonstrated. * * * Though pear blight is a topic discussed at pomological meetings more than any other, scarcely any positive knowledge has been thus far elicited." This truthfully expresses the knowledge, or rather want of knowledge upon the subject at the time it was written. If what follows may be admitted as an explanation of the specific cause of the blight, certainly some progress has been made. This is the firm conviction of the writer, and this the claim for which he seeks the scrutiny and judgment of those scientifically or practically interested.

* Transactions State Horticultural Society, 1877, p. 114.
† Same series, 1878, p. 80.
‡ Vol. 37, p. 356. (1878.)

EXPERIMENTS AND RESULTS.

As opportunity again presented itself in June, 1880, further investigations were undertaken to ascertain the presence and action of the minute organisms heretofore mentioned as occurring with blight. They were again found in every limb and scarred patch upon the trunk in an active condition of disease. Not a single exception was found in hundreds of examinations. More careful study also showed, that so far as could be determined with a microscope furnished with Spencer's first class one-tenth inch objective, affording a magnifying power of one thousand diameters, with the clearest and sharpest definition, the organism was, wherever found, one and the same specific thing. It belongs to a group of very simple plants, which, as a class, are as nearly ubiquitous and omnipresent as material things can well be. Wherever organic matter is in any measure undergoing the process of putrefaction or decay, wherever compounds containing sugar or other carbo-hydrates become sour, wherever ulcerations and pus formations take place in the tissues of animals, *bacteria* of one kind or another are found. On the other hand, they are not found in substances not undergoing such changes as are above indicated, and it is now known that these changes do not occur at all when due precautions are taken to exclude the living organisms. It is, indeed, conclusively proved that *bacteria* and other vegetable organisms of low type are the active agents, the real and sole cause of the ordinary fermentations, putrefactions and decompositions of dead organic matter.

The question now came, "Are the *bacteria* uniformly found in the tissues of blighting trees, themselves the *cause* of the blight, or do they simply follow the true life destroyer and are they chargeable on v with the decomposition of the dead material?" To answer this question, a series of experiments was begun on the first day of July, 1880, and was continued without interruption until the fourteenth day of August following. Blight had been, and was during the time, more or less prevalent in the vicinty. On the isolated acre of ground where most of the experiments were made, there were growing ninety-four pear trees of different ages and kinds, some in cultivated soil, others in grass; also twenty apple trees and one quince. Of the pears, seventy-two were three years old, on pear stocks. These had been transplanted in the spring of 1879, and were in good thrifty condition, making an average growth of the main limbs of about three feet. They were Bartlett's and Clapp's Favorite. The other pear trees were of bearing age, and mostly laden with fruit. Blight occurred, as commonly introduced, on four of the large trees, two Flemish Beauty, one Bartlett and one seedling, and on one only of the seventy-two younger trees.

The weather during the time, except as stated, was clear and fine, of moderate summer temperature. Much rain had previously fallen and a heavy thunder shower occurred on the last day of June. During the few first days of July the air was moist and the temperature during the day time was 90° Fahrenheit, or above. Other storms with thunder occurred July 9th and August 11th, with, however, but little rainfall.

The experiments of July 1 and 10 were made by cutting pieces of diseased bark freshly taken from a blighting tree, and inserting them in the healthy three-year old trees after the manner of budding. These pieces of bark were about three-sixteenths of an inch by two-thirds of an inch. The experiments after the date just mentioned were inoculations with a sharp-pointed knife or needle dipped in virus collected as it exuded from diseased trees, and usually thinned with distilled water. As has been stated above, this exudation is composed almost purely of *bacteria*. By careful collection and frequent microscopical examinations, it was possible to be quite sure that the inoculating material contained nothing but water and the living *bacteria*. Every precaution was taken on this point as well as the thorough cleansing of the instruments used. Usually shoots of the current season's growth were selected for inoculation, and the puncture was made at various distances from the tip.

Experiments numbered thirty-three to forty-two, inclusive, were by inoculating with a needle in thirty apple trees in nursery the third season, operating in the growth of the year before, and using virus from both pear and apple. None of these were successful. Twenty-one experiments were made by simply applying virus, by means of a brush, to the uninjured epidermis of growing shoots and leaves. No one of these communicated the disease. But of the pear trees inoculated by budding and puncturing, as described, *sixty-three per cent. became diseased*, exhibiting all the characteristics, externally and internally, of the blight. Eighteen of these inoculated trees stood in a row of fifty-five, two feet apart in the row, and were selected here and there among those of the same kind and apparent thriftiness left without inoculating. Of the thirty-seven thus left, all save one remained free from the malady. Seventeen others of the same age and kinds growing near by continued healthy. Thus less than two per cent. of those not inoculated became infected with the disease, against sixty-three per cent. of the inoculated ones! When it is remembered that these trees were as nearly identical in kind and condition as it was, or ever is, possible to select, growing very near each other in the same soil, subject to the same treatment except in regard to the inoculations, the case seems to be settled, and an answer to our question obtained. The slight wounds made by the process of inoculation cannot be charged with the results, for similar wounds were made with a clean needle, and these rapidly healed without further injury. *The introduction of the virus introduced the cause of the disease, and the potency of the virus was quite positively due to the living bacteria.*

Of the pear trees inoculated with virus from diseased pear, fifty-four per cent. showed clear evidence of blight; while of those inoculated with virus from blighting apple limbs, seventy-two per cent. became as thoroughly infected, and as speedily died. The greater per cent. of infection from the apple virus does not necessarily prove that it is more destructive to the pear. Another set of experiments may and probably will indicate that it is not; but I think it may be fairly taken to show that the disease is identical in the two trees, as other indications suggest.

The four inoculations of quince with pear virus were all successful. These were upon the branches on one bushy tree whose low head was composed of thirty to forty branches similar to those experimented upon. None of these showed, at any time during the season, any trace of blight. The four diseased ones having been timely removed, the tree was freed from the disease.

Turning to the apples experimented upon, we find the results less positive. As before stated, ten of the trees were in a nursery a half mile distant from the other experimental trees. Among the hundreds of trees in the block, blight was noticed only in a single case. The ten inoculations were made in the bark of the preceding year's growth, by the use of a needle. Pear virus was used in five, but from apple in the other five. None of these were successful. The slight wounds soon healed without the least evidence of the corroding effects of the disease. No explanation can be offered for the failure of the inoculations, though it is quite possible that the result would have been different if the punctures had been made in the bark of the shoots of the current year, upon which the disease is naturally more common. Other experiments seem to favor this supposition, but in two instances the disease was successfully introduced to the bark of the trunks of much older trees. Aside from the ten mentioned, the other experiments upon apple trees were confined to the variety known as Grimes' Golden. This variety is not peculiarly subject to blight, but several young branches were trimmed away from time to time, having plain indications of the disease arising naturally. Sixty per cent. of inoculations, mostly in the bark of very young shoots, clearly communicated the disease; but except in two cases, the subsequent development of the malady was feeble compared with that upon the pears. Basing the reckoning upon the whole number of inoculations upon apple trees, thirty per cent. were successful. This, placed by the side of the sixty-three per cent. successful in pear, shows the apparent relative susceptibility of the trees to receive the disease by the process tried. But little reliance can be placed upon one set of experiments for exactness in numbers. We can only say with positiveness that blight may be induced in apple trees as well as pears by inoculations with *bacteria* from either diseased apple or pear trees.

The application of virus, known to be potent by inoculation, was made with a brush upon the uninjured surfaces of four pear trees and six apple trees. Some of the portions thus treated were bound with cloth moistened with water, to prevent the rapid dessication of the virus, but all proved unsuccessful. In a similar manner virus was applied after six o'clock P. M., upon a large number of leaves of five pear trees and two apple trees. The most perfect and apparently healthy leaves were selected, and account was kept as to the application to the upper or under surface. No certain infection followed; yet previous investigations showed me that leaves may and do suffer from the same blight, even when borne upon healthy shoots. Had some of these leaves showed infection, this would not have satisfactorily proved that the *bacteria* were able to penetrate the epidermis, for the latter might have been minutely ruptured by insects, or otherwise, and escaped notice. But the experiments do tend to show

that the virus is harmless on the external surfaces of sound plants; neither does it appear to gain access to the inner tissues through the stomata, or breathing pores.

In experiments numbered nine and ten, limbs with the disease, in an active state, were cut and bound in among the branches of healthy trees. No injury ensued. This was upon the first day of July, when the earth was wet and air moist from the heavy rain of the day before. Eight days afterward another storm occurred, the dead branches being left in the trees. Here again, disease might have occurred through inoculations by insects, etc.; but the failure further supports the non-communicability of the disease from without. The circumstances would seem sufficiently favorable for positive results, were these possible.

Of the total number of experiments, of which records were kept, detailed in the accompanying table, thirty-four and seventy-eight hundredths per cent. were effective, while of the whole number of *inoculations* with knife and needle, fifty-two and seventeen hundredths per cent. unmistakably communicated the disease.

Thrown into tabular form the per cents., as now given, are as follows:

Number of experiments.	Kinds of trees.	Virus from pear.	Virus from apple.	Successful inoculations.	Successful experiments of all kinds.
36	Pear.	54.00	72.00	63.00	38.80
29	Apple.	30.00	None.	30.00	20.69
4	Quince.	100.00	None.	100.00	100.00
69	All kinds.	.....	.....	52.17	34.78

The close observations required for the work as now detailed, together with much attention given to the disease during some years, have convinced me that two popular opinions concerning the progress of this fatal disease are not founded upon facts. One is the usual supposition that destruction by this blight is very sudden; that a healthy tree may, in the course of twenty-four hours, become so affected that the leaves will speedily blacken and the branch as speedily die. It is thought that a large part, or all the tree is affected at once, and death follows as it might from a stroke of lightning. I find the march of the destroyer very irregular, but always slow! The difficulty usually is to tell after the lapse of a single day whether any advance has been made, not how much. In experiment numbered seven, the progress, counting both ways from the point of inoculation, was about an inch per day for seventeen days, but this was altogether exceptional. Infection after inoculation rarely shows at all under nine days, and after this time the destroyer seldom gains more than one-fourth of an inch per day in its gradual progress through the cells. But if guided solely by the change of color in the leaves, other conclusions would be reached. Ordinarily the leaves do not become blackened until about two weeks after the infection of the bark at their insertion, except in the case of very young shoots. In number seven, just mentioned, every leaf was fresh and green in appearance at the end of the

seventh day. Sometimes the bark of older portions harbors the active blight-producers all the season, while the leaves remain green until autumn. After the outer bark is killed throughout some feet in length of trunk or large limbs, new layers of bark may be formed within, and the tree recover, possibly without the cultivator being aware at all of the crisis through which it has passed. In old limbs and trunks covered with rough bark, the daily progress of the disease cannot be observed; but this is not usually the case in those parts still covered by the smooth epidermis. The color changes, a watery appearance is presented, and especially in dewy mornings, little beads of white or tinted gummy exudations may be seen. If the surface is really wet, this material is dissolved and spreads over the surface, or runs down the bark, often dripping from projecting points. When these characteristics fail to mark the progress of the destroyers, thin shavings from the outer bark quickly and unmistakably give the information. After the disease is well started, the watery appearance of the freshly cut tissues is recognizable within a few hours after invasion by the *bacteria;* and, after as many days, decided change of color takes place showing the death of the cells. The brownish change extends in projecting points and streaks into the healthy tissues; these soon spread laterally until they meet, either entirely around the part, or, as not unfrequently happens, only on one side, in the latter case forming a roundish patch or an elongated strip of dying bark. The more or less circular form seems to be especially common on older parts, as the trunk of trees; but the outlines are always irregular, sometimes decidedly so. After a time the further spread of the disease is often checked, or altogether stopped, by natural causes not yet known.

The second popular notion believed to be erroneous, is the influence of thunder storms in accelerating the progress of the disease. So prevalent is this impression, I am disposed to think the appearance really does give support to the idea, though my own observation is not at all conclusive upon this point. But by carefully noting the exact progress of the malady in the bark as already indicated, I have not been able to detect any variation corresponding to the changes of meteorological conditions. Doubtless there are some such variations; but assuredly not such as are appreciable on account of passing storms. Even winter weather does not offer complete immunity to the trees. During two winters, I have watched the slow progress of the disease in the branches of the same tree, and am positive there was no mistake as to the nature of the phenomena. In the first case*, the gradual destruction was continued into and through the spring; in the second (1878), further progress immediately ceased with the expansion of the buds. If transient thunder storms really have any effect, it is upon the leaves only; and it probably is true that when these, or the shoots upon which they grow, are already diseased, the change in color is greater when the air is saturated with moisture than at other times and under other conditions.

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* Transactions Illinois State Horticultural Society, 1877, p. 114.

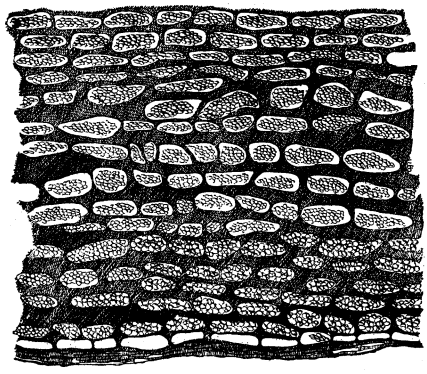

Fig. 1. Cross section of healthy bark taken August 1. The cells are full of starch. Magnified 125 times, linear.

The organism to which we attribute the death of our fruit trees is so minute that a magnifying power of two hundred times across is necessary to see it at all, and one thousand diameters is required for careful study. Only the objectives of sharpest and finest definition give satisfactory results. My own mistake, recorded in the Transactions of the Illinois Horticultural Society, 1877, p. 114, by which these minute bodies were equivocally referred to the *spermatia* of some fungus, shows the want at the time of a proper glass. The wide-angled objectives of recent manufacture are expensive instruments, but are immensely superior for this kind of work.

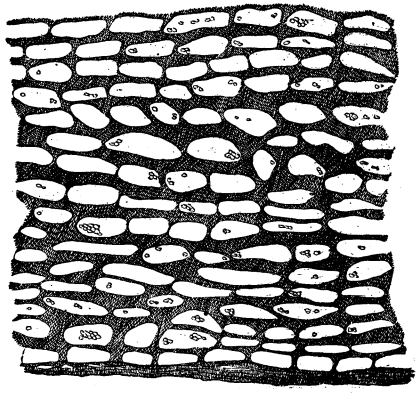

Fig. 2. Cross section of diseased bark from same tree, at same time as Fig. 1. Magnified 125 times.

During the course of the development of the minute creature of which we write, it assumes various shapes, and those of different forms may ordinarily be seen together in the field of the microscope. The most characteristic form, and that most abundantly seen, consists of two oblong joints with obtusely rounded ends, attached close together by a broad base, end to end. Their transverse diameter is about one-thousandth of a millimeter (.0000394 inch), and the length of the two joints is three-thousandths of a millimeter (000118 inch). They are comparatively thicker and shorter than *Bacterium tenno*, so common in putrifying substances. Their motions are less rapid. They slide forward with a slightly undulating motion, they turn over and on end, but never glide with rapidity across the field.

It is exceedingly difficult to determine specifically these minute creatures by size and form, or what are termed morphological characteristics alone. This one appears to me distinct from any that have been described, but I do not undertake at present to decide this question. It is quite possible the active atom, which we find in the diseased tissues, is identical with a common, omnivorous little agent,* which converts sugar, amylaceous matter, lactic,

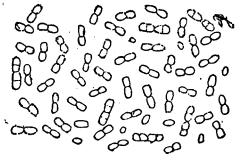

Fig. 3. Bacteria, causing blight in pear and apple trees. Magnified 1,000 times, linear.

Vibro butyrique, Pasteur. *Bacillus amylobacter*, Van Tieghem. These are now believed to be identical.

tartaric, citric malic and muric acids and albuminoid substances into carbon dioxide, butyric acid and hydrogen, whenever and wherever the conditions permit. Should this prove to be the case, it would not necessarily, if presumably, invalidate its active agency in producing the disease of the pear and apple tree; but it might render less hopeful the discovery of preventive treatment. So far as my observation goes, the allied organism found by myself in specimens sent me from Michigan of peach tree afflicted with the "yellows," is, in form and size, very similar to that of the pear blight; but, according to my own measurements and those of Dr. H. J. Detmers, who possesses a magnificent microscope furnished with the very best of Tolle's objectives, the *bacteria* of the peach yellows is, in its characteristic form, one-thousandth of a millimeter in transverse diameter (the same as that from the pear) and three and a half-thousandths of a millimeter long; hence, slightly longer than the pear organism. (Pear, .0000394 inch by .000118 inch; peach, .0000394 inch by .0001377 inch). The peach organism is more commonly more than two-jointed, under the sharpest definition appearing four-jointed nearly as frequently as two. Neither of them is *Bacterium tenno.*

The most conspicuous change that can be observed, by the aid of the microscope, in the tissues affected with the blight, is the disappearance of the stored starch. *The cell walls are not dissolved or altered, in any way*, except by the staining, which sometimes takes place through oxidation, in the later stages of the disease. This is an important point, and though at variance with many published statements, has been established by numbers of microscopical observations devoted to this special problem. If there be any exception, it is confined to the thin walls of very young cells, which soon shrink, and become by drying much distorted. But unless the *bacteria* do dissolve the cellulose of the cell wall sufficiently to make a passageway for themselves, it is impossible for them to gain entrance to such cells as they infest in their adult form. So it must be likewise impossible, in the same condition, for them to spread through tissues as we find them doing. They are assuredly not carried in the circulation of the fluids of the tree; where this is most active they are not found at all, and their slow dispersion from the point of beginning, in all directions through the starch-bearing cells, is too uniform for such interpretations. It is also readily enough proved that the tissues primarily affected by blight have no open pores in their cell walls, such as occur in those of older wood, etc.; neither are there ducts or other channels for their passage. The circulating fluids are filtered most thoroughly in their passage through the walls of each cell; it is impossible for solid particles large enough to be seen by our best microscopes, to pass through the plant tissues. The speculations often made, of ordinary spores of fungi being absorbed by the roots and carried by the watery currents in the plant, are wholly erroneous. Any tyro in microscopy can disprove the too-common assertions of this kind.

Accepting *Nägeh's theory of the molecular construction of the cell wall, we can only understand how the organisms pass from cell to cell in their deadly work, by supposing their germs are less than

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*Sachs' Text-Book of Botany, Eng. Trans., p. 588.

the molecular openings, hence ultra-microscopical, and that in this condition they pass the cellulose barrier and develop into the forms we observe within; or that in some condition they are so plastic, that, amœba-like, they are able to creep through the narrow spaces between the molecules, just as water penetrates the wall. It is well known that the spores of many parasitic fungi, e. g. *Peronospora infestans** causing the potato-rot, send their germ-tube, narrowed to exceeding fineness, though still visible, through the epidermis of the leaf. Through this delicate tube the contents of the spore is transferred to a swelling formed at its apex. Thus the essential portions of the spore gain admission to the inner tissues, through which it is able to thrust its ramifying threads in every direction. The minute opening in the outer wall of the epidermis becomes closed, and all indications of the entrance become obliterated.

If anything like this occurs in the penetrations of our *bacteria*, it has not been observed, and is probably on too small a scale to be made out.

After a cell has been invaded by the moving particles, the first thing noticeable is the agitation of the starch granules. They visibly tremble, they swing minutely to and fro, bumping each other very gently in the confines of the cell. Then dissolution begins, the grains lose their characteristic form, and finally entirely disappear. The protoplasm of the cells is not directly affected. By staining with carmine it may be found in abundance after the stored starch has all disappeared, and after the branch shows by external signs the death of the parts. Probably carbonaceous compounds held in solution, as sugar, organic acids, etc., undergo the same fermentation and destruction as the starch; but the microscope gives no evidence of this. So far as we can *see*, the starch is the only thing upon which the *bacteria* live. In so living, they cause the death of the other portions partially by starvation, partially, no doubt, by the action of injurious substances into which the amylaceous matter is converted.

There is absolutely no trace of other fungus growth in the tissues until after death has taken place, neither have any been found for several days after this in twigs or diseased parts of trees left in the meantime out of doors. In culture baths, ordinary moulds soon appear on the sections of infected parts. If the death of the trees were due to a species of the larger parasitic fungi, like that of the potato rot or of the wheat rust, surely it would have been found by some of the trained eyes that have patiently sought for it. Obscure as they are, none are too much so for the modern microscope, and its mysteries not too inscrutable to be past finding out.

In very young tissues, such as the tips of apple tree shoots, all parts except the epidermis seem to be equally invaded, but in older limbs the bark parenchyma, or the outer layer of living bark, is the first and usually chief seat of the disease. The bast, composing the inner fibrous layer, is not affected. Not unfrequently a close layer of bast cells divides healthy from diseased and dying parts. Sometimes invasion through a layer of bast is gained by way of medullary rays which pass from the wood outward through the

* DeBary, Morphologie und Physiologie.

fibrous bark, aud whose cells are often stored with starch. Contrary to the usual opinion, the cambium, or new layer of thin walled, growing cells just outside of the wood, is by no means the seat of the disease. Often when the whole thickness of the bark perishes, the cambium retains its vitality, and sometimes forms a fresh layer of new bark beneath the old dead coating. In this case the limb or tree may survive without severe, apparent injury. In summer, such a change may take place while the leaves remain green upon the infected branch, showing nothing of their narrow escape from destruction. The wood of a young limb is often discolored above the diseased part by the ascending water colored in its passage through dying and brown portions. The staining is especially noticeable in the fibro-vascular bundles (woody fibers) which turn out into the leaf stalks, and which are the chief water carriers to supply the loss by transpirations from the leaf surfaces. This stained wood may be still healthy in every particular, and continue its proper functions, upon the recovery of the really diseased parts. There is no evidence of the progression of the disease in the wood through which the chief movement of the water on its ascent from the roots to the leaves takes place. The leaves, however, are usually infected from the diseased bark from which they arise. The *bacteria* work their way through the tissues of the leaf stalk, and spread throughout the parenchyma (soft tissue) of the blade. It is also probable that infection starting in the leaf may spread downward to the stem when conditions are favorable, but infected leaves do sometimes die and fall from their attachments without communication of the malady to the cells of the branches. The dying leaves become smeared, especially during dewy nights, with the exuding *bacteria*. When dry they form a varnish-like coating upon the leaf surfaces, in which condition they retain their vitality for an undetermined length of time.

CHEMICAL CHANGES.

My colleague, Professor H. A. Weber, kindly determined for me the kind of fermentation which takes place in the diseased bark. He found, first, that carbon dioxide is abundantly given off. Bark in which the fermentation is active put into water in a stoppered bottle, quickly shows the forming gas. In a few hours the pressure resulting from the accumulating gas forces the frothy liquid out of the bottle in a slow but steady stream. Secondly, butyric acid was determined as a considerable product of the fermentation. This is one of the fatty acids, perhaps best known from its occurrence in butter; it has been heretofore mentioned as one of the products, with carbon dioxide and hydrogen, of a peculiar fermentation of the hydro carbons, such as starch, sugar, various organic acids, etc. It is now well understood that such fermentation is produced by *bacteria*, either by a special species for each substance, or perhaps one and the same for all of these organic compounds. Cellulose (cell wall substance) also undergoes, when the conditions are favorable, the same kind of fermentation. A brief account of investigations upon these peculiar transformations will directly contribute to

our information upon the newly observed fermentation in the living cells attacked with blight.

Until about the beginning of our own century it was generally understood that, as soon as the influence of life was withdrawn, organic bodies began to decompose spontaneously, or without any external cause. It was supposed the vital forces had built up the compounds in opposition to the action of chemical and physical laws, and that the simple cessation of the former was sufficient to permit the latter to retransform the complex life-built bodies to simpler ones, or to the original elements. Willis* (1659) and Stahl (1697) held that an organic compound *in a special state*, was necessary to set up fermentation, which was accomplished by transmitting to the molecules of the fermentable body a peculiar motion by which new arrangements of the elementary substances were affected. In 1680 Leuwenhœck first detected yeast in fermenting beer, but knew nothing of its nature; and it was not until about 1837 that the independent investigations of Latour, Schwann, Kützing, Turpin, Mitscherlich, and others, proved yeast to be a mass of living vegetable cells. The general result of the investigations of these scientists gave support to the idea, first correctly formulated by Latour, that the *yeast cells caused* such fermentation as occurs in the manufacture of beer and bread (Ann. Chim. Phys., 2nd series, vol. 68). This theory, supported as it was by so many careful investigations, ought, it now seems, to have received the assent of scientific men. But this was not the case. From the very commencement of the discussions upon them, Latour's conclusions found a powerful opponent in one whose name at the time was a decided authority in chemistry, and whose influence is still strongly felt upon this and many other questions relating to the practical affairs of life. Justus Liebig had adopted, through Gay-Lussac, the explanations of Willis and Stahl, already noticed, and, by many brilliant experiments and illustrations, he extended and satisfactorily expounded the theory of fermentation through the communication of peculiar atomic motion in the elements of the fermentable compounds. The important experiments of Appert upon the preservation of animal substances, and of Gay-Lussac upon the freedom from fermentation of the juice of grapes excluded from the air, were cited and explained, and withal a very philosophical and seducing interpretation given of the obscure phenomena taking place in the transformations of what were supposed to be unstable organic bodies. Liebig, however, recognized the necessity of *some external cause to introduce* fermentation in a body in which it had not already begun. It could not arise spontaneously, and in the absence of an exciting cause decomposition of even the least stable organic bodies was known to be indefinitely postponed. He claimed that when the molecular motion was once excited, fermentation continued without further external agency, the motion already existing being communicated to the particles adjoining, from the latter to the next, and so on until the transformation was completed. The oxygen of the air was believed to be the most common exciting agent, hence it was simply necessary to exclude the latter, as in the ordinary processes

* The volume of the "International Scientific Series," by Schützenberger, "On Fermentation," contains a condensed history of the subject.

of canning, to preserve fermentable substances. Liebig's theories gained very general scientific and popular acceptation, and have been very slowly, apparently reluctantly, abandoned. He defended them with much vigor against the conclusive experiments of Pasteur, which beautifully confirmed and extended the supposition of Latour.

So late as 1870, the great German chemist published a lengthy memoir (Ann. der Chemic und Pharmacie, vol. 153, p. 1,) upholding his mechanical theory of fermentation against the physiological one renewed by Pasteur; but in this he makes concessions which are almost equivalent to an avowal of defeat. Pasteur replied in 1872, and Dumas showed by ingenious experiments, conducted with his consummate skill, that it was impossible to verify the consequences of the Liebig theory. Tyndale, in ——, published an account of his wonderfully precise and beautifully conclusive experiments, showing that atmospheric oxygen freed from living organisms has no power to excite fermentation, putrefaction or decay.

There are still differences of opinion among scientists concerning these phenomena; but we may receive it as definitely settled that fermentations producing alcohol are excited and continued by the physiological action of yeast, and that those producing acetic, lactic and butyric acids, and the analogous transformation giving rise to ill-scented gases and known as putrefactions, are similarly induced and sustained by *bacteria*. Both of these groups of organisms have been variously classified as fungi, as algæ, or even as animals; but this does not indicate disagreement upon their physiological activeness and effects. The latter constitute the so-called "disease germs," to which are attributed by many the contagious and infectious diseases of animals, and to which we now refer diseases of plants.

I now append a short sketch of investigations and interpretations that have been made, more closely bearing upon the special subject before us.

In 1850, Mitscherlich* communicated to the Academy at Berlin his studies upon the fermentation of cellulose, and expressed the opinion that it was due to a particular organism which he found in the fermenting material. Pasteur†, in 1861, studied the butyric fermentation of sugar and calcium lactate, and concluded that the transformations were produced by a special infusorium "composed of little cylindrical rods, rounded at the extremities, usually straight, either isolated or united in a chain of two, three or four joints, and even more." This he placed in the genus *Vibrio*. In 1865, Trecul† found in macerated vegetable substances, a living organism, which he believed arose spontaneously from a direct transformation of the protoplasm in the closed cell. Having assured himself that it stored starch within itself in certain stages of its development, he named it *Amylobacter*. Twelve years afterward Van Tieghem‡, after careful study, transferred the organism to the genus *Bacillus*, retaining, however, Trecul's name for the species. The scientific name now became *Bacillus amylobacter*. The *savant* last mentioned as studying the little creature, satisfied himself that it could and

* Comptes Rendus, t. 88, p. 205; t. 61, pp. 156 and 436, t. 65, p. 513.
† Comptes Rendus, t. 52, p. 344.
‡ Bulletin de la Societé botanique, March 23, 1877. Comptes Rendus, t. 88, p. 205.

did penetrate the cell walls of plants in the adult state, thus overthrowing, as he thought, the idea of spontaneous origin. Here, however, the battle still wages. Trecul* holds his first opinion, criticising, and with apparent justness, Van Tieghem's proofs. In June, 1879, Prazmowski‡, of Leipzig, announced the discovery that this *Bacillus amylobacter* produced, as a product of fermentation, butyric acid, and concluded from this that it was the same organism as that described by Pasteur and classed in the genus *Vibrio*. Van Tieghem had, before Prazmowski's announcement, suspected this identity, and now by further investigation confirms the opinion.

It therefore appears probable that the butyric fermentation of at least all dead carbonaceous compounds, soluble or insoluble, is directly or indirectly produced by one specific organism, a very minute, living, moving, rapidly multiplying, wonder working creature. Does it now extend its dominion, and, conquering the life forces of our trees, seize upon their treasured products and ruthlessly appropriate them to uses of its own? Present information leads me to think the organism of the blight is specifically distinct, as well as that of the yellows; but this cannot now be definitely decided, neither is it important that we should hasten the verdict. The life history of the creature, its mode of action, our methods of preventing its ravages, are much more important than the name by which it is known.

Whether the species is described or not, this proof of disease in plants produced by bacteria-like organisms must contribute something towards the solution of the germ problem in diseases of animals. By careful experiments to determine the exact facts of its influence and operation in the plant cell, where the conditions can be controlled and manipulations can be made much more favorably than in animals, we may possibly gain for human pathology very important scientific and practical results. Thus science aids science, and important help comes from unexpected quarters.

REMEDIAL MEASURES.

No claim is here made to the discovery of such prophylactic or remedial methods as shall change fruit growing from failure to success, or, indeed, shall materially modify the methods of the best cultivators in any way. While something is to be advanced in the way of improvement in the means usually adopted to save our pear trees, the information already given may be of more service in saving us from crude hypotheses and useless labor, fighting in the dark an unknown foe.

There is a common but often mischievous supposition that the attacks of vegetable as well as animal parasites are always preceded by an enfeebled condition of the host or affected plant. This is true enough in some cases, but by no means uniform enough to be called a rule. Indeed, so far as the operations of parasitic fungi are concerned the rule is that the special condition of the supporting plant as to feebleness or vigor has no effect, and exceptions occur not very unequally upon both sides. External conditions, as

* Comptes Rendus, t. 88, p. 401 (1879).
‡ Comptes Rendus, t. 89, p. 5 (1879).

of temperature, moisture, light, ventilation, etc., are always controlling influences in plant growth, whether of the higher or lower organized classes; but the effect of these, singly or combined, is by no means the same, even upon species belonging to the same group, much less so upon widely different classes. The same variation in temperature may be injurious to the vital processes of a leafy plant, and beneficial to those of a fungus parasite in the tissues of the former, and the reverse. So it happens that certain fungus parasites may, like certain insects, be much more destructive in one climate than in another. There is something, too, in what we call constitutional hardiness or capability to withstand vicissitudes, and this applies to varieties as well as orders and classes. But the same peculiarity which prevents the operations of one parasite may predispose the plant to the attack of another,—even, perhaps, of an allied species.

Aside from the selection of varieties which have been proved by trial to be least affected by blight, the preventive measures here recommended are such as would, without the blight, be best for the growth and healthfulness of the tree. No one need hope by starvation, as in grass sod—or severe mutilation, as by root pruning—to obviate the tendency to blight, unless, in peculiar circumstances, these are really favorable in the direction indicated. In ordinary soils good culture, managed so as to secure thriftiness of growth in the early part of the season and thorough ripening of the wood in autumn, must be best everywhere. Everything tending to lessen the depredations of ordinary insects of every kind, whether leaf eaters, fruit gnawers, trunk borers or anything else, will tend to prevent the introduction of blight. The contagion is not usually, if ever, carried by the air, for it is conclusively established that certain species of *bacteria* are not commonly disseminated in this way, and the viscid character of the species causing blight teaches us it is not likely to be found in the air. But however abundant in the air currents or upon the uninjured surfaces of the trees, it is not probable that it gains entrance to the tissues without help. Anything making punctures or wounds, even though very minute ones, furnishes this help and renders blight possible. The pruner's knife need not assist in the same way, but if it does not, scrupulous care must be exercised to avoid it. A knife used upon diseased limbs is well furnished with *bacteria* and in good order for inoculations. Wounds left exposed are also dangerous. Washes of different kinds have been apparently useful and we may now understand why. Without sufficient experience for positive tests, I recommend washing the trunks and larger limbs once or twice per year with strong lye from wood ashes, crude potash or a solution of the concentrated lye of the shops, for the purpose of making these parts clean and smooth. Exposure will in this way be reduced by destroying insects and their harborers, etc., by rendering less likely any cracks in the bark by the expansion of the stem. Linseed oil has been highly recommended and as severely condemned; but if applied after the above to trees, free at the time from infection, the effect must be in the right direction. By forming an impervious but elastic coating, it resembles the natural epidermis, the best protection the tree possesses. Petroleum is bad, for it kills the outer stratum of bark,

causing cracks and roughness. Lime and sulphur solutions or mixtures do no injury and may be beneficial. A dilute solution of carbolic acid is still more likely to prove a protecting wash.

Whether it is possible to apply to the soil, to be absorbed by the roots, or to introduce to the circulation in any other way, preventive or remedial substances is a question to be solved by further experiments. Probably not. A tree can not be doctored like an animal by forcing it to swallow medicine. Materials presented to the roots may or may not be absorbed. If the former, they may or may not spread throughout the tissues, or may not spread in such manner as to reach the diseased parts. The roots do not blight except in cases of contagion from the trunk, hence, so far as they are concerned, we do not need protecting substances about them. So far as my examinations show, this is also true of the peach yellows. The roots sent me were certainly free from disease, while the bark and pith of the parts above ground were full of *bacteria*. It has been supposed that the chief seat of this disease is in the roots. I cannot say these are not sometimes infected, but am well convinced that they are not always so when other parts are severely suffering.

I ought here to express my decided opinion that neither the blight nor the yellows is due to any lack of special nutrient substances in our soils. After careful attention to this popular idea and abundant opportunity for observation in regard to the first mentioned disease, I find nothing in its support. The physical differences in soil, especially in relation to drainage, and the ability to withstand drouth, have important bearings on the general healthfulness of the trees and indirectly may affect the tendency to blight; but that there is in the Western States, either upon new or long cultivated soils, any special poverty of mineral ingredients necessary to the proper food of the trees, corresponding in any way to the ravages of blight, is certainly not proved, and for anything I can find out is wholly untrue.

If we now ask what may be done after infection has taken place in the pear and apple, there is but one remedy which can be confidently depended upon to check the progress of the disease. This is the old one of removing the infected parts. There has been much difference of opinion as to the usefulness of this procedure, but in the light of these investigations, this difference has certainly arisen from want of knowledge as to the evidence of infection in its earlier conditions, and from failure, through inattention, to really accomplish the work undertaken. He who cuts away only the parts already cleared, or who uses a knife or saw smeared with material from diseased portions, must not wonder that his labor is in vain. Neither should we be surprised if the disease spreads from an unprotected wound made in healthy portions with a carefully cleaned instrument. It is very plain that, to be successful, the really infected parts, whether conspicuously changed in color or not, must be excised, and that by some method not likely by its very process to re-communicate the infection.

It is true this cure must sometimes be severe, but the proved slowness of the progress of the malady, together with its positively local character in the tree, are good reasons for thankfulness that we have a certain remedy, and ought to give us confidence in its

use. If the alkaline washes heretofore commended are applied once or twice during the season, the resulting smoothness and freshness of the bark will aid materially in early detecting the presence of the *bacteria*. In young limbs this can always be done as before indicated, not by waiting for the leaves to reveal the destruction already accomplished, but by evident changes occurring in the bark. In the absence of wounds or bruises upon older parts, as well as knotty places from bad pruning and other causes, the thickness of the outer layer of corky substances provides an excellent protection; hence, in well grown, well kept trees, the parts most liable to receive disease-producing inoculation are such as quickly show the effects of the destroyer. Among such trees, careful examination once in two weeks, especially during the months of June, July and August, and as careful, well-managed use of the knife, may not insure freedom from serious loss, but certainly will, in most cases, materially and hopefully reduce the ravages of this heretofore mysterious disease.

It is reasonably probable that some antiseptic application upon the surface, at least after removal of the epidermis, or layer of dead bark, may be found an effective remedy; but I am not experimentally satisfied upon this point. Carbolic acid (pure) five parts, to one thousand of water, kills the *bacteria*; other similar substances are known to act equally well much more diluted; but this can readily be obtained, and may prove the best practical remedy. Professor Turner, of Jacksonville, Illinois, thinks he has during many years prevented the spread of the disease from infected parts by painting the surface with turpentine, in which, for convenience, lamp-black had been stirred.

After a limb has been cut away, the fresh wound should be washed with the one-half per cent. carbolic acid solution, and immediately covered with linseed oil, oil and lead paint, or shellac dissolved in alcohol. If a spot upon the trunk or a large limb shows infection, the bark should be sliced away deep enough to remove the invaded portions as indicated by the appearance of the tissues, being careful not to disturb, unless necessary, the liber and cambium, the surface washed with carbolic acid solution and painted as before, or bandaged with cloth or stout paper, made impervious by wax, oil or parafine. An excellent bandage may be made by applying, with a brush, a coat of linseed oil upon sheets of manilla wrapping paper, and cutting these, when dry, into strips two inches wide. The strips may be used just as a surgeon uses bandages of muslin, by winding spirally over the wound. Mr. Ricketts, of Newburgh, New York, reports, after many trials, good success by paring off the diseased bark and binding tempered clay upon the exposed tissues.

Upon apple trees, the blight is more commonly confined to the young shoots, and upon these the leaves quickly indicate the presence of the disease. Prompt removal of the shoots, taking care to cut below the infection, even without further treatment, must be advantageous. When, however, larger limbs and trunks are attacked, the method proposed above is required.

It can do no harm, and may be useful to burn the severed, diseased parts; but infection from such portions thrown upon the ground cannot be very direct, if likely to occur at all, under ordinary circumstances. The knife may be disinfected, from time to

time, by dipping in a strong solution of carbolic acid, carried for the purpose, or by passing it through a flame in such manner that the surface may be momentarily highly heated without injuring the temper of the blade. An alcoholic lamp furnishes facility for this. Scouring thoroughly in the earth would probably, but not certainly, be effective.

According to the current opinion concerning the slow contagion of the peach yellows, it may be practically possible to "stamp out" the disease from any given locality. This will largely depend upon the specific nature of the parasitic organism, and whether or not it lives upon anything else than the tissues of the peach tree. This process does not appear feasible in regard to the blight of the pear and apple; yet, further investigations may reverse present probabilities. Stranger things have rewarded research than the discovery of some well known plant which, by serving as nurse to the minute parasite in an essential stage of its development, is indirectly responsible for the ruinous disease of the pear. Should, for example, conviction of this kind rest upon the Lombardy poplar, how widely different the cure from our present proposals!

We shall conquer when we know how. When we, with open eyes and unstopped ears, as true students of Nature, acquire the knowledge within the possibilities of our reach, we shall be able to rightfully assert our royal authority, and to have effectual domination over every living thing that moveth upon the earth. The following table gives in detail the number of experiments tried of which records were kept, the date when performed, the kinds of trees operated upon, the source of the infecting material (virus), the method of applying the latter, the date when the first evidence was noticed of the successful result of the inoculation, the number of days elapsing between the time of the inoculation and the first noticed evidence of infection, the number of days elapsing between the date of first visible evidence of the infection and its spread, counting both ways from point of inoculation of four inches, and some miscellaneous matter. In the fourth column, the initial letters P. and A. denote pear and apple, the inoculating material having been taken from these trees in various stages of blight. In the fifth column, the word "budding" denotes that a small piece of diseased bark was inserted in the healthy tree; the word "needle" is meant to indicate that the healthy bark was simply punctured, either with a needle or the sharp point of a small knife, previously charged with virus; the word "brush" denotes that the virus was applied to uninjured parts of healthy trees. The sixth and seventh columns show, in different ways, the apparent time required for the small amount of the inoculating material to effect change in the tissues sufficient to be observed by external characteristics, and the eighth column gives some idea of the rate at which the disease progresses, mostly judged in the same manner. Nearly all, except numbers 33 to 42, inclusive, were in shoots of the current year's growth. In old trunks, etc., the spread of the disease is much slower, but irregular:

EXPERIMENTS IN DETAIL.

No. of Experiment.	Date, July and August, 1880.	Kind of Tree.	Virus.	Method.	First Evidence of Infection.	Days after Inoculation.	Days Progressing 4 Inches.	
1	1	Bartlett Pear.	P.	Budding.	17	16	8	
2	1	"	A.	"	21	20	5	
3	1	"	P.	"				Bound with cloth.
4	1	"	A.	"				
5	1	"	P.	"				
6	1	"	A.	"	22	21	9	
7	1	"	P.	"	9	8	4	Diseased 18 inches in 17 days.
8	1	"	A.	"	15	14	9	
9	1	Clapp's F. Pear.	P.	Limb.				
10	1	"	A.	"				
11	10	Bartlett Pear.	P.	Budding.	19	9	3	
12	10	"	A.	"	22	12	5	
13	10	Anger's Quince.	P.	"	23	13		
14	10	"	P.	"	22	12		
15	12	Bartlett Pear.	P.	Needle.				Bound with cloth.
16	12	"	P.	"	22	10	3	
17	12	"	P.	"				
18	12	Clapp's F. Pear.	P.	"				
19	12	"	P.	"	24	12		Bound with cloth.
20	12	"	P.	"	20	8	7	
21	12	Bartlett Pear.	A.	"	23	11	4	
22	12	"	A.	"	24	12	5	
23	12	"	A.	"				
24	12	Clapp's F. Pear.	A.	"	21	9	3	
25	12	"	A.	"	22	10	1	Bound in cloth; young shoot.
26	12	"	A.	"				
27	12	Bartlett Pear.	P.	Brush.				
28	12	"	P.	"				
29	12	"	P.	"				
30	12	Clapp's F. Pear.	P.	"				
31	12	"	P.	"				
32	12	"	P.	"				
33	13	Apple.	P.	Needle.				In bark of last year.
34	13	"	P.	"				In bark of last year.
35	13	"	P.	"				In bark of last year.
36	13	"	P.	"				In bark of last year.
37	13	"	P.	"				In bark of last year.
38	13	"	A.	"				In bark of last year.
39	13	"	A.	"				In bark of last year.
40	13	"	A.	"				In bark of last year.
41	13	"	A.	"				In bark of last year.
42	13	"	A.	"				In bark of last year.
43	17	Grimes' Apple.	P.	"				
44	17	"	P.	"				
45	17	"	P.	"		14	18	
46	17	"	P.	"		11	16	
47	17	"	P.	Brush.				
48	17	"	P.	"				
49	17	"	P.	"				
50	17	"	P.	"				
51	27	"	P.	Needle.		16		Apex died.
52	27	"	P.	"		12		Two inches died.
53	27	"	P.	"		17		Three inches died.
54	27	"	P.	Brush.				Leaves, upper surface.
55	27	"	P.	"				Leaves, lower surface.
56	27	"	P.	"				Leaves, upper surface.
57			P.	"				Leaves, lower surface.
58			P.	"				Leaves, upper surface.
59	31	Bartlett Pear.	P.	"				Leaves, upper surface.
60	31	"	P.	"				Leaves, lower surface.
61	31	Clapp's F. Pear.	P.	"				Leaves, upper surface.
62	31	"	P.	"				Leaves, lower surface.
63	31	Grimes' Apple.	P.	"				Leaves, upper surface.
64	31	"	P.	"				Leaves, lower surface.
65	31	Anger's Quince.	P.	Needle.	11	11	15	
66	31	"	P.	"	14	14	16	
67	5	Grimes' Apple.	P.	"				
68	5	"	P.	"	14	19		
69	5	"	P.	"				

LIST OF NATIVE AND FOREIGN WOODS.

By N. Clifford Ricker, M. Arch., *Professor of Architecture.*

The following list comprises, as far as possible, the woods which are used in the United States and Europe for building, for all industrial purposes, and for furniture and decorative work.

It gives the common and botanical names, the place of growth, the qualities and color of each wood, and the uses for which it is chiefly employed.

All woods which grow within the United States, and which would probably be of value, are included.

Abele—See Poplar.

Acacia, false—See Locust.

Acacia, true, *Acacia proxima mordi.* Warm climates; hard, tough, reddish. Ship building, gum arabic, tanning.

Alder, *Alnus glutinosa.* Europe; medium hardness, reddish-yellow. Cogs, spoons, pumps, turning.

Algoraba—See Mezquit.

Almond, *Amygdalus communis.* S. Europe and N. Africa; hard. Cogs, tool handles, pulleys.

Amboine. W. Africa; medium hardness, yellowish-brown. Veneers, fancy boxes.

Angica-wood—See Cangica-wood.

Apple, *Pyrus malus.* America and Europe; hard, reddish-brown. Turning, cabinet work, tool handles.

Apple, American crab, *Pyrus coronaria.* United States; hard, light red. Turning, cogs.

Apple, Oregon crab, *Pyrus rivularis.* California and Oregon; hard, tough.

Apricot, *Armenica vulgaris.* Cultivated. Turning.

Arbor Vitae, *Thuja occidentalis.* Temperate climates; soft, reddish. Building, fences, posts.

Arbor Vitae, western, *Thuju gigantea.* Alaska to California; soft, light, durable. Building, shingles.

Ash, *Fraxinus excelsa.* Var. Hungary; yellowish-brown, hard. Veneers, furniture.

Ash, *Fraxinus excelsior.* Europe and N. Asia; hard, tough, white or light brown. Handles, turning, machines, implements.

Ash, black, *Fraxinus sambucifolia.* E. United States; hard, light brown, very durable. Hoops, splints, baskets, chairs.

Ash, blue, *Fraxinus quadrangulata.* E. United States; hard, white, durable. Wagons, furniture, agricultural implements.

Ash, mountain, *Pyrus Americana.* N. United States; hard. Turning.

Ash, Oregon, *Fraxinus Oregona.* Pacific States; hard. Implements,

Ash, prickly, *Xanthoxylum clava Herculis.* S. E. United States; hard, yellow, close-grained.

Ash, white, *Fraxinus Americana.* United States; hard, tough, white. Wagons and carriages, furniture, implements.

Asp, quaking—See Aspen, American.

Aspen, American, *Populus tremuloides.* N. United States; soft, white. Paper, floors, fuel, turning.

Bamboo, *Bambusa arundinacea.* India; yellow, tough. Furniture.

Barberry, *Berberis vulgaris.* Tough, yellow.

Bar-wood, Africa—Hard, dark red. Ramrods, violin bows, turning, dyeing.

Bass-wood—see Linden.

Bay, red, *Persea Carolinensis.* S. W. United States; hard, rose-color, very durable. Ship building, cabinet making.

Bay, rose, *Rhododendron maximum.* N. E. United States; hard, close.

Bay-tree, sweet, *Laurus nobilis.* S. Europe.

Beech, *Fagus ferruginea.* N. United States; hard, reddish-yellow, very durable, if dry. Planes, handles, turning.

Beech, *Fagus sylvatica.* Europe; hard, liggt yellowish-brown. Handles, lasts, tools, furniture.

Beech, blue—See Hornbeam, (*Carpinus Americana*).

Beech, water—See Hornbeam.

Beef-wood, *Casuarina stricta.* Australia; hard, dark red. Ornamental.

Big tree, *Sequoia Gigantea.* California; medium hardness, red, very durable. Building.

Bilsted—See Gum, sweet.

Birch, *Betula alba.* Europe; hard. Spoons, tables, turning.

Birch, *Betula occidentalis.* California. Building, fencing.

Birch, black, *Betula lenta.* E. United States; hard, reddish-brown. Cabinet making, furniture, gun-stocks, ornamental.

Birch, gray—See Birch, yellow, (*Betula lutea*).

Birch, paper, *Betula papyracea.* N. E. America; medium hardness, whitish, not durable. Canoes, turning, fuel.

Birch, white, *Betula alba populifolia.* N. E. America; soft, whitish, not durable. Turning, furniture, fuel.

Birch, yellow, *Betula excelsa.* Medium hardness, yellow. Furniture.

Birch, yellow, *Betula lutea.* N. E. America; medium hardness, yellow. Furniture, turning.

Biti. India; open-grained, like Rosewood. Ornamental.

Bitter-nut wood, *Juglans amara.* United States; white, medium hardness. Agricultural implements, wagons, etc.

Bitter-nut wood, *Juglans aquatica.* United States; soft, white.

Black-wood, *Dalbergia latifolia.* India; heavy, fine-grained, greenish-black. Furniture, ornamental.

Blue-gum, *Eucalyptus globolus.* Australia; hard. Building, ship-building, piles, bridges.

Bog-oak, *Quercus.* Ireland and England; hard, black. Cabinet making, turning, ornamental work, fancy work.

Botany-Bay oak—See Beef-wood.

Botany-Bay wood, black. Australia; hard, black heart, yellow sap. Handles, turning.

Boxwood, *Boxus sempervirens*. S. Europe and Asia; hard, yellow. Turning, engraving, musical instruments, rules, scales.

Brazil-wood, *Cæsalpina echinata*. Brazil; red. Dyeing, turning, violin bows, ornamental work.

Braziletto, *Cæsalpina Braziliensis*. West Indies; reddish-orange. Turning and ornamental work.

Buckeye, *Aesculus glabra*. N. W. United States; soft and spongy, white. Baskets, turning.

Bullet-tree, *Achras sideroxylon*. Jamaica; hard, durable. Building, turning.

Butternut—See Walnut, white.

Button-wood—See Sycamore.

Cabbage-tree—See Palmetto.

Cajeput—See Laurel. California.

Calamander, *Diospyros quaesita*. Ceylon; very hard, black, yellow and red, beautifully marked. Furniture and ornamental.

Calembeg, *Aquillaria agallocha*. Siam; olive-green. Turning.

Calico-bush—See Laurel.

Cam-wood. Africa; hard, fine-grained, dark red. Dyeing, turn.

Camphor-wood, *Camphora officinarum*. Formosa; soft, grayish-yellow. Cabinet making, turning, furniture, ornamental work.

Canary-wood. Brazil; light orange. Cabinet making, turning, ornamental work.

Cangica-wood. Brazil; yellowish-brown. Cabinet work, turning.

Catalpa, *Catalpa bignonoides*. S. United States; medium hardness, close, whitish, very durable. Posts, cabinet work.

Catalpa, western, *Catalpa speciosa*. W. United States; medium hardness, very durable. Cabinet work, posts, R. R. ties.

Cedar, *Cedrela Australis*. Australia; soft. Furniture and cabinet.

Cedar, *Taxus brevifolia*. Pac. United States; hard, durable, reddish.

Cedar, Alaska, *Chamæcyparis Nutkaensis*. Alaska; soft, white.

Cedar, bastard, *Librocedrus decurrens*. S. California.

Cedar of Lebanon, *Cedrus Libani*. Syria; yellowish brown.

Cedar, Oregon, *Chamæcyparis Lawsoniana*. Pac. United States; medium hardness, very durable, whitish.

Cedar, red, *Juniperus Virginiana*. E. United States; soft, very durable, brown. Pencils, furniture, cigar boxes, posts, R. R. ties, ornamental work, inlays, fur chests.

Cedar, rock, *Juniperis Californica*. Pac. United States; durable, yellow.

Cedar, Spanish, *Juniperus Bermudiana*. West Indies and S. America; hard, brown. Cigar boxes, cabinet work, ornamental.

Cedar, western, *Juniperus occidentalis*. Pac. United States.

Cedar, West Indian, *Cedrela odorata*. West Indies; soft, brown. Furniture, cigar boxes, cabinet work.

Cedar, white, *Chamæcy paris sphæroidea*. E. United States; soft, very durable, reddish. Shingles, boats, casks, posts, R. R. ties.

Cedar, white—See Cedar, bastard.

Cedar, white, *Thuja occidentalis.* N. United States; soft, very durable, light. Posts, R. R. ties, fencing.

Cedar, white—See Cypress.

Cedar, yellow—See Cedar, rock.

Cherry, *Prunus cerasus.* Cultivated; soft or medium, light brown. Cabinet work, turning, furniture.

Cherry, wild black, *Prunus Serotenus.* E. United States. Medium hardness, reddish brown. Furniture, turning.

Cherry tree, *Exocarpus cupressiformis.* Australia; hard. Tools, turning, spokes, gun stocks.

Chestnut, *Castanea vesca.* E. United States and Europe; medium hardness, very durable, light brown. Furniture, turning, building, cabinet work, posts, R. R. ties.

Chinquapin, *Castanea pumila.* S. United States; very durable.

Cocoa wood. W. Indies; hard, brown. Turning, musical instruments.

Coffee tree, Kentucky, *Gymnocladus Canadensis.* S. W. United States; medium hardness, very tough, rose color. Furniture.

Cog-wood, *Laurus chloroxylon.* Jamaica; hard, whitish. Cogs, machinery, building.

Cork-oak, *Quercus suber.* S. W. Europe; bark is commercial cork.

Coromandel—See Calamander.

Cotton-wood, *Populus monilifera.* W. United States; soft, white. paper, fuel.

Cowdi-pine, *Damara australis.* New Zealand; very durable. Turn.

Crab-tree, *Pyrus coronaria.* United States; very hard, light brown. Turning, tools, tool-handles, cogs.

Cucumber-tree, *Magnolia acuminata.* N. United States; soft, white. Pumps.

Cypress, *Cupressus sempervirens.* S. Europe and N. Asia. Building.

Cypress, *Cupressus thyoides.* S. United States. Building.

Cypress, *Torreya taxifolia.* New Zealand; hard. Ships, building.

Cypress, bald, *Taxodium distichum.* S. United States; soft, very durable. Shingles, building, posts, R. R. ties, fencing.

Cypress, black—See Cypress, bald.

Cypress, deciduous—See Cypress, bald.

Cypress, white—See Cypress, bald.

Deal—See Pine. (Deal is an English name for some kinds of pine lumber.)

Deodar, *Cedrus deodar.* N. India; very durable, yellow. Building.

Dog-wood, *Bedfordia salicina.* Tasmania; hard, beautifully marked. Ornamental work, furniture, gunpowder.

Dog-wood, *Cornus Florida.* E. United States; hard, reddish. Turning.

Dog-wood, Jamaica; *Piscidia erythrina.* S. United States and W. Indies; hard, durable, light brown. Carriages.

Dog-wood, striped—See Maple, striped.

Ebony, *Byra ebenus.* Jamaica; hard, greenish-black. Turning, cabinet-making, furniture, dyeing, ornamental work.

Ebony, *Diospyros ebenus.* Africa, S. Asia; hard, black. Turning, veneers, furniture, ornamental work, fret-sawing.

Elder, *Sambucus niger*. Europe and America; soft. Turning, rules, shuttles, gunpowder.

Elm, *Ulmus campestris*. Europe; hard, durable, light brown. Building.

Elm, American—See Elm, white.

Elm, American cork—See Elm, rock.

Elm, moose—See Elm, red.

Elm, red, *Ulmus fulva*. E. United States; medium hardness, reddish. Building, produces slippery elm bark.

Elm, rock, *Ulmus racemosa*. W. United States; hard and heavy. Agricultural implementns, furniture, cabinet making.

Elm, slippery—See Elm, red.

Elm, small-leafed—See Elm, winged.

Elm, white, *Ulmus Americana*. E. United States; medium hardness, light brown. Staves, hoops, piles, pipes.

Elm, winged, *Ulmus alata*. S. United States; hard. Hubs.

Fir, *Abies grandis*. Oregon.

Fir, red, *Abies magnifica*. Pacific States.

Fir, red silver, *Abies amabilis*. California.

Fir, Scotch, *Pinus sylvestris*. Europe; medium hardness, yellowish-white. Building. Called "yellow deal."

Fustic, *Morus tinctoria*. S. United States and W. Indies; medium hardness, yellow. Turning, dying, ornamental work.

Grape, sea, *Coccoloba unifera*. S. United States and W. Indies; very hard, violet. Cabinet making.

Greenheart, *Nectandra rodioei*. S. America and W. Indies; hard, very durable, greenish and dark brown. Ships, piles, bridges, turning.

Grenadillo. W. Indies; hard, brown. Turning, furniture, ornament.

Gum, sour, *Nyssa multiflora*. E. United States; hard, tough, white. Hubs.

Gum, sweet or red, *Liguidambar styraciflua*. S. United States; hard, compact, reddish.

Gum tree, *Nyssa Caroliniana*. S. E. United States; hard, close. Hubs, hatters' blocks.

Hackmetack, *Larix Americana*. N. United States; medium hardness, very durable, light. Ships, building, posts, ties.

Hawthorn, *Cratægus oxyacantha*. Europe; hard, white. Turning.

Hazel, *Corylus avellana*. Europe; white. Turning, hoops.

Hemlock, *Abies Canadensis*. N. United States; medium hardness, grayish yellow. Building, bark for tanning.

Hickory, eastern Shell-bark, *Carya alba*. United States; hard, whitish. Agricultural implements, carriages, wagons, bent work.

Hickory, western Shell-bark, *Carya sulcata*. W. United States; hard, whitish. Agricultural implements, carriages, bent work, wagons.

Hickory, white—See Hickory, swamp.

Hickory, white-heart, *Carya amentosa*. Mid. United States; medium hardness, whitish.

Holly, *Ilex aquifolium*. Europe; hard. Turning, cabinet making, engraving, ornamental work.

Holly, *Ilex opacca*. S. United States; hard, white. Ornamental work, fret-sawing, turning.

Hoonsay. India; red and black.

Hornbeam, *Carpinus Americana*. United States; hard, whitish. Cogs, levers, turning.

Hornbeam, *Carpinus betulus*. Europe; hard, whitish. Machines, turning, cogs, levers.

Hornbeam, *Ostrya Virginica*. Hard, durable, white. Levers, turning.

Horse Chestnut, *Aesculus hippocastana*. Asia, Europe and America; soft, whitish. Turning, brushes.

Huon Pine, *Dacrydium franklinii*. Tasmania; hard. Building, ships, cabinet making, furniture.

Iron-wood, *Rumelia lycioides*. E. United States; hard, whitish. Turning.

Iron-wood (Redwood), *Erythroxylon areolatum*. Jamaica; hard. Cogs, machines.

Iron-wood—See Hornbeam.

Ivy—See Laurel.

Jack-wood, *Artocarpus integrifolia*. S. Asia; hard, yellow and reddish. Furniture, building.

Judas tree—See Red-bud.

Juniper—See Cedar.

Kiabocca-wood. India; hard, orange brown. Ornamental work.

King-wood. Brazil; hard, violet. Turning, cabinet making, ornamental work.

Laburnum, *Cistinus alpinus*. Europe; hard, white and brown. Turning.

Lance-wood, *Anona duquetia*. S. America; hard, light yellow. Springs, bows, billiard cues, fishing rods.

Lance-wood, *Oxyandria virgata*. W. Indies; hard, light yellow. Springs, bows, billiard cues, fishing rods.

Larch, *Larix Europea*. Europe; very durable. Ships, building.

Larch, *Larix occidentalis*. Oregon.

Larch, American—See Hackmetack.

Larch, black—See Hackmetack.

Larch, western—See Larch, (*Larix occidentalis*).

Laurel, *Kalmia latiafolia*. E. United States; very hard and strong. Tool handles, fuel.

Laurel, big, *Magnolia grandiflora*. S. United States; soft, very white. Cabinet work, building.

Laurel, California, *Umbellaria Californica*. Close, brown. Cabin.

Laurel, great—See Bay, rose.

Laurel, mountain—See Laurel, (*Kalmia latifolia*).

Laurel, mountain—See Laurel, California.

Leopard-wood, *Piratinera guianensis*. Cent. America; hard, mottled, reddish-brown. Canes, ornamental work.

Letter-wood—See Leopard-wood.

Lignum vitæ, *Guiacum officinale*. W. Indies; very hard, black and yellow. Turning, pulleys, balls.

Lignum vitæ, *Guiacum sanctum*. S. United States; hard, black and yellow. Turning, ornamental work, pulleys, balls.

Lime, *Tilia Europea.* Europe; fine-grained, white. Carving, turning, musical instruments.

Lime-tree—See Linden.

Linden, *Tilia Americana.* United States; soft, tough, yellowish-white. Bent work, carriages, turning; bark makes excellent glue-brushes.

Linn—See Linden.

Liquidambar—See Gum, sweet.

Locust, *Hymenia courbarii.* W. Indies and S. America; hard, reddish-brown. Machines, pins, cogs.

Locust, *Bobinia pseudacacia.* E. United States; very hard, tough and very durable; yellowish-brown. Hubs, posts, turn.

Locust, honey, *Gleditschia triacanthus.* United States; hard and very stable, yellow. Felloes.

Locust, honey—See Mezquit.

Logwood, *Hæmatoxylon campeachianum.* W. Indies; red. Dyeing.

Madrona, *Arbutus Menziezii.* Oregon; hard, white.

Mahogany, *Swietena mahagoni.* W. Indies; hard, brown. Turning, cabinet making, veneers, ornamental work.

Mahogany, mountain, *Cereocarpus ledifolius.* W. United States; very hard, dark red. Ornamental work, fuel.

Manchineel, *Hippomane maneinella.* W. Indies and C. America; hard, very durable, yellowish-brown. Cabinet making.

Mangrove, *Rhizophora Mangle.* Tropics; hard, brown. Cabinet making, ships, instruments, staves.

Manzanita, *Arctostaphylos pungens.* Pacific United States; hard, heavy, reddish-brown. Cabinet making, ornamental.

Maple, black, *Acer nigrum.* E. United States; hard, white. Furniture, fuel, turning.

Maple, large-leaved, *Acer macrophyllum.* California; hard, close. Sugar, baskets, furniture, building.

Maple, red, *Acer rubrum.* E. United States; soft, reddish-white. Fuel, cabinet making, turning, furniture.

Maple, striped, *Acer Pennsylvanicum.* N. E. United States; very hard, white.

Maple, sugar, *Acer saccharinum.* E. United States; hard, white. Sugar, furniture, turning, fuel.

Maple, vine, *Acer circinatum.* Hard, tough, white. Oregon.

Maple, white silver, *Acer dasycarpum.* N. United States; soft, white. Fuel, turning, furniture.

Maracaybo. S. America; hard, reddish. Furniture.

Mezquit, *Prosopis Juliflora.* S. W. United States; hard, very durable. Fuel, gum, forage.

Moose-wood—See Maple, striped.

Mora, *Mora excelsa.* Hard, reddish. Ships, building.

Mountain ash, *Eucalptus pilularis.* Australia; hard, tough. Wagons.

Mountain ash, (Rowan,) *Pyrus aucuparia.* Europe and America.

Mulberry, *Morus alba.* Europe and America. Leaves for silkworms.

Mulberry, *Morus Nigra.* Europe and America. Leaves for silkworms.

Mulberry, red, *Morus rubra*. E. United States; medium hardness, very durable, yellowish. Posts, ships, building, pins.

Muskwood, *Eurybia argophylla*. Australia; hard. Furniture, ornament.

Mustaiba. Brazil; hard, brown. Turning, handles.

Myrtle, *Myrtus communis*. S. Europe; hard, close. Ornamental work.

Myrtle, Tasmanian, *Fagus Cunninghamii*. Tasmania; dark, mottled. Cabinet work, turning.

Nellec. India; dark flesh color. Ornamental.

Nettle-tree, *Celtis Australis*. S. Europe; close-grained. Turning.

Nicaragua-wood. S. America; dark red. Ornamental work.

Norway spruce, *Abies excelsa*. Norway; medium hardness. Building. Lumber is called "white deal" in England.

Nova-laddi. India; close, greenish-brown. Ornamental work.

Nutmeg, California, *Torreya Californica*. California; hard, light.

Oak, *Quercus robur*. Europe; hard, yellowish. Ships, furniture, building, turning, carving, implements.

Oak, African. Africa; hard. Ships, furniture, turning.

Oak, bur, *Quercus macrocarpa*. N. United States; hard, yellow. Furniture, building, wagons, implements, cabinet making.

Oak, chestnut, *Quercus prina*. E. United States. Building, fencing, casks.

Oak, live, *Quercus virens*. S. United States; hard, very durable, yellow. Ships.

Oak, mossy-cup white—See Oak, bur.

Oak, Muhlenberg's, *Quercus Muhlenbergii*. Mid. United States; Medium hardness, very durable. Posts, R. R. ties.

Oak, over-cup—See Oak, bur.

Oak, post, *Quercus stellata*. N. United States; hard, yellowish. Wagons, furniture, agricultural implements, building.

Oak, red, *Quercus rubra*. N. United States; hard, reddish. Casks, furniture, building.

Oak, red, *Quercus tinctoria*. N. United States; hard, durable, red. Building, dyeing, casks, wagons.

Oak, rock chestnut—See Oak, chestnut.

Oak, Spanish, *Quercus falcata*. Mid. United States; medium hardness, reddish. Casks, barrels.

Oak, swamp white, *Quercus bicolor*. N. United States; hard, yellow. Buildings, implements, furniture, wagons.

Oak, white, *Quercus alba*. United States; hard, yellowish. Building, ships, furniture, implements, wagons.

Oak, willow, *Quercus phellos*. Mid. United States; reddish. Felloes.

Oak, yellow-barked—See Oak, black.

Olive, *Olea Europea*. Europe and Asia; medium hardness, yellow. Turning, furniture, ornamental work.

Olive, California—See Laurel, California.

Osage Orange, *Maclura aurantiaca*. S. W. United States; hard, very durable, yellow. Wagons, hedges, turning, implements.

Osier, *Salix viminalis*. Europe; soft, white. Baskets, wickerwork.

Paddle-wook, *Aspidosperma excelsum.* Guiana. Paddles, rollers.
Palisander—See Rosewood.
Palm (many kinds and species). Tropics. Oil, building, boats, furniture, cordage.
Palmetto, cabbage—S. United States. *Sabal palmetto*; very durable in water. Piles, wharves.
Partridge-wood, *Hoisteria coccinea.* W. Indies and S. America; hard, reddish-brown. Canes, umbrellas, turning.
Pear, *Pyrus communis.* Europe and America; hard, light-brown. Turning, carving, engraving, drawing instruments.
Pepperidge—See Gum, sour.
Persimmon, *Diospyros Virginiana.* Mid. United States; hard, heavy, brownish. Turning, lasts.
Petuvian-wood. Hard, reddish-brown. Ornamental work.
Pheasant-wood—See Partridge-wood.
Pine, *Pinus contorta.* Pacific States; soft, white. Building.
Pine, *Pinus monticola.* Pacific States; medium hardness; light.
Pine, brown—See Pine, southern.
Pine, California yellow, *Pinus Jeffreyi.* California; hard, yellowish. Building.
Pine, Douglas, *Abies Douglassii.* England; medium hardness. Building.
Pine, fox-tail, *Pinus Balfouriana.* Pacific States; medium hardness, reddish. Building, mining.
Pine, Georgia—See Pine, southern.
Pine, hard—See Pine, southern.
Pine, loblolly, *Pinus taeda.* S. E. United States. Building, turpentine.
Pine, long-leaved—See Pine, southern.
Pine, Norfolk Island, *Araucaria excelsa.* Norfolk Island; medium hardness. Building.
Pine, Norway—See Pine, red.
Pine, nut, *Pinus monophylla.* Pacific Territories; soft, white. Fuel, charcoal.
Pine, Oyster Bay, *Callitras Australis.* Tasmania; hard. Agricultural implements, cabinet making.
Pine, pitch, *Pinus rigida.* S. E. United States; turpentine. Building.
Pine, red, *Pinus resinosa.* N. United States; hard, durable. Building ships.
Pine, short-leaved—See Pine, yellow (*Pinus mitis*).
Pine, southern, *Pinis Australis.* S. United States; medium hardness, very durable, yellow. Building, ships, fencing, railroad ties, tar, turpentine.
Pine, spruce, *Pinus glabra.* S. E. United States; soft, white.
Pine, spruce—See Pine, yellow (*Pinus mitis*).
Pine, sugar, *Pinus lambertiana.* Pacific States; medium, white.
Pine, white, *Pinus flexilis.* Pacific States; soft, white. Building.
Pine, white, *Pinus strobus.* N. United States; medium hardness, yellowish. Building, furniture, implements.

Pine, yellow, *Pinus mitus*. United States; hard, durable, yellow. Building.

Pine, yellow, *Pinus ponderosa*. Pacific States; hard, durable, yellow. Building.

Pine, yellow—See Pine, southern.

Plane, *Acer pseudo-platanus*. England; soft, yellow. Turning, carving.

Plane, occidental—See Sycamore, (*Platanus occidentalis*).

Plane, oriental, *Platanus orientalis*. Asia; medium hardness. Building, cabinet making, turning, ornamental work.

Plane-tree, American—See Sycamore.

Plum, *Prunus domestica*. Cultivated; soft, whitish. Turning, cabinet making, ornamental work.

Poplar, *Populus alba*. Europe and Asia; medium hardness. Toys, furniture, carving, turning.

Poplar, *Populus grandidentata*. N. United States; soft, white. Paper.

Poplar, white and yellow, *Liriodendron tulipifera*. E. United States; medium hardness, whitish. Building, furniture, paper.

Poon-wood, *Calophyllum augustifolia*. India; soft, grayish. Ships, spars, building.

Porcupine-wood, *Cocos nucifera*. Tropics. Ornamental work.

Princess-wood. Jamaica; yellowish. Turning.

Purple-heart, *Copaifera pubiflora*. Brazil; hard, purple. Furniture, turning, ornamental work.

Rattan, *Calamus rotang*. Tropics. Canes, brooms, wicker-work.

Quassia—Tropics; hard, light yellow. Medicine.

Red-bud, *Cercis Canadensis*. N. United States; hard, compact.

Red-wood, *Sequoia sempervirens*. California; medium harness, very durable, red. Building, furniture, railroad ties, posts, fencing.

Red Sanders wood, *Pterocarpus santalinus*. India; very hard, red. Dyeing, turning,

Red wood—See Big Tree

Rhododendron, *Rhododendron*. N. India; hard, fine grained.

Rosetta-wood. India; hard, dark red.

Rosewood, *Dalbergia*. Brazil; hard, reddish-brown. Veneers, furniture, turning, ornamental work.

Rosewood, African, *Pterocarpus erinaceous*. Gambia; hard. Veneers, furniture, turning.

Rosewood, Tasmanian, *Acacia?* Tasmania; hard, turning, furniture.

Sal—See Saul.

Sallow, *Salex caprea*. Europe? soft, white. Toys, baskets, bonnets.

Sandal-wood, *Santalum album*. India; soft, white, yellow and red. Perfumes, carving, ornamental work, fancy boxes.

Sapan-wood, *Cæsalpina sapan*. India. Dyeing, turning.

Sassafras, *Atherosperma moschata*. Tasmania; hard. Floors, screws.

Sassafras, *Sassafras officinale*. U. States; reddish-yellow. Turning, cabinet-making, medicine.

Satin wood, *Chloroxylon swientenia*. India; hard, yellow. Cabinet-making, ornamental furniture.

Satin wood, *Ferolia Guianensis.* W. Indies and S. America; medium hardness, yellow. Ornamental work, cabinet making, furniture, veneers.

Saul, *Shorea robusta.* India; hard, light brown. Building.

Scotch fir—See Fir, Scotch.

Service-tree, *Amelanchier Canadensis.* East U. States; hard, durable, red. Handles, tools, turning.

She-oak, *Casuarina quadrivalvis.* Tasmania; hard. Cabinet work, furniture.

Silver-wood, *Leucadendron Argenteum.* S. Africa; hard, beautifully marked. Furniture, cabinet making.

Sissoo, *Dalbergia sissoo.* India; hard, light brown. Ships.

Snake wood—See Leopard wood.

Spice tree—See Laurel, California.

Spindle tree, *Euonymous Europeus.* England; soft, yellow. Skewers, turning.

Spoon wood—See Laurel.

Spruce, *Abies nigra.* North U. States; medium hardness, reddish-yellow. Building, spars, timber, paper.

Spruce, *Picea Engelmanni.* Pacific States; medium hardness, light yellow. Building.

Spruce, *Picea sitchensis.* Alaska; medium hardness, light.

Spruce, black—See Pine, Douglass.

Spruce, Douglas', *Pseudotsuga Douglasii.* Pacific States; medium hardness, reddish-yellow. Building, masts, spars.

Spruce, white, *Picea alba.* British America; light. Spars.

Stringy-bark, *Eucalyptus fabrorum.* Australia; hard. Building.

Sycamore—See Plane. (*Acer pseudo platanus*).

Sycamore, *Platanus occidentalis.* United States; hard, reddish. Turning cheap furniture.

Sycamore fig, *Ficus sigamorus.* Egypt; soft. Furniture, coffins.

Tamarack—See Hackmetack.

Teak, African; *Oldfieldia Africana.* W. Africa; hard, ships, build.

Teak, Indian; *Tectona grandis.* India; hard, light brown. Ships, R. R. cars, building.

Thorn, *Crataegus punctata.* E. United States; hard, light red. Turning, cabinet making.

Toothache-tree—See Ash, prickly.

Toqua. N. India; dark colored. Ornamental.

Tulip tree—See Poplar, white.

Tulip-wood. Brazil; hard, reddish. Cabinet making, ornamental.

Tulip-wood, *Harpulia pendula.* Australia; hard. Veneers, cabinet making, turning, ornamental work.

Tupelo—See Gum, sour.

Turtle-wood. Surinam. Turning.

Walnut, black, *Juglans nigra.* Mid. United States; medium hardness, dark brown. Furniture, cabinet making, turning, veneers, organ cases, ornamental work.

Walnut, English; *Juglans regia.* Europe; hard, light brown. Furniture, veneers, gunstocks, ornamental work.

Walnut, French. Persia, Asia Minor. Veneers, ornamental work.

Walnut, white; *Juglans cinerea.* United States; soft, yellowish-brown. Furniture, cabinet making, ornamental work.

Whahoo—See Elm, winged.

Whitewood, *Pittosporum bicolor*. Australia; hard, yellowish. Engraving, carving.

Whitewood—See Linden.

Whitewood—See Poplar, white.

Willow, *Salix* (various species). Europe and America; soft, white. Bats, pegs, hoops, turning, wicker work, toys.

Yacca wood. Jamaica; light brown. Cabinet making, turning, ornamental work.

Yellow wood, *Cladrastis tinctoria*. S. United States; yellow. Fuel.

Yellow wood, *Nauclea*. India; hard, yellow. Combs.

Yew, *Taxus baccata*. Europe; hard, very durable, orange. Furniture, turning, canes.

Yew, *Taxus brevifolia*. Pacific States; hard, red.

Zante, *Rhus cotinus*. Europe; yellow. Dyeing.

Zebra wood. S. America. Cabinet making, turning.

NOTES ON THE MOST USEFUL SPECIES.

Apple.—Fine-grained, compact, rich in color, excellent for turning-tools, etc., but liable to split when used for chisel handles. Very liable to dry rot when exposed to dampness, and often partially decays while the tree is still standing; excellent for carving.

Ash, Hungarian.—Wavy in grain, very beautiful, and much used for veneers for sideboards and cabinets. An imitation, termed "corrugated ash," is made mechanically, is much cheaper, but less beautiful.

Ash, Brown.—Wood brownish, brittle, used sometimes for floors, ceilings, etc., particularly for wood-vaulted ceiling of Harvard Memorial Hall.

Ash, White.—Grain rather coarse, so that it is unfit for fine work; very useful, being much used for wagons, carriages and machinery, for floors and wainscoting of buildings, and sometimes for furniture; in color and grain not as rich as oak, but the wood is more stable and easier to work. That with thick layers is best. Avoid stained and dark-colored pieces, for they are generally weak. Sap-wood is liable to be destroyed by insects, unless kept well painted; liable, also, to dry rot when damp.

Beech.—Wood hard and stable, handsome, excellent for tools and turning. Mostly used for plane stocks and turning, sometimes for furniture. Very liable to dry rot when exposed to dampness, unless soaked in hot linseed oil; excellent for furniture and carvings.

Birch, Black.—Not common in the markets, except locally; reddish-brown, takes an excellent polish, stable, handsome, excellent for furniture and cabinet-work, gun-stocks, etc., and ought to be more used, when possible.

Bitter-nut Wood.—Resembles hickory, and used for similar purposes, but lighter and more brittle; sold with hickory.

Boxwood.—Yellow, very fine and even in grain, one of the very best of woods for turning, engraving and fine carving; expensive, but much used for rules, musical instruments, engravings, and ornamental work. Tolerably stable, yet not enough so to make a good ruler, T-square or straight-edge; makes excellent inlays for ornamental work.

Butternut.— Sometimes called white walnut. Wood is good in color and grade, without large pores or ducts, resembling white ash considerably, though more brownish in tint; soft and easy to work, without hard crystals, stable, excellent for furniture and inside finish, but not easily obtained, except where it is locally abundant. Should be more used, where possible, as it is as handsome as ash or chestnut, and much easier to work and finish.

Catalpa.—Not common, except in southern United States. Cultivated, as it grows very rapidly, and is very durable when placed in contact with earth or water, for posts, ties, etc.

Cedar, Red.—Very durable, easy to work, but very liable to split; stable, much used for posts, railroad ties, furniture, cigar and fancy boxes, lead pencils, etc.; can be obtained in the log, boards, veneers, and thin stuff, in any large city. Boxes made of or lined with cedar, are said to protect furs and woolen clothing placed in them from moths. Hence, in the finest houses, a closet is usually planned which is lined and finished with red cedar.

Cedar, Spanish.—Yellowish-red, coarser in grain than the last, and much more apt to warp; resembles mahogany considerably, though more yellow, and is sometimes sold for that wood. It has a strong odor which is quite offensive to many persons. Most of the inside work of the finest railroad passenger cars is made of Spanish cedar, especially the mouldings. It is also much used for cigar boxes.

Cedar, White.—Wood whitish, not handsome, and therefore seldom used for building. Very durable, and therefore much employed for fence posts, railroad ties, telegraph poles, etc.

Cherry, Black.—Very valuable wood, very stable if properly seasoned and worked, easy to work, and durable when dry; may be obtained in any large city, but is not kept at ordinary yards; sometimes used for floors and inside finish of houses, but more commonly for good furniture. The "ebonized" furniture which is now so fashionable, is mostly made of cherry, the inferior quality being of whitewood. Where cherry is used so as to show its natural grain and color, it is at first quite handsome, but gradually darkens, eventually becoming almost as dark as black walnut, and of an unpleasant color. Some persons admire it, however. Much of the old furniture to be found in New England is of cherry. Excellent for drawing boards, and T-squares if the drawing edge be lined with an inserted slip of a harder wood; fully as stable as mahogany, but less handsome; costs but little more than the best white pine.

Chestnut.—Resembles oak in grain and color, but is more brownish, and has much less prominent medullary rays. Most trees are full of small black wormholes, made while the tree is still standing. Wood is very stable and exceedingly durable, light, easy to work, and handsome. Much used for fencing, posts, railroad ties, etc. also sometimes used for the inside finish of churches and public halls, etc. Bodies of piano-cases, tops, and veneered furniture are often made of chestnut, as it is so stable, and holds the glue well. It is a very valuable wood, which should be used when it can be had. Unfortunately, it is not found in the Western States, and is said to not do well there when cultivated.

Cucumber Tree.—Wood soft, but not liable to crack or split; easy to work, hence it is commonly used for the ordinary wooden pump.

Cypress.—Wood resembles spruce, very durable, and is much used for building purposes in the Southern States, especially for shingles.

Ebony.—Two kinds; one from West Indies, known by its lighter color, less valuable; the other comes from Ceylon, chiefly, and is the best; sold in pieces which resemble cord-wood, and are very irregular in form; very stable and handsome, and is excellent for turning and ornamental work. It is too costly for furniture, except as veneers, but is much used for veneers, fret-sawing, turning, musical instruments, ornamental inlays, lines and dots, in cabinet work.

Elm.—There are several kinds, varying in value and use. Wood is of medium hardness, not handsome or durable, except under water. Not of great value, but used for carriage hubs, piles, where under water, and sometimes for fencing or sheathing for cheap buildings.

Green-heart.—Said to be the only wood, except palmetto, which will resist the animals which destroy wood in salt water; hence, used for piles of wharves and other structures in salt water.

Gum, Sour and Sweet.—Wood hard and very difficult to split. Used for hubs of wagons and carriages, etc.

Hackmetack.—Wood is of medium hardness, very durable, and therefore much used for timbers of vessels, telegraph poles, railroad ties and fence posts, but rarely for building purposes.

Hemlock.—Wood not handsome, liable to splinter, coarse-grained, full of exceedingly hard knots, and is very apt to warp, spring and crack. It is much used in some parts of New England for scantling, planks for barn floors and mills, fencing, etc., as a substitute for white pine. Sawed into thin boards, split irregularly, and stretched so as to open the cracks, it is also used there instead of laths. Durable when kept dry or wet, but decays very quickly when exposed to dampness. The bark is very valuable for tanning.

Hickory.—There are several varieties, the shell-bark keing considered the toughest and best. Wood has a good color, is very strong and tough, hard, stable when seasoned. Heart-wood is durable, but sap-wood is liable to decay from dampness, and to destruction by small insects, unless kept well painted. It is exceptional among woods, for the sap-wood is most prized, especially for carriage spokes, etc. The best hickory is obtained near Dayton, Ohio. Hickory is a very valuable wood, and is used for wagons, carriages, bent-work, agricultural implements, turning, and sometimes for furniture, for which it would be excellent, especially for chairs, tables and bent-work furniture, being as handsome as ash or oak, and much stronger, though harder to work. The best hickory is the white, quite heavy, and with thick layers. Liable to dry rot when in contact with earth.

Holly.—Wood very white, fine-grained, hard and compact. Very stable when seasoned; excellent and much used for turning, fret-sawing, veneering, fancy and ornamental work, sometimes for engraving, as a substitute for boxwood. Also used for inlays and marquetry, but requires a very white varnish or polish.

Hornbeam.—Very tough and hard, close-grained and stable. Used for levers, beetles, and sometimes for turning. Would do pretty well as a substitute for boxwood, if its color were more pleasing.

Lignum Vitæ.—Very hard and heavy; heart-wood nearly black; sap-wood yellow, not as good. Excellent and much used for turning, especially for belaying pins, sheaves of pulleys, also for croquet balls, and for fancy work, inlays, etc.

Linden, or Baswood.—Soft, yellowish; does not easily split, but if it is steamed or wet with hot water, it may be bent into almost any form. It is therefore often used for curved work, such as the bent panels of carriages, and for cylinders of fanning-mills. Also used for bottoms of drawers, etc. A piece of the bark, cut into a proper form, with a wedge-shaped end, and hammered a little, makes an excellent glue-brush, much better than one of bristles.

Locust.—Heart-wood is dark brown, very durable and much valued for hubs, fence posts and railroad ties. Would also be good for turning and ornamental work, but is rather scarce. A borer kills most of the trees cultivated in Illinois.

Locust, Honey.—Wood coarse, of little value, though it is said to not shrink in seasoning, and is sometimes used for felloes.

Mahogany.—Of two kinds, one soft, much like Spanish cedar, the other much darker, heavier and more stable. A good piece is probably the most stable of any wood, but this is very difficult to obtain now. Much used formerly for fine furniture, stair rails, etc. Now used for veneers, ornamental and fancy work, inlays, and the cases of microscopes, engineers' instruments, etc.

Maple, Red.—Principally used for turning, but sometimes for floors, furniture, and inside finish of houses. It is softer than and inferior to rock or sugar maple.

Maple, Sugar or Rock.—White, very hard and compact, stable when seasoned, very liable to dry rot if exposed to dampness. The sap produces maple sugar. Wood is used for turning, croquet sets, toys, cheap furniture, floors, veneers, inlays, cabinet work, etc.

Wavy Maple is a handsome variety, mostly cut into veneers.

Bird's-eye Maple is another variety, also used for veneers and ornamental work. They are not separate species, but are accidental, and their causes are not known. Tapping the tree for its sap greatly injures the quality of the wood, making it dark in color, often, and liable to rot while still standing. Select the whitest, heaviest and that most free from stains and streaks.

Mulberry.—Rare, yellowish, handsome. Very durable. Would make good furniture or ornamental work.

Oak, Bur.—Wood yellow, not very durable when damp. Used for furniture, for fence posts, railroad ties, etc.

Oak, Live.—Yellow, handsome and exceedingly durable, much prized for ship building. It is only found along the coast of the Southern States, and I believe that the most of the forests have been appropriated by the U. S. government for naval purposes.

Oak, Red.—Wood reddish, rather coarse and porous, stable when seasoned. Used for building, for casks and furniture.

Oak, White.—A very valuable wood with a beautiful grain, but is apt to warp, and requires a very long time to properly season. Much used for ships, wagons, agricultural implements of all kinds,

and rarely for furniture and inside finish, in this country. It ought to be more used for furniture, as it is very appropriate for offices, libraries and dining rooms, because it is handsome and well adapted to decoration by carving and inlays. Heart-wood is durable, but sap-wood is liable to become "powder-posted," and to dry rot. The best is heavy, with few ducts and thick layers, a straight grain and free from sap. This is the most valuable of all the oaks, and should be more used in building and for furniture. It darkens with age, and becomes very rich in color, perhaps the handsomest of all native woods. The principal difficulty in its use is its difficulty of working. It is dressed or worked by machinery with great difficulty, as the edges of the knives are quickly taken off and they soon begin to gouge into the wood. But this can be in part avoided by a selection of a lighter and more brittle kind, which is strong enough for furniture, and by thoroughly drying it before using. The very best furniture is mostly made by hand, and the increased cost of working is in part made up by the smaller cost of the material. Warps unless fully seasoned.

Osage Orange.—Wood rather coarse, deep yellow, hard and heavy, sometimes used for turning, inlays and ornamental work.

Palmetto.—Said not to be injured by animals in salt water, and therefore used sometimes for piles of wharves and of other constructions in salt water.

Pear.—Resembles apple in properties, but is light brown in color, liable to dry rot, very stable, excellent, and much used for turning, models, T-squares, triangles and rulers. Most of the German drawing instruments are made of this wood. Rare in America, though it is probably imported sometimes. Imitation ebony is sometimes made by dyeing pear wood. It is excellent for fine carving, though its color is not pleasing.

Pine, Norway.—Wood whitish, of medium hardness, heavy; requires long seasoning, and is apt to warp, and hence should not be used for good work. It is sold at the yards mixed with white pine, and is used for the same purposes, though it will never give satisfaction for any important work. It is commonly called "hard pine" by the mechanics, though really a different species. It may be readily known by its weight and its color, whiter than that of white pine, and by the more apparent annual layers.

Pine, Southern or Yellow.—Wood yellowish, of medium hardness, very valuable for building purposes, durable and stable. Much used for ships, building, floors, and furniture, etc. It is considerably stronger than white pine, to which it should be preferred, when it can be obtained. It is the best and most useful variety of pine, though not so abundant or as commonly used as white pine. It is much used in the cities along the Atlantic coast for the best buildings.

Pine, White.—Wood of a light yellowish-white color, soft, and easily worked, and durable when dry, or under water. This is the principal wood used in the United States for all building purposes. Stable when properly selected, seasoned and worked. The best is from large trees, with thick annual layers, few ducts, and free from resin and shakes. This is yellowish in color, darker than the ordinary quality. This is excellent for drawing boards, and for furniture, etc.

First clear consists of the very best quality, free from sap, shakes, knots and all other defects, and clear.

Second clear comprises the next quality, narrower, with some defects, though not many.

Third clear consists of the best boards which can be selected from ordinary or common lumber remaining after first and second clear have been taken out.

First clear can rarely be obtained at country yards, or at least, is not better than the second clear of city yards. Country dealers usually purchase lumber by the cargo, comprising all qualities mixed together, except the best, and then assort it out to suit themselves. Therefore, each man has a standard of quality of his own, one which is considerably lower than that of the large city yards.

White pine looks well when merely varnished, and its color gradually becomes darker, though less pleasing than that of white oak.

Pine, Yellow.—The best quality is that which is also termed Southern Pine, and has already been described. Another variety, *Pinus mitis*, is less durable and weaker, contains more resin, but is still stronger than white pine, and is much used for floors, scantling, etc., in the cities along the Atlantic coast. It is, I believe, sold mixed with the southern pine.

Poplar, White and Yellow.—These are produced by the same species of tree, but the two woods vary considerably in their properties. They are sold together at the yards.

Yellow Poplar is yellow in color, lighter, rather brittle, more liable to split, pretty stable, though less so than white pine. Excellent, and much used for wagons and carriages (the bodies only) and agricultural implements. Where abundant, it is the wood commonly used for ordinary building purposes, and is said to be quite durable.

White Poplar is whiter, harder, much more liable to warp, and much less so to split, and is tougher. It may be better for bent or curved work, yet for most purposes it is inferior to the yellow variety, and is harder to work, and less valuable.

Redwood, California.—Red, somewhat resembling red cedar, very valuable and durable, and much used in California for all building purposes. It is said to shrink or warp none in seasoning, and is hence often used without any seasoning. It grows to a very large size, a plank which is exhibited at the Smithsonian Institution being at least six feet in width.

Rosewood.—Hard and heavy, dark brown, and with a very beautiful, mottled grain, rather brittle, though when heated it becomes very flexible and tough. It is much used for veneers, ornamental work, fancy and small turned articles. It is the usual veneer which is used on pianos, but is very seldom now used for organs or for furniture. Most of the dark, so-called ebony pianos are really veneered with a cheap rosewood veneer, which is afterwards stained with a strong solution of extract of logwood, which is darkened by an application of a solution of sulphate of iron. The fragrance and dust injuriously affect the nervous system.

Sandal Wood.—A yellow wood, which is fine grained and has a pleasing and permanent fragrance. Sometimes used for fret-sawing, fancy work, boxes, fans and other fancy articles.

Satin Wood.—Wood yellow, very compact and even in grain, often with a very wavy grain which gives it a satiny lustre; very stable and excellent for rulers, T-squares, triangles, etc. Also used for fret-sawing, veneers, ornamental work and for engineers' leveling rods.

Spruce.—Wood resembles that of white pine and hemlock, very strong and elastic, pretty durable, and very valuable for timber and scantling; too coarse-grained and hard to work to be suitable for joinery, though it might, perhaps, be used with advantage for furniture.

Sycamore or Buttonwood.—A large tree which is very common in Illinois, along the banks of creeks, etc. The wood cannot be split. owing to the interlacing of its fibres; of medium hardness, very apt to warp and spring in seasoning, yet very valuable for turning, and commonly used for the cheap furniture, stained dark, which is so common in the West, such as the ordinary "cottage" bedstead, etc. Where properly seasoned and selected, and finished, its grain is said to be quite handsome, somewhat resembling that of beech, but less yellow.

Walnut, Black.—This is the darkest and most ornamental of all native woods. The wood contains a great number of very hard crystals, which quickly dull the edge of a tool. These are much less numerous in the "first growth," which should always be selected for good work. Select that which has thin sap, thin annual layers, is as light as possible, and is cut from large old trees free from knots. It is much used for organs, furniture and inside finish, mouldings, ornamental work, veneers, ornamental floors and marquetry; very durable, and very hard to fully season, hence, it is very certain to warp unless it be well kiln-dried, and be of the very best quality; wood porous and with large ducts, which require to be carefully filled before it is varnished, or the wood will appear very rough. The finishing of walnut should never be entrusted to painters, for very few can do it properly, but to a good cabinet finisher. The Berry patent wood filler and "hard oil" finish are best to use. The sap-wood is whitish, soft and worthless, besides being liable to decay. Walnut veneers are cut from stumps and knots, and crotches, and are often very beautiful.

By wetting the surface of a piece of walnut, after working, with aquafortis, and drying it over a blaze, if it have a wavy grain it may be made to resemble mahogany very closely, and is sometimes sold for it.

Great care should be taken to have walnut properly seasoned, and carefully finished, or its use for building and furniture will be very unsatisfactory. Simple varnishing, without filling, should never be permitted. Oiling makes the wood look well, and is cheap, but dust settles on the wood and is hard to remove; raw linseed oil should be used, as boiled oil makes the wood too dark.

ORIGINAL RESEARCHES

MADE IN THE

CHEMICAL LABORATORY.

CONTAMINATION OF WELL AND CISTERN WATER BY ORGANIC MATTER.

By Henry A. Weber, Ph.D., *Professor of Chemistry.*

The flatness of the Illinois prairies, their deficient drainage, the depth of their soils, and the wealth of organic matter present in them, cause the opinion to prevail that well water must necessarily be contaminated with the organic substances carried into them by surface water. Further, it is supposed that rain water, which has not come into contact with the soil, especially if collected in good cisterns and if properly filtered, must be much more free from this deleterious contamination than well water, and hence better for drinking.

The fallacy of this opinion was indicated to me some time since while making a series of examinations of well, cistern and river water for the State Board of Health. The specimens of water were collected at Peoria in this State. For the sake of comparison, I made at the same time an examination of the water of my own well, which, from its location and construction, had never to any appreciable extent been contaminated by surface water.

The following tabular statement gives the result of the analysis:

Source.	Am'nt of Potassium Permanganate required to oxidize organic matter in 1,000,000 parts of water.	Absolute amount of organic matter in 1,000,000 parts of water.
1. H. A. Weber's well water	0.26	1.30
2. Mississippi river water	6.44	32.20
3. Ohio river water	8.35	41.75
4. W. P. Hallady's cistern water	8.62	43.10
5. Brown's Hotel cistern water	23.50	117.50
6. Bulletin office drive well	27.42	137.10
7. Bulletin office cistern water	30.03	150.15

From these results it will be seen, that the water from one of the cisterns is by far the worst of the series in regard to contamination by organic matter. The amount of organic matter contained in the

first specimen of well water is less than the average of what may still be considered good drinkable water; but the organic matter in good well water should never exceed four or five parts in a million. Hence, specimens Nos. 2, 3 and 4 must be regarded as very poor drinking water, while specimens Nos. 5, 6 and 7 are utterly unfit for that use,

The condition of the cisterns mentioned above, and the use to which their water was put, were unknown to me, and in order to pursue this subject further, Mr. C. F. Cook, at my request, undertook the examination of the well and cistern water of this vicinity. From his work, which will be given in full in another part of this report, I take a few interesting facts.

In all, one hundred analyses were made. Eighty-six of these analyses were of water from wells, and fourteen of water from cisterns.

The smallest amount of organic matter found in well water was 1.65 parts in a million parts of water. The largest amount was 248.95 parts in a million parts of water. This large proportion of organic matter was contained in a well located near a barn, and no doubt was due to the drainage from the barn-yard.

The average amount of organic matter in the eighty-six wells was 23.61 parts in a million parts of water. In this average the well containing 248.95 parts in a million is included. By excluding this well the average would be reduced to 21 parts in a million of water.

The smallest amount of organic matter found in cistern water was 7.05 parts in a million parts of water, and the largest amount was 179.55 parts in a million. The average amount of organic matter in the fourteen cisterns examined was 81.45 parts in a million, or nearly four times as great as that of the wells examined.

In selecting the cistern waters for examination, those were chosen which were known to be used as drinking water and for general family purposes, and which, for this reason, were kept in the best possible condition.

DETERMINATION OF ORGANIC MATTER IN RIVER WATER, ETC.

BY HENRY A. WEBER, PH. D.

At the request of J. H. Rauch, M.D., Secretary of the State Board of Health, I undertook a large series of determinations of organic matter, chiefly in the rivers of the State. As the results of the investigation properly belong to the State Board of Health, I give them here without comment, merely to show a part of the work done in the Chemical Department. The specimens of water

were shipped to the laboratory at the expense of the Board, who also paid the expenses accruing to the department by the use of chemicals and apparatus.

The results of the analyses are as follows:

Specimen of water.	Potassium permanganate required to oxidize the organic matter in 1,000,000 parts of water.	Amount of organic matter in 1,000,000 parts of water.	Specimen of water.	Potassium permanganate required to oxidize the organic matter in 1,000,000 parts of water.	Amount of organic matter in 1,000,000 parts of water.
1	18.08	96.40	30	29.99	115.34
2	13.14	77.40	31	26.15	100.00
3	25.44	95.69	32	11.99	46.11
4	22.55	83.40	33	32.98	126.84
5	204.14	504.00	34	9.80	41.54
6	562.03	1,034.00	35	19.07	73.34
7	38.37	109.00	36	19.07	73.34
8	41.27	113.00	37	86.62	333.15
9	9.96	50.80	38	11.98	45.31
10		7.19	39	26.15	100.58
11		28.13	40	26.69	102.54
12		29.44	41	14.51	55.81
13		33.66	42	22.57	86.81
14		35.74	43	10.32	39.69
15		199.52	44	6.45	24.81
16		12.00	45	14.18	54.54
17		12.06	46	22.57	86.81
18		23.55	47	47.10	181.15
19	6.44	24.75	48	26.07	100.27
20	8.35	32.11	49	54.51	209.65
21	8.62	33.15	50	94.80	364.61
22	23.50	98.08	51	80.58	309.92
23	27.42	105.47	52	31.60	121.24
24	30.03	116.54	53	30.33	116.65
25	15.25	50.65	54	8.21	31.60
26	19.07	73.34	55	53.72	268.60
27	21.80	83.84	56	26.54	132.70
28	14.48	55.69	57	5.68	28.40
29	14.16	64.46			

NOTES ON ARRAGONITE.

By Henry A. Weber, Ph. D.

Mr. G. A. Wild, formerly of the Natural History Department of this Institution, on his return from a western trip, presented the writer with several specimens of a mineral, which, on examination, was found to be arragonite. The remarkable size and form of these crystals warranted a thorough examination and description. The specimens were found in Red Canyon, about four miles from Colorado Central Railroad, and seven miles from Bristol, Colorado, a post-office on the Colorado Central Railroad, thirty miles south of Cheyenne.

The crystals were all more or less weathered and stained with a red ferruginous matter, which no doubt accounts to some extent for the foreign substances revealed in the analysis.

The largest specimen measured one inch in height and three inches in shortest diameter. The smaller specimens, however, were more perfect in their crystalization, and the angles on them could be measured with a tolerable degree of accuracy.

The form of the crystals resembled a combination of the rhombic prism with a brachy-pinakoid and a basal-pinakoid. The brachy-diagonal angle of the prism measured 129 degrees. The angle formed by the intersection of a face of the prism with that of the brachy-pinakoid corresponded, within a fraction of a degree, to the calculated value 115 degrees and 30 minutes.

The chemical composition of the mineral is as follows:

Calcium carbonate	95.30
Magnesium carbonate	1.19
Ferric oxide	2.18
Silicious matter	0.87

ON THE "FLASH TEST" OF KEROSENE.

By Henry A. Weber, Ph. D.

Explosions of lamps or vessels containing kerosene are caused by the ignition of explosive, gaseous mixtures, with which the lamps or vessels are partially filled. These explosive mixtures consist of air and the vapor of a portion of the kerosene. The natural coal oils consist of a variety of hydrocarbons, differing widely in regard to their boiling points. In the process of refining, the hydrocarbons which have a low boiling point are supposed to be separated from those having a higher boiling point. The latter form the kerosene of commerce. The oils of a low boiling point, however, have always been imperfectly separated from the kerosene, by the refiners, and to this neglect the many sad accidents caused by the explosion of lamps and oil cans is due. To protect the people against this abuse, many States have passed laws requiring the dealers to sell only those grades of kerosene which give off no inflammable vapor under a fixed temperature, which in our own State is 150 degrees Fahrenheit.

The temperature at which kerosene gives off an inflammable vapor is determined by what is known as the "flash test." This test is applied in various ways. One method consists in placing a few ounces of the kerosene in a shallow porcelain dish, and heating the oil on a sand bath. While the heat is applied, a burning taper is passed to and fro about four inches above the surface of the oil until the vapor given off ignites or "flashes." The temperature at which this takes place is shown by a thermometer, whose bulb dips in the heated oil. If it is borne in mind that the most highly combustible gases do not ignite when mixed with an undue proportion

of air, and that the amount of oils of a low boiling point in kerosene is comparatively small, it will appear that this method is utterly worthless. The vapors given off at a low temperature are disseminated through a large volume of air, and pass off unrecognized, and the oil begins to flash only when the temperature is sufficiently high to vaporize those oils which have a boiling point high enough to be considered safe. In a lamp or other closed vessel, the vapor from those hydrocarbons having a low boiling point accumulates in the space above the oil, and produces, with the air, an explosive mixture.

The law in our State requires the oil to be tested with some approved apparatus, as "Tagliabue's Tester." In the use of apparatus of this kind, there is still one fallacy, although not so great as that mentioned above. The apparatus during the operation of testing the kerosene is in a state of rest. But after the boiling point of a dangerous hydrocarbon is reached, it takes some time for the vapor to disengage itself from the remainder of the kerosene and mix with the air contained in the empty space of the tester, so as to produce the flash. In the meantime, however, the heat is continually applied, and the temperature of the kerosene is gradually raised. Hence, the flashing point is invariably given a number of degrees too high. The true flashing point of kerosene is the lowest temperature at which it will flash after it has been shaken up with a quantity of air, equal in volume to about one-half or one-third of that of the kerosene employed, as first shown by Prof. Meyer, of Zurich. To make the test in this manner with ordinary apparatus, however, requires some skill, and much time and labor. To meet this difficulty, I have designed and used a tester, by which the test may be made as rapidly and easily as in the usual manner. It consists of three cylinders of common sheet tin, the largest of which is about eight inches high and four inches in diameter, and is entirely closed, with the exception of a circular opening in the top of about one inch and a half in diameter. Into this opening, the next cylinder, which is open at the top, and is two inches shorter than the large one, exactly fits. The large cylinder is nearly filled with water, and the second cylinder, which is filled to within an inch or two of the top, is inserted into it. The whole is then covered with a tin disc, having a hole in the center, through which the stem of a thermometer can readily pass. To the bulb of the thermometer the third cylinder is attached, by means of a perforated cork. This cylinder is about one and a half inches in length, and fits closely into the second cylinder. It is closed at one end, with the exception of a hole in the center for attaching it to the thermometer, and a series of small holes for the escape of air and gas. When properly attached to the thermometer, it is inserted into the second cylinder, with its open end downward. The disc mentioned above is then placed over the whole, the stem of the thermometer projecting out through the central opening. Thus charged, the whole is placed over a small alcohol lamp, or Bunsen's burner, the heat being so regulated that the temperature of the kerosene does not rise more than one or two degrees a minute. While the heat is thus applied, the short cylinder is moved up and down, by which means the air and kerosene are brought into contact and the latter

thoroughly agitated, while the disc remains in its place, covering the mouth of the cylinder containing the kerosene. When the test is to be applied, the short cylinder is raised out of the oil the temperature noted, and then the thermometer and short cylinder, and with them the disc, are removed with one hand, while with the other a small gas jet is immediately passed into the open mouth of the cylinder containing the kerosene. If no flash occurs, the parts removed are replaced, and the tests repeated when the temperature has risen one or two degrees more.

In order to test the instrument, four experiments were made with an oil of unknown flashing point, with the following results:

	Flashing point.
First experiment	95 Degrees.
Second experiment	96 "
Third experiment	96 "
Fourth experiment	95 "

Being interested to know in how far the various brands of kerosene sold in this community met the requirements of the law, I procured from dealers in Champaign specimens of the brands sold in this market.

The following table gives the flashing points claimed by the refiners and dealers, as well as the *true* flashing point, as determined by the tester just described:

Kind of oil.	Claimed flashing point.	True flashing point.
Brand No. 1	150 degrees.	107 degrees.
" " 2	150 "	89 "
" " 3	150 "	87 "
" " 4	150 "	86 "
" " 5	150 "	104 "
" " 6	150 "	140 "
" " 7	175 "	172 "

Numbers 6 and 7 were obtained at the shops of the Illinois Central Railroad. These were used for head lights on locomotives, and their flashing point is practically the same as claimed for them. The other five brands constitute the kesosene with which the families of this community are supplied. Their flashing points are from 43 to 64 degrees lower than that required by law. It is needless to say that they are of the most dangerous character, especially three of them, and are liable at any time, through a defective burner or wick, or through thoughtless handling, to spread destruction and death among those who use them.

SHRINKAGE OF CORN.

By M. A. Scovell, M. S.

The following are the results of an investigation on the loss of weight of corn during storage:

Reliable data as to the comparative weight of the same corn in the fall and in the spring must have great value to the farmer and the dealer in corn, and it is hoped that the results here given may be of general interest.

The experiments were made with the following six varieties of corn grown on the University farm: Mammoth, Thomas, Murdock, Geneseo, Wright's Gold, and Cameron.

In order to secure an average result, ten ears of corn of each variety were employed. The corn was gathered on October 6, and carefully weighed. It was then properly labeled and the whole placed in a room, which was entirely cut off from any artificial source of heat.

On November 6, the corn was weighed again, with the following results:

Loss of Weight of Corn from October 6, to November 6, in 100 parts.

Cameron.	Wright's Gold.	Geneseo.	Murdock.	Thomas.	Mammoth.
10 7	17.5	8.2	12.2	17.5	25.5

After weighing the corn, it was put back into the room as before, and allowed to remain until November 29, when it was weighed again.

Loss of Weight of Corn from October 6, to November 29, in 100 parts.

Cameron.	Wright's Gold.	Geneseo.	Murdock.	Thomas.	Mammoth.
14.7	21.0	10.6	14.3	21.2	30.8

Finally the corn was allowed to remain in the room until February 28, when it was again weighed, with the following results:

Loss of Weight of Corn from October 6, to November 29, in 100 parts.

Cameron.	Wright's Gold.	Geneseo.	Murdock.	Thomas.	Mammoth.
16.1	22.5	17.4	16.8	22.8	33

From this it will be seen, that, with the exception of one variety (Geseseo) the loss of weight in the last three was less than in the month preceding.

To determine the loss of weight of the single ears the ten ears of each variety were weighed separately when gathered October 6, and again at the close of the investigation February 28. The following tabular statement shows the result obtained:

Loss by weight of separate ears of Corn from Oct. 6 to Feb. 28, in 100 parts.

No. of ear.	Cameron.	Wright's Gold.	Geneseo.	Murdock.	Thomas.	Mammoth.
1	15	20	13	19	21	35
2	14	23	23	19	28	33
3	19	28	18	21	26	30
4	9.5	18	19	17	27	30
5	9.5	19	20	20	28	49
6	9.6	20	14	19	23	35
7	10	18	18	15	18	43
8	10	21	14	16	22	29
9	10	21	15	14	19	35
10	9.5	17	14	16	14	36

From this table it will be seen that there is a wide difference in the loss of weight of the individual ears of the same variety, due no doubt to different stages of maturity. The same statement holds good for the "Mammoth" corn in comparison with the other varieties, although all of the ears were apparently matured, and yielded good sound corn at the close of the investigation.

After the last weighings were made, on Feb. 28, the corn was shelled and the weight of cobs determined. The results obtained are as follows:

Weight of cob in 100 parts by weight of Corn in the ear.

Cameron.	Wright's Gold.	Geneseo.	Murdock.	Thomas.	Mammoth.
12.3	15	16	12.6	11	14.4

From this table it can readily be found by calculation, that for a bushel, or fifty-six pounds of kernels, a bushel of corn in the ear would weigh as follows:

Cameron.	Wright's Gold.	Geneseo.	Murdock.	Thomas.	Mammoth.
63.8 lbs.	65.9 lbs.	66.6 lbs.	64.1 lbs.	63 lbs.	65.4 lbs.

According to these figures it would appear that the weight usually taken for a bushel of old corn in the ear, namely, seventy pounds, is too great.

In reference to the loss of weight which corn undergoes as already shown, an interesting calculation can be made, which may serve as a guide to the farmer in disposing of his crop.

Suppose that corn is selling early in the fall for thirty cents per bushel of *eighty* pounds, and a farmer wishes to keep his corn for two months and then sell it at the rate of *seventy-five* pounds to the bushel, he would have to expect the following prices in order to realize the same amount of money for his crop:

Cameron.	Wright's Gold.	Geneseo.	Murdock.	Thomas.	Mammoth.
33c	36c	31½c	33c	36c	40½c

A similar calculation could be made in case the corn should be kept until spring and then sold at the rate of *seventy* pounds to the bushel, by taking into consideration the loss of weight as given for the period from Oct. 6 to Feb. 28.

To conclude the experiments it was intended to make a chemical analysis of the six varieties of corn in their condition when last weighed. It was possible, however, to analyze but three of them, and these analyses are here given.

CHEMICAL COMPOSITION OF CORN (kernels).

Ingredients.	Cameron.	Wright's Gold.	Mammoth.
Water	14 67	13.62	14.61
Starch	68.02	66.67	63.09
Sugar	3.00	2.07	1.87
Albuminoids	9.78	10.64	10.50
Oil	3.92	3.13	3.84
Fiber	1.94	2.09	3.07
Ash	1.22	1.63	1.62
Total	99.45	99.85	98.60

ANALYSES OF SOILS FROM UNIVERSITY FARM.

By M. A. Scovell, M.S.

The soils whose composition follows, were gathered in July, 1878.

Method of Gathering.—A square hole was dug in the ground two feet deep, and a slice about one inch thick, and the entire width to the depth of the sub-soil, shown by the sudden change in the color, in No. 1 and 2; and through the sub-soil in No. 3.

The soils were designated as:

Soil No. 1 ..... Virgin prairie
" No. 2 ..... In cultivation 30 years
" No. 3 ..... Sub-soil of No. 2

Soil No. 1 was collected on a plat of virgin prairie adjoining the University farm. Its depth was one foot.

This soil was gathered in three different parts of the field, the portions intermediately mixed and the sample obtained from the mixture.

Soil No. 2 was gathered on the University farm adjoining the prairie plat. It had been in cultivation 30 years, mostly in corn. The ground had never been manured. The depth of the soil was 7 inches. It was obtained from three portions of the field.

Soil No. 3 was the sub-soil of No. 2. Its depth was 10 inches.

Composition of soils from the University Farm.

Soil.	No. 1.		No. 2.		No. 3.	
Organic matter	1.9414		2.4880		3.7551	
Silicic acid	0.0798		0.0617		0.0975	
Sesquioxide of iron	1.8367		1.4517		1.2650	
Alumina	1.4775		0.5700		1.7150	
Manganese	0.1798		0.2200			
Phosphate of lime	0.1683		0.2103		0.1152	
Carbonate of lime	0.3835		0.5845		1.2515	
" of Magnesia	0.5244		0.6757		0.7140	
Potash	0.0733		0.0785		0.0505	
Soda	0.0177		0.0211		0.0970	
Sulphuric acid	0.1403		0.1519		0.2137	
Soluble matter found		6.8327		7.5134		9.2745
Organic matter	4.1150		6.0700		8.9549	
Silicic acid	72.1765		68.7127		68.0224	
Alumina with trace of iron	12.7143		12.0520		9.3156	
Lime	0.5729		0.7721		0.6444	
Magnesia	0.4893		0.4831		0.4836	
Potash	3.0041		3.0331		2.4561	
Soda	0.5120		0.6344		0.5664	
Manganese	0.0093		0.0847			
Phosphoric acid	0.1933		0.1553		0.2628	
Insoluble matter formed		92.7867		91.9974		90.7062
	99.6194	99.6194	99.5108	99.5108	99.9807	99.9807

CHEMICAL ANALYSES OF, AND PRACTICAL EXPERIMENTS WITH, SORGHUM CANE, GROWN ON THE UNIVERSITY FARM.

By H. A. Weber, Ph.D., and M. A. Scovell, M.S.

The following data in regard to the planting and cultivation of the cane were furnished by G. E. Morrow, Professor of Agriculture:

"Two varieties, Orange and Early Amber; seed obtained from Hedges, St. Louis; planted by hand, May 14, 1880.

"The Orange was planted in a plot of nearly one acre (.955) in 24 rows four feet apart, in hills about four feet in row.

"The Early Amber was planted in a plot of one and one-half acres (1.48) in 40 rows three and one-half feet apart, and with hills about same distance apart.

"Each plot was on good prairie soil which had been in corn two years, following a liberal application of barn-yard manure.

"The plots received ordinary field culture—with two-horse corn cultivator,—except hand-hoeing and thinning to four or five stalks in each hill, when stalks were ten to twelve inches high. The suckers were not removed.

"The Orange averaged about seven feet in height, and over an inch in diameter at base.

The Early Amber averaged over nine feet in height, and rather less than three-quarters of an inch in diameter at base.

"They were cut about six inches from ground. Of the Orange, from two to three feet of top were taken off; of the Early Amber, rather more than three feet."

PERIODICAL EXAMINATION OF THE CANES FOR SUGAR.

The objects of these analyses were:

1. To note the development and changes of the sugars in the plant during its growth.

2. To ascertain the rate at which the percentage increases.

3. To determine, in the ripening process of the plant, at what stage of development the largest amount of crystallizable sugar is present.

4. To notice the changes which the cane undergoes after reaching this maximum stage, in the quality and quantity of its saccharine matter—*first*, by standing in the field untouched; *second*, standing stripped two weeks; *third*, cut and lying under shelter.

5. To ascertain what part of the cane is richest in sugar.

The examinations of the canes were conducted in the following manner:

On the dates specified, the stalks were cut off one joint above the ground, and to within three feet of the Amber tops, and two and one-half feet of the Orange, and all the leaves of both varieties removed.

The juice from the remaining parts of the cane, after being tested for its specific gravity, was divided. A portion was distilled and tested directly with Fehling's solution, for grape sugar. Another portion was acidulated with dilute sulphuric acid, and boiled over a water bath to convert the cane sugar into grape, and then subjected to the same process as the above. The difference between the two results was calculated as cane (crystallizable) sugar.

THE EXPERIMENTS.

1. *Amber*—Aug. 14, 1880. Juice obtained from plants with well developed seeds, yet very soft and milky.

Specific gravity	1.065	
Grape sugar present	3.34	per cent.
Cane sugar present	10.75	"

2. *Orange*—Aug. 14, 1880. Juice obtained from plants with flower-stalks just beginning to appear.

Specific gravity	1.055	
Grape sugar present	5.70	per cent.
Cane sugar present	4.90	"

3. *Amber*—Aug. 25, 1880. Juice obtained from plants with seed in dough, and black.

Specific gravity	1.068	
Grape sugar present	2.47	per cent.
Cane sugar present	12.48	"

4. *Orange*—Aug. 29, 1880. Juice obtained from plant in full blossom.

Specific gravity	1.062	
Grape sugar present	6.10	per cent.
Cane sugar present	7.12	"

5. *Amber*—Sept. 6, 1880. Juice obtained from plant with seed ripe, and easily falling from husk.

Specific gravity	1.064	
Grape sugar present	2.13	per cent.
Cane sugar present	16.06	"

6. *Orange*—Sept. 6, 1880. Juice obtained from plants with seed in dough, and speckled.

Specific gravity	1.068	
Grape sugar present	5.00	per cent.
Cane sugar present	9.13	"

7. *Amber*—Sept. 16, 1880. Juice obtained from ripe cane; fallen by storm.

Specific gravity	1.065	
Grape sugar present	2.79	per cent.
Cane sugar present	10.02	"

8. *Orange*—Sept. 16, 1880. Juice from plants with seed nearly ripe; plants standing.

Specific gravity	1.065	
Grape sugar present	4.11	per cent.
Cane sugar present	9.76	"

9. *Amber*—October 2, 1880. Juice obtained from cane still in the field and still prostrate from the storm.

Specific gravity	1.069	
Grape sugar	2.47	per cent.
Cane sugar	1.06	"
Weight of entire stalk taken	45	pounds.
" leaves of same	2	" 7 oz.
" seed and two top points	8½	"
" juice obtained	14	"
Per cent. of leaves	5.55	
" tops	18.8	
" juice from crushed cane	41.1	

10. *Amber*—October 2, 1880. Juice from stalks, the leaves of which, on the 18th day of September, had been removed without disturbing them otherwise.

Specific gravity	1.074
Grape sugar	1.82 per cent.
Cane sugar	13.11 "

11. *Amber*—October 2, 1880. Juice obtained from the upper half of the stalks after topping as usual.

Specific gravity	1.069
Grape sugar	2.94 per cent.
Cane sugar	9.67 "

12. *Amber*—October 2, 1880. Juice obtained from the lower half of stalks.

Specific gravity	1.070
Grape sugar	1.94 per cent.
Cane sugar	11.64 "

13. *Orange*—October 6, 1880. Juice obtained from plants very ripe, stalks still standing in the field. No appearance of injury by the slight frost of the previous week.

Specific gravity	1.078
Grape sugar	4.02 per cent.
Cane sugar	11.41 "
Weight of entire stalks taken	37 pounds.
" leaves and tops	12 "
" stalks used to obtain juice	25 "
" juice obtained	9 "
Per cent. of juice	37
" Bagasse	64
" Grape sugar obtained from juice estimated as including bagasse	1.45
Per cent. of cane sugar, reckoning as above	4.01

14. *Orange*—Oct. 23, 1880. Juice obtained from cane which was cut, stripped and topped Oct. 2, and placed under shelter until examined. Juice whitish.

Specific gravity	1.094
Grape sugar	14.66 per cent.
Cane	3.55 "

The acidity of the juices was tested from time to time. The juice of the amber was more acid in every instance than that of the orange. Each variety reached its minimum of acidity at the maximum of cane sugar, and its maximum acidity by standing after being cut. The temperature in these experiments was 20° C.

Tabulating these observations, we have the following:

Date.	Early Amber.				Orange.			
	No. of Experiments.	Specific Grav. of Juice.	Pr. ct. of Grape Sugar.	Pr. ct. of Cane Sugar.	No. of Experiments.	Specific Grav. of Juice.	Pr. ct. of Grape Sugar.	Pr. ct. of Cane Sugar
Aug. 14, 1880....	1	1.065	3.34	10.75	2	1.055	5.70	4.90
" 25, 1880....	3	1.068	2.47	12.48	4	1.062	6.19	7.12
Sept. 6, 1880....	5	1.064	2.13	11.42	6	1.068	5.00	9.13
" 16, 1880....	7	1.065	2.79	11.02	8	1.065	4.11	9.76
Oct. 2, 1880....	9	1.069	2.47	10.60	.....	.....	.....	.....
" 2, 1880....	10	1.074	1.82	13.11	.....	.....	.....	.....
" 2, 1880....	11	1 069	2.93	9.67	.....	.....	.....	.....
" 2, 1880....	12	1.070	1.94	11.64	.....	.....	.....	.....
" 6, 1880....	.....	.....	.....	.....	13	1.078	4.02	11.41
" 23, 1880....	.....	.....	.....	.....	14	1.094	14.66	3.55

From the above observations the following conclusions may be safely deduced, at least so far as our soil and climate bear upon the growth and development of these two varieties of canes, as sugar producing plants:

1. That both varieties are rich in cane sugar.

2. That the Early Amber is richest in cane and the Orange in grape sugar. As grape sugar hinders cane sugar from crystallizing, when in solution with it, in proportion to its amount, it follows:

3. That the sugar in the Early Amber sirup will crystallize more readily, other conditions being the same, than in the Orange sirup.

4. That the Orange yields the greater amount of juice per acre, and if all the sugar in both varieties could be crystallized, the greater amount of sugar.

5. The safest way to secure the full benefit of either the Early Amber or Orange crop for sugar manufacture is to begin cutting the canes when the seed is in the "dough," and to grind them as soon as possible after cutting.

6. The cane sugar of the plants changes into grape sugar after they are once cut off, slowly when under shelter, and rapidly when exposed to the sun's rays.

PROXIMATE ANALYSIS OF SORGHUM CANE.

An average portion of the Orange cut at the same time—October 6—as that used in experiment 13 was reserved, with tops and leaves still remaining, for the analysis.

The leaves and two feet of tops were removed, and cross sections taken between each joint of the remainder of the stalks.

The proximate principles were then determined according to the following scheme:

The sections, as soon as cut, were weighed and then dried in a water oven, allowed to cool in the air, weighed, finally pulverized, and put in a stoppered bottle.

Of the dried substance, ten grams were required for sugar, fiber, starch, gum and vegetable acids; one gram for hygroscopic water and ash; one gram for total albuminoids; five grams for oil.

The gram of dried cane reserved for water and ash was heated in an oven at 110° C. until its weight was constant. It was then ignited and the ash weighed.

The ten grams for the estimation of sugar, etc., were macerated with water in a mortar, the water decanted, and this process continued several times, the decanted liquids being filtered by Bunsens' method, and finally the residue was thrown on the filter and washed until the filterate measured one litre.

100 c.c. of this solution were evaporated nearly to dryness on a water-bath, then the desiccation completed by passing a current of dry air upon the residue by means of an aspirator, the temperature of the substance in the meantime ranging between 90° and 100° C. The residue was then weighed, incinerated, and weight of ash noted.

Albuminoids.—400 c.c. of the aqueous extract were evaporated to a sirup on the water-bath, calcined gypsum added, the whole then dried and the residue ignited with soda-lime.

500 c.c. of the aqueous extract were rapidly evaporated nearly to dryness, and the residue exhausted with alcohol of 87 per cent. by repeated boilings with fresh portions of the solvent as long as it was colored. The liquids were filtered, the residue thrown upon the filter and washed with hot alcohol, and the washing added to the filtrate. Water was added to the filtrate, the alcohol expelled by heat, and then the solution diluted to 200 c.c.

Grape Sugar.—100 c.c. of this solution were reserved for the estimation of grape sugar. The remainder was acidulated with dilute sulphuric acid, and boiled to convert the cane into grape sugar.

Cane Sugar.—The cane sugar was then estimated with Tehling's solution, as usual. The residue insoluble in alcohol was dried at 100° C, weighed, and then incinerated. This ash and the soluble albuminoids were subtracted from the total amount of residue, and the remainder estimated as gum and vegetable acids.

The residue left after extracting the ten grams of cane with water was washed with alcohol acidulated with sulphuric acid to dissolve the albuminoids, transferred to a beaker, and diluted to 200 c.c. 5 c.c. of normal sulphuric acid were added, and the whole boiled for an hour on the water-bath, then filtered through Bunsen's filter. The filter was also cut into shreds and boiled with water containing one per cent. of sulphuric acid, to dissolve any starch remaining on it. After filtering, the two filtrates were added, and the starch estimated from an alliquot portion by conversion into glucose.

The method was as follows: The starch solution was diluted to 500 c.c. Three separate portions of 50 c.c. each were transferred to prescription bottles, 10 c.c. normal acid added, the bottles were then stoppered with rubber stoppers firmly tied, and placed in salt-bath and boiled respectively for three, four and six hours. The contents of the bottles were then neutralized, diluted, and starch estimated from the amount of grape sugar present. The solution boiled six hours had .02 per cent. more starch than that boiled four hours. Three hours' boiling did not convert all of the starch into grape sugar. The residue from which the starch was taken was boiled with sodium hydroxide, thrown upon a weighed filter and repeatedly washed with the same solution, then washed with hot water, and finally with alcohol and then ether. The washed residue was dried at 110° C. and weighed, then incinerated the weight of ash subtracted from the former weight, and the difference estimated as fiber. The gram reserved for the albuminoids was ignited with soda-lime, and albuminoids determined as usual.

The oil was extracted by ether from fine grains of the dried cane.

The total water was estimated by adding the per cent. of loss of the air dried cane and the hygroscopic water.

RESULTS.

Composition of stalks of Orange cane in one hundred parts:

Water	76.58
Grape sugar	3.00
Cane sugar	9.77
Starch	4.12
Fiber	4.54
Oil	0.07
Gums and vegetable acids	0.24
Soluble albuminoids	0.23
Insoluble	0.16
Soluble ash	0.68
Insoluble ash	0.06
	99.45

ASH.

The ash from the remaining dried cane was analyzed by the following method: The cane was incinerated at a low heat, pulverized, dried, and put in a stoppered bottle.

Chlorine.—Two grains of the ash were exhausted with water, silver-nitrate added to the extract and the whole acidified with nitric acid. The precipitate of chloride of silver was collected upon a filter, dried, ignited, weighed, and the chlorine estimated in the usual manner. The filtrate was treated with excess of hydrochloric acid, silver chloride removed and the solution preserved.

Silica.—The ash insoluble in water was treated with hydrochloric acid, brought to dryness, moistened with hydrochloric acid, water added, and the residue thrown on a weighed filter. The filter and its contents were heated at 160° C until of constant weight, then ignited and the silica weighed. The loss found between the two weights was called coal.

The solution from which the chlorine had been precipitated and the filtrate from the silica were mixed, and the whole diluted to 200 c. c., and well shaken. 50 c. c. of this solution were reserved for the estimation of sulphuric acid and alkalies, 50 c. c. for phosphoric acid, manganese, lime and magnesia.

Iron.—The remaining 100 c. c. were treated with sulphuric acid, and heated upon a water bath until the chlorine was expelled; then transferred to a flask, water and sulphuric acid added, and the iron reduced with hydrogen, generated by zinc suspended in the liquid, by means of a platinum wire. To facilitate the operation, a strip of platinum was introduced into the flask and allowed to come in contact with the zinc. After the reduction, the iron was estimated by a standard solution of potassium per manganate.

Phosphoric Acid.—A solution of ferric chloride was added to the portion reserved for phosphoric acid, etc., in sufficient quantity for the iron to combine with all the phosphoric acid present. Sodium carbonate was added until the last drop caused a precipitate, which did not re-dissolve upon agitation. The mixture was then heated, a hot solution of sodium acetate added, and the whole brought to the boiling temperature, filtered, and washed with hot water.

The residue was dissolved in nitric acid and concentrated to about 10 c. c.; a nitric acid solution of molybdate of ammonia was added in excess, and the mixture allowed to stand in a warm place for 24 hours.

The precipitate was collected on a filter, the beaker rinsed, and the contents of the filter washed with a mixture of the molybdate solution and water. The precipitate was dissolved in the smallest quantity of ammonia. Any of the phospho-molybdate precipitate remaining in the beaker was dissolved in a mixture containing 3 parts of water and 1 of ammonia and thrown upon the filter; finally, the filter was washed with the ammoniacal water. The filtrate was boiled, and the phosphoric acid precipitated with a mixture of ammonium-chloride, magnesium-sulphate and ammonia, made according to Fresenius' formula. After allowing the mixture to stand 12 hours, the precipitate was collected on a filter, washed with ammonia water, and the volume of the filtrate and washings noted.

The precipitate was ignited in a platinum crucible, a little nitric acid added, and again ignited to oxidize the charred matter present, cooled, and weighed. As ammonia-magnesia-phosphate is soluble in about 54,000 parts of ammoniacal water, .003 of a grain was added to this weight, as the filtrate measured a little over 150 c. c. The phosphoric acid was then estimated from this weight of pyrophosphate of magnesium.

Manganese.—The solution from which the iron and phosphoric were precipitated was treated with a few drops of bromine, and boiled to precipitate the manganese. The precipitate was collected upon a filter and thoroughly washed, then strongly ignited, and weighed.

Lime.—The above filtrate was concentrated, and while hot a little ammonia added, and then an excess of ammonium-oxalate, to precipitate the lime. The mixture was allowed to stand 12 hours.

The precipitate was then collected upon a filter, washed, dried, and ignited in a platinum crucible. After the filter was reduced to ash, carbonic acid was passed over the ignited lime, to reconvert any oxide formed into carbonate. From the weight of calcium-carbonate thus obtained the per cent. of lime was estimated.

Magnesia.—The filtrate from the lime was concentrated, ammonia added in excess, and then a solution of phosphate of soda to precipitate the magnesia present. This precipitate and its filtrate were treated the same as the corresponding one, the estimation of phosphoric acid. The magnesia was estimated from the amount of pyrophosphate of magnesia found.

Sulphuric Acid.—The 50 c. c. of the solution reserved for this purpose were boiled, and the sulphuric acid precipitated, with a slight excess of barium-chloride. The precipitate was collected upon a filter, washed, ignited and weighed.

Potassa.—The above solution was treated, after concentration on a water-bath, with ammonia and ammonium-carbonate as long as any precipitate was formed, digested on a water bath, filtered, and the contents of the filter carefully washed. The filtrate and washings were evaporated to dryness on a water bath, and the residue ignited to expel ammoniacal salts. This residue was then treated with five and one-half times its weight of pure oxalic acid in the form of a concentrated solution, then evaporated to dryness, and again ignited to dull redness. The ignited residue was treated with a small quantity of boiling water, thrown upon a filter, washed with hot water, hydrochloric acid added to the filtrate, the mixture evaporated to dryness, and gently ignited, and the weight of the alkaline chloride ascertained. The separation of the alkalies was effected with platinic chloride, as follows:

The residue of alkalies was dissolved in a little water, and enough platinic chloride added to combine with the alkalies estimated as potassium salt. This mixture was evaporated nearly to dryness over a water bath, care being taken not to boil the water. A mixture of six volumes of alcohol and one of ether was poured over the residue, and the whole allowed to stand several hours in a covered vessel, with occasional stirring. The insoluble potassio-platinic chloride was transferred to an equipoised filter, washed with alcohol and ether mixed, and finally dried at 100° C., and weighed.

Soda.—From the weight of the double potassium chloride, the amount of the potassium chloride was ascertained. This weight was subtracted from the weight of the combined alkali chlorides, and the remainder called sodium chloride, and estimated as soda.

Carbonic Acid.—One grain of the ash was transferred to a Rose carbonic acid apparatus, and the carbonic acid estimated by loss.

The following were the results obtained:

Composition of Ash.—

Silica	27.91
Iron oxide	0.14
Phosphoric acid	5.37
Manganese oxide	0.89
Lime	6.82
Magnesia	4.64
Sulphuric acid	6.23
Potassa	46.48
Soda	0.98
Sodium chloride	0.42
	99.89

ANALYSIS OF SORGHUM SEED.

A sufficient quantity of the seed were ground as fine as possible in an iron mortar, and were preserved in a glass-stoppered bottle. The following portions of the ground seed were taken:

10	grains,	for the estimation of	sugar, dextrine, starch and fiber.
1	grain,	" "	water and ash.
1	"	" "	albuminoids.
1	"	" "	oil.
1	"	" "	tannin.

Sugar, Etc.—The ten grains reserved for sugar, etc., were rubbed up thoroughly with water in a mortar, then transferred to a filter and washed well with water.

Solution=A.
Residue=B.

The solution, A, was concentrated to about 10 c.c. in a porcelain dish on a water bath, then transferred into a strong prescription bottle and washed with about 10 c.c. of water, and the washings added. 5 c.c. of normal sulphuric acid were added, the bottle closed with a rubber stopper, securely tied. The bottle and its contents were then transferred to a salt bath and boiled for six hours. After cooling, the contents of the bottle were transferred to a graduated cylinder, neutralized and diluted to 100 c.c., the coloring matter precipitated with acetate of lead, and, after thoroughly mixing, the whole was allowed to stand until the precipitate had settled to the bottom. A portion of the clear liquid was then transferred to a barette and dropped into 10 c.c. of Fehling's solution, diluted four times, and at the boiling temperature, until the whole of the copper had been precipitated as cuprous oxide. This point was determined by filtering a small quantity from time to time, acidifying the filtrate with acetic acid, and testing for copper with ferro-cyanide of potassium. The number of c.c. of the sugar solution it took was noted, and the sugar and dextrine determined by the following proportions:

1. The number of c.c. it took to precipitate copper solution: total number of c.c. : : .05 (grains of grape sugar required to precipitate 10 c.c. of Fehling's solution) : x.

X multiplied by .95 will give the grains of sugar in 10 grains of seed.

The residue, B, was washed on the filter with alcohol acidulated with sulphuric acid and finally with water, to dissolve the gluten. Then the residue was washed off the filter into a beaker diluted to about 400 c.c. 5 c.c. of sulphuric acid added, and the whole boiled on a water bath until the liquid had no milky appearance. It was then filtered through an equipoised filter and washed.

Solution=C.
Residue=D.

Solution C was diluted to 500 c.c. 50 c.c. of this solution were transferred to a prescription bottle and then treated as above for sugar and dextrine. From the grape sugar obtained, the amount of starch was obtained.

Residue D was boiled with hot sodium hydroxide, again thrown upon the filter and washed with the same solvent; afterwards, with hot water, then with alcohol, and finally with ether. The washed residue was dried at 110° C., weighed, ignited, and the amount of ash deducted. The remainder was estimated as fiber.

Water.—For the estimation of water, the ground seed was weighed in a glass-stoppered test tube. After weighing, the glass stopper was replaced by a rubber one, through which passed two glass tubes, bent at right angles. One of these tubes was connected with an aspirator; the other, with a calcium chloride tube and a sulphuric acid drying bottle. The test tube and its contents were then placed in an opening of a drying oven, whose temperature was between 100 and 110° C. During the operation, a current of air, passing through the sulphuric acid and calcium chloride tube, thus drying it, was drawn into the tube and the moisture sucked out by means of the aspirator. When the weight became constant, the loss was estimated as water.

Ash.—The contents of the tube were transferred to a platinum crucible, incinerated, and ash weighed.

Albuminoids.—One grain of the ground seed was ignited with soda lime. The substance was intimately mixed with a portion of soda lime sufficient to fill a 14-inch combustion tube two-thirds full. About two inches of the tube were filled with soda lime, then the mixture of soda lime and substance added, the mortar rinsed with soda lime, and finally the rinsings and enough soda lime added to nearly fill the tube. A plug of asbestos was put in, and the tube gently tapped to insure an air passage throughout its length.

Will's bulbs were charged with a deci-normal solution of oxalic acid. The tube being placed in the combustion furnace was connected with the bulbs. The fore part of the tube, containing the soda lime only, was heated to redness, then heat applied, one jet at a time, along the entire length of the tube, care being taken that the combustion was completed in that portion of the tube where heat was applied before other jets were turned on, and also that the combustion was not too rapid. After the combustion was

ended, the contents of the bulbs were transferred to a beaker, tincture of litmus added, and the excess of acid titrated with a decinormal solution of potassa. The amount of ammonia found to be present was calculated as nitrogen. The nitrogen was multiplied by 6.25, and the result called albuminoids.

Oil.—The one grain of ground seed reserved for the estimation of oil was placed in a short test-tube, the bottom of which was drawn out in the shape of a cone, with a small opening at the apex. A small filter placed in the cone kept any of the substance from passing through the opening. The tube was suspended in a small flask, and this stoppered with a cork through which a long glass tube passed. The whole was placed in a water bath, ether ($\frac{1}{2}$ oz.) put in the outer tube, and heat applied to the water bath until the temperature of the water boiled the ether. This operation was continued for a half an hour, the percolate transferred to a small weighed beaker, ether evaporated and the beaker and its contents dried at 100° C., and then weighed.

Weight.—Oil—One grain of the pulverized seed was digested with hot water for several hours, and the tannin estimated by a standard solution of gelatine.

Composition of Sorghum Seed—Orange.—

Sugar	0.56
Starch	63.09
Fiber	6.35
Water	12.51
Ash	0.64
Albuminoids	7.35
Oil	3.08
Tannin	5.42
Total	99.00

EXPERIMENTS IN SUGAR MAKING.

The grinding of the cane, and the evaporation of the juice began an the 18th of September. It was the intention to begin working up the Early Amber as soon after it had reached its maximum per cent. of cane sugar, as possible, and thus have it finished by the time the Orange was ready to harvest, leaving a small portion for subsequent experiments. Owing to the delay in the arrival of the machinery, the work was not begun until the above date.

The Early Amber had been ripe for over two weeks, and was lying prostrate from the effects of a storm. The Orange was ripe. The object of these investigations was to see whether any method of manufacture of the juice into sirup could be depended upon to insure the subsequent crystallization of the sugar.

These investigations were undertaken with a view to the simplicity of machinery used and to the economical manufacture of the sirup, so that they could be of practical use to the farmer, should any of the experiments prove successful..

The apparatus used for crushing and pressing the cane, was a two-horse Victor mill, with three upright rollers. The juice was evaporated in Cook's evaporator, with furnace attached, and of the size recommended for use with a two-horse crusher.

The remaining apparatus consisted of barrels, tubs, pails, etc.

An attempt was made to heat the juice for skimming and classification after it had been treated by chemicals, in the pan of a steam boiler of the form used by farmers to cook food for cattle. This boiler was found unfit for the purpose, as the temperature of the juice could not be raised in it above 108° F. A small pan was made, similar in construction to a Cook's evaporator, but furnished with a double bottom. The steam space in the bottom was about two inches high, and was connected with one of the boilers in the Chemical Laboratory. The object was to test the feasibility of evaporating the juice by steam under pressure with shallow pans.

In the experiments which follow, the juice was either evaporated directly as it came from the mill, *i. e.*, without the use of re-agents, or after it had been submitted to clarifying processes. In the first, the juice is designated in the experiment as *not clarified*, in the second, as clarified, defecated, or *neutralized*.

THE EXPERIMENTS.

1. *Early Amber.*—September 18, 1880. Cane, very ripe and down; juice, *not clarified*,—evaporated to a sirup which upon cooling weighed 11 lbs. to the gallon. It was of a light color and had a distinct sorghum taste. Stalks, stripped and topped, yielded 48 per cent. of juice, having a specific gravity of 1.066. The sugar, not crystallized.

2. *Early Amber.*—September 20, 1880. *Juice defecated.* As the juice was brought from the mill, milk of lime was added, little at a time, until a piece of red litmus paper would change to purple when dipped into the juice. Then a solution of tannic acid and finally gelatine was added. The juice was then boiled and well skimmed, and concentrated to sirup. The sirup was scorched and had a taste of extract of licorice. A small portion of the sirup evaporated over a water-bath, to almost candy; was readily crystallized.

3. *Early Amber.*—September 21. Juice not clarified. The evaporation was continued until the sirup upon cooling weighed 11 lbs. The sugar did not crystallize,

4. *Early Amber.*—September 22. Juice made alkaline with lime, and thus neutralized with sulphate of alumina, Concentrated to a sirup that weighed when cooled between 11 and 11½ lbs; Sugar crystallized. Before expressing the juice for this experiment the rollers were moved closer together and the cane crushed so much that the bagasse as it came out fell in pieces. 51 per cent of juice was obtained with a specific gravity of 1.068. One row of cane, (0.037 acres) was taken for this experiment producing 23 gallons juice from which was made 3.17 gallons sirup weighing 11¾ lbs. per gallon. Calculating from this data, an acre of the early amber would yield 624.3 gallons of juice, or 86.1 gallons of sirup.

5. *Orange.*—Sept. 23, 1880. Juice neutralized with milk of lime; afterwards tannin and gelatin added; evaporated to a sirup of 12 lbs. to the gallon; sirup dark. The sugar commenced crystallizing in a few days. Three weeks afterwards the sugar was separated from the sirup by a centrifugal separator. Sugar, brown.

In this experiment, 360 lbs. of topped and stripped stalks were used; producing 155 lbs of juice (43 per cent.); 28 lbs. sirup (7.78 per cent. of the stalks and 18.04 per cent. of the juice); $13\frac{3}{4}$ lbs. sugar (3.8 per cent. of stalks, 8.87 per cent of juice, 49.1 per cent. sirup).

One row, .0398 acres, yielded 30 lbs. juice. Calculating the yield of an acre from these data, we have 754 gallons juice, 120.6 gallons or 1,447.2 lbs. sirup, and 710.67 lbs. sugar.

6. *Orange.*—Sept. 24, 1880. Juice neutralized with lime, and a few drops of tannin added to every 10 gallons juice; then $\frac{1}{8}$ oz. gelatin, and afterwards a little sulphate of allumina. Juice evaporated to a sirup of 11 lbs. to the gallon; color, very light. Sugar began crystallizing after standing two days.

7. *Orange*—Sept. 27, 1880. Juice neutralized with lime, and concentrated to a sirup from 11 to 12 lbs. per gallon. Sugar readily crystallized.

8. *Orange.*—Sept. 27, 1880. Juice neutralized with milk of lime; *sulphurous* acid was added to combine with any lime remaining uncombined in the juice. The sugar began crystallizing as the sirup was cold.

9. *Orange.*—Oct. 1, 1880. Juice defecated with lime and sulphate of alumina. Sugar began crystallizing after three days. In this experiment stripped and topped stalks were used; yielding 54.2 per cent. of juice; specific gravity, 1.076.

10. *Orange.*—Oct. 1, 1880. Juice evaporated without defecation. The sirup, after standing about five weeks, had but few crystals of sugar. In a subsequent analysis of this sirup (see analysis of sirup, No. 4), there was found to be 38.9 per cent. of cane sugar, and 26.91 per cent. of grape sugar.

11. *Orange.*—Juice not defecated; evaporated to a sirup of 12 lbs. to the gallon. The sugar has not crystallized.

12. *Amber.*—Juice defecated with lime and sulphate of alumina. The juice was quite acid as it came from the mill. Sirup black. Sugar crystallized.

Finding that some of the sirup whose juice had not been defected, did not crystallize, it was thought that, perhaps, a farther concentration would cause the sugar to crystallize. For this purpose the sirup produced in experiment No. 3 was selected. In the early part of November it was further concentrated in the steam evaporator, but this had no effect upon the crystallization of the sugar.

Finding that the concentration of the sirup did not cause the sugar to crystallize, an analysis of several of the sirups was undertaken, in order to investigate this subject more thoroughly. The following sirups were selected to be analyzed:

No. 1. *Early Amber.*—Sirup taken from that made in experiment No. 3.

No. 2. Sirup of No. 1 subjected to further concentration.

No. 3. *Orange.*—Sirup of experiment No. 9, with the crystallized sugar taken out by the centrifugal separator.

No. 4. *Orange.—Obtained from the sirup of experiment No. 10.*— The following were the results obtained:

Composition of Sorghum Sirups.

Number.	Cane Sugar.	Grape Sugar.	Gum.	Water.	Ash.	Total.
No. 1.....	47.32	14.70	6.80	29.4	1.97	100.1
No. 2.....	45.62	20.00	10.51	20.39	3.78	100.3
No. 3.....	35.63	26.82	6.75	28.67	1.40	99.27
No. 4.....	38.9	26.91	7.80	24.04	1.75	96.40

The cause of the large per cent. of ash shown by No. 2 was undoubtedly the lime added to neutralize the sirup before the second concentration.

GENERAL CONCLUSIONS.

1. From the results above given, it appears, that crystallized sugar can be obtained from sorghum of as good a quality as that of the ordinary brown sugars found in market. A portion of this brown sugar was re-dissolved and the solution passed through a mixture of charcoal and clay. On evaporation it yielded a light brown sugar, which dried very readily in the air, and showed no trace of sorghum taste or smell. A portion of this product was placed in a percolator and the adhering molasses washed out. The result was a perfectly white sugar.

2. To insure the production and best yield of crystallizable sugar, the juice must be treated with lime before heating. If, after skimming, the excess of lime be neutralized by aluminum sulphate, sulphurous acid, or even sulphuric acid, the sirup obtained will be of a light color; otherwise the excess of lime will cause the sirup to be dark.

3. From the proximate analysis of the cane, it appears that one acre of sorghum produces 2,559 pounds of cane sugar. Of this amount we obtained 710 pounds in the form of good brown sugar, and 265 pounds were left in the 737 pounds of molasses drained from the sugar. Hence, sixty-two per cent. of the total amount of sugar was lost during the process of manufacture. This shows that the method of manufacture in general use is very imperfect.

4. The 710 pounds of sugar, at eight cents a pound, would bring $56.80. The molasses is worth, at 25 cents per gallon, $17.75; or the products of an acre of sorghum would bring $75.55. There is no question that, with proper care and apparatus, the above yield can be readily doubled.

5. Nearly two-thirds of the sugar, as has been seen, is left in the *begasse*. This could, in great part, be recovered by percolation with water, as is done sometimes in the manufacture of beet-root sugar.

6. The amount of tannin in the ripe seed shows conclusively that the cane should be topped before expressing the juice, as an excess of tannin, especially in presence of lime, would tend to darken the sirup.

INVESTIGATIONS IN CHEMICAL LABORATORY OF STUDENTS

CONTAMINATION OF CISTERN AND WELL WATER BY ORGANIC MATTER.

The investigation of this question was made the subject of thesis by Mr. C. F. Cook, of the class of 1880. The specimens of water were collected in the towns of Champaign and Urbana, and in all cases but one were used for drinking water. We here omit the names of the parties using the water.

The organic matter was determined by what is known as Kubel's method, so modified that the amount of permanganate of potossium required to oxidize the nitrites and ferrous salts, when present, was deducted from the total quantity of potassium permanganate consumed.

The organic matter in each specimen of water was determined twice, and, if the results disagreed, a third determination was made.

The following tables give the results of Mr. Cook's valuable work, from which some interesting and useful conclusions can be drawn. The results are calculated for 1,000,000 parts of water:

I.—WELL WATERS.

Specimen of water.	Potassium permanganate required	Organic matter	Specimen of water.	Potassium permanganate required	Organic matter
1	1.84	9.20	17	5.03	25.15
2	17.29	86.45	18	0.42	2.10
3	14.30	71.50	19	11.98	59.90
4	1.90	9.50	20	0.54	2.70
5	1.36	6.80	21	6.53	32.65
6	7.08	35.40	22	2.31	11.55
7	3.10	15.00	23	0.68	3.40
8	1.63	8.15	24	0.98	4.90
9	1.41	7.05	25	1.00	4.75
10	0.82	4.10	26	1.97	9.85
11	0.82	4.10	27	3.54	17.70
12	1.27	6.35	28	4.23	21.15
13	1.83	9.15	29	1.12	5.60
14	2.25	11.25	30	2.25	11.25
15	4.76	23.80	31	0.84	4.20
16	1.09	5.45	32	1.41	7.05

Well Water—*Continued.*

Specimen of water.	Potassium permanganate required	Organic matter	Specimen of water,	Potassium permanganate required	Organic matter
33	5.72	28.60	61	5.43	27.15
34	3.95	19.75	62	1.35	6.75
35	3.95	19.75	63	3.73	18.65
36	1.41	7.05	64	4.45	22.25
37	1.97	9.85	65	1.60	8.00
38	3.66	18.30	66	1.60	8.00
39	1.97	9.85	67	9.17	45.85
40	2.53	12.65	68	17.52	87.60
41	18.33	91.65	69	14.07	70.35
42	4.93	24.65	70	6.11	30.55
43	4 51	22.55	71	1.43	7.15
44	11.28	56.40	72	3.05	15.15
45	1.97	9.85	73	49.26	246.30
46	0.84	4.20	74	7.81	39.05
47	49.79	248.95	75	1.15	5.75
48	2.11	10.55	76	1.60	8 00
49	1.00	5.00	77	2.71	13.55
50	2.01	10.05	78	2.01	10.05
51	3.05	15.15	79	0.67	3.35
52	2.03	10.15	80	5.43	27.15
53	2.37	11.85	81	4.02	20.10
54	2.37	11.85	82	1.60	8.00
55	0.33	1.65	83	1.01	5.05
56	4.02	20.10	84	0.69	3.35
57	2.71	13.55	85	6.61	33.05
58	2.01	10.05	86	3.73	18.65
59	0.33	1 65	87	3.05	15.25
60	1.35	6.75			

II. CISTERN WATERS.

Specimen of Water.	Potassium Permanganate required.	Organic Matter.	Specimen of Water.	Potassium Permanganate required.	Organic Matter.
1	11.30	56 50	8	18.90	94.50
2	14.10	70.55	9	11.14	55.70
3	35.91	179.55	10	10.77	53.85
4	18.81	94.05	11	6.45	32.25
5	24.54	122 70	12	1.52	7.60
6	1.41	7.05	13	24.70	123.20
7	15.50	77.50	14	33.01	165.05

By referring to the results above, it will be seen that organic matter is a constant constituent of both well and cistern water, and that its amount varies widely in both kinds of water.

The amount of organic matter usually assumed to be admissible in drinking water is about twenty parts in a million parts of water. From the results given above, it would appear that this proportion of organic matter is entirely too high to be taken for the standard of purity. In fact, enough of the well waters contained five parts or less of organic matter in a million, to warrant the assumption of five parts organic matter in a million parts of water as the limit for good drinking water, in this community at least. If we assume either twenty parts or five parts of organic matter in a million parts of water as the standard of purity, it will be seen that a large num-

ber of the well waters examined would fall into the category of good drinking water. Of the cistern waters, however, only two could, under any circumstances, be considered fit to drink.

ANALYSES OF INDIAN CORN.

The following four analyses were made by O. W. Hoit, and incorporated in his graduating thesis. The results gixen for 100 parts of the kernel are as follows:

Varieties.	No. 1.	No. 2.	No. 3.	No. 4.
Ash	2.230	1.000	2.380	1.020
Water	12.380	14.740	10.000	10.900
Sugar and dextrine	3.249	2.103	3.311	2.934
Starch	62.142	60.818	64.572	62.658
Oil	4.000	3.940	3.750	4.200
Fiber	3.500	3.870	4.440	4.370
Albuminoids	11.865	13.366	11.441	13.875
Totals	99.866	99.837	99.894	99.957

No. 1 is of the yellow flint variety, known as Yankee corn. It is very hard, has eight rows of kernels on the ear, which is about eight inches long, and ripens in about ninety days. The specimen analyzed was grown upon the University farm, the seed having been obtained of Dr. Sturtevant, of Waushakum farm, Mass. The soil upon which it was grown is a rich prairie loam, which had been under cultivation for several years and was not manured the season the sample was grown.

No. 2 is a white flint, and has the same number of rows of kernels as No. 1. The ears are, however, a little larger and longer. The kernels are as hard as those of No. 1.

No. 3 is a yellow Dent corn with long kernels and a small cob, known as California Golden. It was raised by Mr. Wright, of Mount Pulaski, Ills., and, though a new variety, gives promise of being one of the best of its kind.

No. 4 is a white Dent, with long kernels and a small cob. It thus bears the same relation to the white varieties that No. 3 does to the yellow. The specimen analyzed was grown by Mr. Hutchinson, of Champaign.

Two other varieties of corn were analyzed, and their composition in 100 parts is as follows:

Varieties.	No. 1.	No. 2.
Ash	1.60	1.04
Water	15.75	20.63
Sugar and dextrine	3.52	1.35
Starch	63 56	62.78
Oil	2.92	2.88
Fiber	3.97	1.48
Albuminoids	8.74	8.11
Totals	99.06	98.27

No. 1 is a variety known as Plymouth White, and was analyzed by Mr. J. H. Mann.

No. 2 is yellow corn, and was analyzed by Mr. J. O. Pearman.

ANALYSES OF WHEAT.

The following table gives the chemical composition of a variety of wheat known as Fultz wheat. Analyses Nos. 1 and 2 were made by Messrs. Slauson and Wilson, respectively, of the wheat grown in 1878:

Analyses Nos. 3 and 4 were made by Messrs. Schwartz and Pearman respectively of a specimen of the wheat grown in 1879.

Ingredients.	1	2	3	4
Water	12.40	14.50	13.85	13.09
Starch	65.16	63.87	67.50	67.82
Sugar	4.99	1.50	2.95	3.16
Albumen	12.79	14.70	10.49	10.49
Oil	1.66	1.45	1.22	0.97
Fiber	1.96	1.82	2.41	2.78
Ash	1.95	1.80	1.56	1.68
Total	100.91	99.64	99.98	99.99

ANALYSIS OF FLAX SEED.

The following analysis of flax seed was made by Mr. Boyd.

Water	7.40
Starch	24.99
Sugar	1.56
Albumen	11.33
Oil	38.00
Fiber	12.27
Ash	4.30
Total	99.85

ANALYSES OF OATS.

The two following analyses were made by Mr. C. C. Barnes.

The hulls of a known weight of the two varieties were separated from the kernels by hand and weighed. The analyses were made of the kernels without the hulls. No. 1 is a common variety; name not known.

No. 2 is a variety known as Australian oats.

The chemical composition of the oats in 100 parts is as follows:

Ingredients.	1	2
Hulls	30.0000	39.0000
Water	8.6632	7.8110
Ash	1.5071	1.5597
Oil	5.5020	2.9463
Fiber	.9933	1.1010
Albuminoids	9.5151	10.5871
Sugar, Starch, Dextrine	43.8103	39.0000

ANALYSES OF BEER.

No. 1 represents the analysis of a specimen of Indianapolis "Tafel Beer." The analysis was made by S. D. Ross.

No. 2 is the analysis of V. Blatz's Milwaukee beer, made by Mr. B. A. Slade.

No. 3 is an analysis of J. Schlitz's Milwaukee beer, made by Mr. Schlandeman.

No. 4 is the analysis of Harpstrite and Schlandeman's beer, of Decatur, Illinois.

No. 5 is the analysis of the same beer after it had soured. The latter two analyses were also made by Mr. Schlandeman.

Ingredients.	1	2	3	4	5
Specific gravity	1.028	1.019	1.095	1.021	1.018
Alcohol	2.00	3.89	3.89	3.50	4.03
Grape sugar	2.65	1.28	1.71	1.49	0.87
Dextrine	3.35	2.30	2.47	3.25	2.72
Solid extract	7.98	7.59	6.84	6.45	6.73

ANALYSIS OF MILK.

The following analysis of milk of the Jersey breed, was made by Mr. C. N. Boyd:

In 100 parts of milk:

Water	84.22
Ash	0.70
Sugar (Lactose)	5.68
Butter	4.17
Caseine	4.90
Total	99.67

ANALYSIS OF MINERAL WATER.

The following is the analysis by Mr. B. A. Slade of the Paxton Artesian well water, Paxton, Illinois:

In 1,000,000 parts:

Calcium sulphate	262.8
" carbonate	189.6
Magnesium carbonate	149.1
Ferrous carbonate	81.8
Sodium chloride	12,672.0
Total	13,335.3

PEABODY WATER, NEAR TOPEKA KANSAS.

Grains in a gallon:

Silica	7.952
Calcium sulphate	28.000
" carbonate	0.000
Potassium chloride	35.280
" carbonate	008
Magnesium sulphate	18.833
" carbonate	39.928
Sodium carbonate	16.600
Total	147.601

CENTENNIAL SPRINGS, SALEM, ILLS.

In 1,000,000 parts:

Silica	18.7386
Sodium sulphate	1,988.5810
Magnesium sulphate	1,509.6031
Calcium sulphate	284.2788
" carbonate	263.7120
Potassium sulphate	461.6104
" chloride	42.9617
Ferrous carbonate	30.6216
Total	4,600.1072

The following analyses were made by Mr. Jos. Schwartz:

MINERAL WATER OF THE TOPEKA MEDICAL INSTITUTE, TOPEKA, KANSAS.

In 1,000,000 parts:

Organic matter	45.000
Silica	20.000
Calcium sulphate	92.070
Sodium sulphate	189.333
Potassium chloride	32.394
Sodium chloride	71.166
Sodium carbonate	232.739
Ferrous carbonate	302.428
Magnesium carbonate,	28.000
Alumina	32.000
Total	1,045.217

HORNER SWITCH WATER, NEAR KANSAS CITY, IN KANSAS.

Grains in a gallon:

Silica	7.840
Calcium sulphate	17.584
Calcium carbonate	6.160
Potassium chloride	14.400
Potassium carbonate	890
Sodium carbonate	10.976
Magnesium carbonate	15.680
Total	60.530

MINE WATER, FROM NEW MEXICO.

Grains in a gallon:

Organic matter	5.1600
Silica	1.5904
Calcium sulphate	50.9208
Sodium sulphate	16.2512
Potassium chloride	2.6712
Sodium carbonate	10.3992
Potassium carbonate	2.1448
Magnesium carbonate	23.2064
Ferrous carbonate and alumina	1.7360
Calcium carbonate	4.9600
Magnesium sulphate	5.7120
Total	124.7520

CANTON WELL WATER, NEAR TOPEKA, KANSAS.

Grains in a gallon:

Silica	1.624
Calcium sulphate	6.160
Calcium carbonate	5.600
Potassium chloride	1.680
Potassium carbonate	3.248
Sodium carbonate	56.336
Total	74.648

TRANSACTIONS OF THE BOARD OF TRUSTEES.

The Board met at the University parlor on Tuesday, December 17, 1878, at 3:30 P. M.

Present—Messrs. Cobb, Mason, McLean, Gardner, Fountain and Pickrell.

Absent—Governor Cullom, Messrs. Byrd, Gilham, Brown and Sabin.

Mr. T. T. Fountain, appointed member of the Board *vice* Flagg, deceased, was introduced by the President, the oath of office was administered to him by Judge Brown, and he took his seat with the Board.

The minutes of the last meeting were read and approved.

Dr. J. M. Gregory read a report on appropriations (part of his full report), which was referred to the Committee on Appropriations and Salaries.

Adjourned to meet at the Doane House, in Champaign, at 7 o'clock P. M.

EVENING SESSION.

The Board assembled as by adjournment.

Jno. W. Bunn, the Treasurer, read the following report, which was accepted:

ILLINOIS INDUSTRIAL UNIVERSITY,

In account with John W. Bunn, Treasurer.

1878	Cr.		
Sept. 10...	By balance	.....	$23,950 43
Oct. 1...	" interest on Sangamon county bonds	.....	1,250 00
Oct. 1...	" " Douglas county district school bonds	.....	450 00
Nov. 30...	" amount rec'd on account of Agricultural Department.	$893 26	
	" " " " Mechanical "	330 67	
	" " " " Architectural "	1,011 68	
	" " " " Horticultural "	85 29	
	" " " " Chemical "	9 30	
	" " " " Buildings and grounds...	41 65	
	" " " " Fuel and light.....	150 15	
	" " " " Incidentals.....	15 50	
	" " " " Fees and room rent.....	2,269 00	
	" " " " Tuition.....	1,004 50	
	" " " " Ill. Cent. R. R. freights....	877 60	
			6,688 60
			$32,339 03

DR.		
To amount paid Board expense	$71 25	
" " " for salaries	7,189 93	
" " " Buildings and grounds	12 03	
" " " Fuel and lights	1,232 82	
" " " Stationery and printing	140 70	
" " " Furniture and fixtures	86 24	
" " " Mechanical Department	700 45	
" " " Architectural "	885 15	
" " " Agricultural "	1,009 33	
" " " Horticultural "	269 72	
" " " Chemical "	293 30	
" " " Military "	43 93	
" " " Library and apparatus	3 56	
" " " Incidental expense	133 23	
" " " Cabinets	6 25	
" " " Physical Laboratory	15 19	
" " " Preparatory Department	690 00	
		$12,783 07
" " " Chemical Laboratory	$3,133 79	
" " " Mechanical and Architectural Shops	311 35	
" " " Books and publications	219 29	
" " " Buildings and grounds	427 37	
" " " Cabinets	214 99	
" " " Chemical and Physical Laboratories	153 50	
" " " Cabinet cases	486 20	
" " " Green House	357 77	
		5,304 26
		$18,087 33
Balance		14,251 70
		$32,339 03

URBANA, Dec. 17, 1878. JOHN W. BUNN, *Treasurer.*

Mr. McLean, chairman of Committee on Salaries and State Appropriations, submitted the following report, which was adopted:

URBANA, Dec. 17, 1878.

To the President and Board of Trustees of Illinois Industrial University:

The undersigned, your committee, appointed September 19, 1878, to take into consideration the question of salaries and State appropriations for the ensuing year, would respectfully recommend the following:

We recommend that appropriations be requested from the General Assembly at its next session:

1.	For payment of taxes on University lands in Nebraska and Minnesota, per annum, $2,500, total for two years	$5,000
2.	For repairs and care of buildings, per annum $2,500, total for two years	5,000
3.	For chemical and physical laboratories, " 1,000, " "	2,000
4.	For shops and shop practice, " 1,500, " "	3,000
5.	For library books, pamphlets, etc., " 1,500, " "	3,000
6.	For cabinets in various departments, " 1,000, " "	2,000

In view of the present financial depression, and shrinkage of values and income from our endowment fund, we cannot, at this time, recommend any change in the salaries of professors as fixed by the Board at commencement of present University year. (We deem this wise and prudent, hoping that a beneficial change can be recommended in the near future.)

As to the establishment of additional chairs, to-wit: Physics and History, recommended by Regent Gregory, while it would be desirable to have such chairs established, we think it would be difficult, under our present financial condition, to obtain the necessary appropriations to meet the requirements of such chairs, therefore would not recommend asking for appropriations at the present time.

We would recommend an appropriation of $500 for the purpose of obtaining musical instruments for the band connected with the Military department, and side arms and equipments for the officers of said department.

We also recommend that an appropriation be requested to build new water closets for main building, drainage, additional steam heating coils, water and gas service pipe of same, and ventilation of main building, amounting to twenty-five hundred dollars, as set forth in report of Prof. N. C. Ricker, said report to be part of this, our recommendation.

As to the matter of appropriation for purpose of building proper dormitory and housekeeping building for female students, we respectfully refer to you petition of Miss Allen relative to the same, for your consideration.

Respectfully submitted.

ALEX. McLEAN,
J. H. PICKRELL,
D. GARDNER.

Mr. Gardner offered the following resolution, which was adopted;

Resolved. That a committee of three be appointed by the President, to give what attention seems necessary to the Legislature, at their next session, to procure the passage of appropriations asked for the coming two years.

The President so appointed Messrs. Gardner, McLean and Pickrell.

The Regent then submitted his report; which was received.

QUARTERLY REPORT OF REGENT.

GENTLEMEN: I have the pleasure of reporting to you another term of prosperous, pleasant work. The term just closing has been one of unusual pleasantness and good progress. The faculty and students have worked in great harmony, and with mutual good will. While so many of the older Colleges and Universities of the country are disturbed by the foolish and injurious customs which have been allowed to grow up among them, the divisions and distractions occasioned by secret societies, and class feuds and rivalries, and by the brutality of "hazings" which the faculties have lost all power to suppress, and which work endless mischiefs to scholarship and morals, our almost complete exemption from the common vices and follies of Colleges is due in part, perhaps, to the youth of the institution, and much to the care taken by the faculty to cultivate kindly and just relations with the students; but much credit must also be given to the students' government and to the sense of manliness and personal responsibility which it promotes.

The number of new students entered this term is 137, of whom 82 entered the Preparatory and special classes, and 55 entered the regular College classes.

The whole number in attendance during the term is as follows:

	Men.	Women.	Total.
In Preparatory department	67	15	82
In the College classes	232	45	277
Post graduate and special	2	7	9
General total of attendance			368

The numbers in the several Colleges are as follows:

In the College of Agriculture	23
In the College of Engineering	74
In the College of Natural Science	31
In the College of Literature and Science	149
In Post-Graduate and Special Studies	9

The number of instructors on service during the term is as follows: Professors and assistants in charge of departments, 18; assistants not in charge of departments, 9.

The class reports of the term show the following numbers of students in the several studies: Chemistry, 118; Physiology, 48; Physical Geography, 3; Geology, 16; Agricultural Engineering, 4; Elements of Agriculture, 19; Elements of Horticulture, —; Mechanism, 7; Resistance of Materials, &c., 9; Shop Practice, iron, 6; Esthetics of Architecture, 1; Architectural Drawing and Designing, 5; Statics, 5; Wood Construction, 4; Mathematics College, 129; Ancient History, 21; Ancient Languages College, 9; French, 103; German, 90; English College Classes, 80; Agricultural Chemistry, 4; Hygiene, 10; Calisthenics, 48; Prof. Drawing, 27; Land Surveying, 6; R. R. Eng., 4; Prac. Astronomy, 2; Bookkeeping, 33; Algebra—Preparatory, 67; Physiology—Preparatory, 55; Bookkeeping—Preparatory, 48; Latin—Preparatory, 17; Prep. Greek, 8.

REPORTS AND REQUESTS OF DEPARTMENTS.

I communicate herewith the report of the Head Farmer, with the statements of receipts and expenditures, and the inventories of stock, &c. The several requests and suggestions in his report are recommended to our attention. As Mr. Lawrence's yearly term of service expires on the last day of this month I recommend his reappointment, and also that the furlough of one month that he asks for be granted to him.

Horticultural Department.—The report of Prof. Burrill, herewith presented, will afford you a view of the condition and wants of that department, and also of the interesting investigations made by him. His requests for appropriations will be found at the close of his report, and will doubtless receive your attention.

In addition to these, Prof. Burrill very much desires an appropriation for the purchase of a new objective for his microscopic investigations. Very great improvements have recently been made in objective glasses for the microscope, giving a definiteness and clearness not attainable by the old instruments. A first-class objective will cost $70.

Mechanical Department.--The communication of Prof. Peabody gives notice of a donation of a valuable steam pump from the Knowles steam pump works of Warren, Mass. The improvements recommended by Mr. Kimball are very desirable. The new ceiling of the shop has heretofore been brought to your notice, and only put off for want of funds. I hope it may be possible to make this improvement. Prof. Peabody should be authorized also to make the necessary expenditures from the appropriation for the Physical Laboratory.

Library.—The Librarian desires permission to procure the binding of about 100 volumes of periodicals and other unbound books now in the library. I would also respectfully ask that the committee, consisting of the Regent and Librarian, be authorized to renew the subscriptions for periodicals, and to expend the balance of the library appropriation in the purchase of the books selected by the several departments, in due proportion, as in former purchases.

Chemical Department.—Prof. Weber's report asks for certain purchases for the Chemical Laboratory. As these are the ordinary purchases, they do not need recommendation. He asks also for an appropriation to fit up furnace room. This seems needful and proper.

Domestic Science.—Miss Allen requests the expenditure of $30 for the purchase of a collection of food materials to illustrate her lectures on the Chemistry of Foods. I have not inquired into the proper cost of such a collection, but think its purchase should be authorized.

Commercial Department.—Mr. Parsons desires an appropriation for the purchase of a set of books and a dating stamp for his practical business department, which is having good success. The amount required will be $25. The request seems reasonable, and is recommended.

Natural History.—I respectfully ask your attention to the report of Prof. Taft in regard to the operations of Mr. Wild, our taxidermist. As the expenditure of the State appropriation for this museum has heretofore been entrusted to the committee named by Prof. Taft, it may be wise to leave the settlement with Mr. Wild and the expenditure of the balance of the appropriation to the same committee. As Mr. Wild's services will still be needed in mounting the specimens procured, and in teaching the class in taxidermy, and also, perhaps, in the preparatory classes in geometry, I recommend his employment at the salary named, $60 per month.

I also recommend that the salary of Mr. Charles Pickard, who is on his third year of service with us, be raised to $60 per month.

I wish also to call the attention of the Board to the circular prepared by Prof. Morrow for the Agricultural lectures to be given at the University the last week in January. The course given the last winter was so favorably received that we may reasonably expect a still larger success this winter. As has been the case in its entire career, the University is leaving no effort untried to promote the cause of true Agricultural learning.

In this connection, I may mention the continued success of the valuable work of Dr. Prentiss in his lectures on Veterinary Science. His clinic is visited by animals brought from a great distance, for treatment in the presence of his class. Nearly fifty cases have been treated this term.

A good class in Agricultural Chemistry has been taught by Mr. Scovill, whom you appointed instructor in that branch. Mr. Scovill has also been doing some valuable work in analysing the soils of the State.

In the absence of Prof. Webb, the classes in Civil Engineering have been successfully taught by Mr. Baker and Mr. Clark. Prof. Peabody, who was finally employed by your committee to fill the place vacated by the resignation of Prof. Robinson, has been on service since the 10th of October, and is winning the confidence and respect of his classes in an unusual degree.

The report of Prof. Dinwiddie will inform you of the progress and condition of the Military department. I recommend that the usual small appropriation be made for the expenses of this department, being the pay of the Adjutant and Armorer.

The several other departments of instruction left unmentioned in this report, are doing their accustomed good work, which will show in the general result.

I ought also to mention to the credit of our students, that a young Apache Indian was brought here in September by Major Ingalls, of the Indian Territory, and his education has been undertaken by the body of students. They have raised money by contributions among themselves to pay his board, and several of them have volunteered to give him instruction to prepare him to enter the classes of the University. When he shall be ready to enter, I recommend that the usual fees be remitted in his case.

STATE APPROPRIATIONS.

As the General Assembly will meet before the next session of this Board, it becomes necessary at this time to consider the appropriation to be asked for. Some of these are so established as regular appropriations that they do not need discussion. Such are the following:

1. For payment of taxes, per annum	$3,000	Total for 2 years	$6,000
2. Repair and care of buildings, per annum	2,500	" "	5,000
3. For Chem. and Phys. Laboratories, per annum	1,000	" "	2,000
4. For shops and shop practice, per annum	1,500	" "	3,000

It is important also that the appropriation of $2,500 per annum be asked again for library and cabinets. The diminution in our annual income leaves us little or nothing for these important purposes, and the best interests of the University must suffer seriously by any failure to maintain in full efficiency these important instrumentalities of its work.

Another question at length meets us full in the face. The shrinkage of the regular income of the University from its endowment funds, has already compelled you to reduce below a safe point the salaries of the regular Professors, and forbidden the increase of those of some of the assistants whose long and faithful service and increasing usefulness deserves such recognition. There is also a need, becoming annually more pressing, that one or two additional chairs, notably those of Physics and History, shall be filled. In a similar crisis, Michigan, Wisconsin, Iowa and Missouri came to the aid of their State Universities and granted them annual or permanent appropriations to meet current expenses. The restoration of the salaries reduced and the reasonable increase of others would, as I compute, require $4,000, per annum. The filling of the two additional chairs would cost $4,000 per annum; making $8,000 a year more than our present resources will allow.

A small appropriation of $500 is very much needed for the Military department, for instruments for the band, and for side arms and equipments for the officers. The present instruments of the band are owned partly by the members of the band, and partly by the University. Those belonging to the University were purchased several years ago, and most of them had been some time in use. They were never in complete accord, as instruments of the same set are designed to be, and some of them have become useless through age and long use. The Legislature has never been asked for anything for this important department of the University, except for the naked drill hall. Its recognized usefulness may well entitle it to this reasonable amount of aid from the State.

I lay before you herewith a communication from Miss Allen, asking your attention afresh to the long mooted question of a proper Dormitory and Housekeeping building for the female students. Permit me to recall to mind the arguments I have repeatedly had the honor to lay before you in this behalf. The old Dormitory building, never fit for the purpose for which we have been obliged to use it, has steadily deteriorated and demands a complete reconstruction. With the material in it, there might be erected a building for the lady students, which would be of great importance to that side of our work, and to the important department of Domestic Science. The northern half of the grounds, inclosed with a high sheltering fence, would give to the young ladies the much needed opportunities for out-of-door exercise now provided at Vassar, Wellesley, and Smith colleges for women. The lack of a proper Dormitory building has subjected the young women coming here for education, not only to greater expense than that incurred by their brothers, but has also acted often as a barrier against their coming at all, since many parents refuse to allow their daughters to attend an institution where no safe provision is made for their care and comfort. It is for the trustees to determine whether the time has come when they may hopefully ask the General Assembly for the necessary appropriation. It should be remembered that our Legislature, always mindful of the serious disadvantages and embarrassments under which woman labors in her efforts to gain an education and to better her condition in life, have uniformly shown a disposition to deal liberally, and to do all in their power to aid her efforts. It is doubtful if any claim of the University would receive a more favorable consideration than this, if fairly presented and heartily urged.

No plans have as yet been worked out in full for the reconstruction of the building, but Prof. Ricker has made some estimates based upon general data, of the requirements of the new building, and thinks the work and new material would cost $25,000. The amount required for heating, furnishing and fencing would be not far from $12,000 or $13,000. It cannot be doubted that some such provision for female students is needed, and is needed now. Any delay in asking or obtaining the appropriation for it is a delay, to the same extent, of the advantages which would come from it.

HEATING AND VENTILATION OF THE MAIN BUILDING.

Prof. Ricker has been making some plans and estimates for the changes required in the heating and ventilation of the main building. They contemplate the removal of the heating boilers, and also the water closets, from the basement where they now are to a new building in the rear of the main building.

J. M. GREGORY, *Regent.*

Prof. S. W. Shattuck, Business Agent, presented the following report:

CHAMPAIGN, ILL., December 17, 1878.

Hon. Emory Cobb, President Board of Trustees Illinois Industrial University:

SIR:—I have the honor to make the following report, as business agent, for the three months ending November 30, 1878:

Paper A, gives the current appropriations, with expenditures and receipts under the same.

Paper B, is a list of the State appropriations, and expenditures under them.

Paper C, is a list of bills on which warrants have been drawn, presented for auditing.

Paper D, is a credit warrant voucher in favor of Agricultural Department, which the Board is asked to pass upon.

Respectfully submitted,

S. W. SHATTUCK, *Business Agent.*

"A."

Statement of Current Appropriations, Receipts and Expenditures, Nov. 30, 1878.

Account of—	Appropriated.	Receipts.	Expended	Balance.
Board expenses	$300 00		$71 25	$228 75
Salaries	17,310 00		7,189 93	10,120 07
Buildings and grounds	100 00	$41 65	12 03	129 62
Fuel and lights	3,000 00	150 15	1,232 82	1,917 33
Stationery and printing	300 00		140 70	159 30
Furniture and fixtures	139 00		86 24	52 76
Mechanical Department	260 68	320 67	700 45	109 10
Architectural Department	109 61	1,011 68	885 15	236 14
Agricultural Department	1,152 17	892 26	1,009 33	1,035 10
Horticultural Department	190 52	85 29	269 72	6 09
Chemical Department	258 52	9 30	293 30	—25 82
Military Department	50 00		43 93	6 07
Library and apparatus	50 00		3 55	46 45
Incidental expenses	200 00	15 50	133 23	82 27
Sundries—Cabinets	11 44		6 25	5 19
Physical Laboratory	198 55		15 19	183 36
Preparatory Department		1,004 50	690 00	314 50
State appropriations			5,304 26	
Fees and room rents		2,269 00		
Illinois Central freight		877 60		

"B."

Statement of State Appropriations, Nov. 30, 1878.

For what purpose.	Appropriated	Expended.	Unexpended.
Buildings and grounds	$5,000 00	$4,025 16	$974 84
Chemical and Physical Laboratories	2,000 00	1,775 63	224 37
Mechanical and Architectural shops	3,000 00	1,873 44	1,126 56
Library cases	1,000 00	1,000 00	
Books and publications	3,000 00	1,898 73	1,101 27
Cabinet cases	4,500 00	1,842 41	2,657 59
Cabinets	2,000 00	1,518 44	481 56
Chemical Laboratory	40,000 00	39,219 11	780 89
Green house	2,500 00	2,496 34	3 66
Taxes on lands	4,306 02	4,306 02	
	$67,306 02	$59,955 28	$7,350 74

"C."

List of Bills for which Warrants have been Drawn.

No.	To whom.	For what.	Amount.
1	J. M. Gregory	Salary, September	$300 00
2	T. J. Burrill	" "	150 00
3	S. W. Shattuck	" "	150 00
4	E. Snyder	" "	150 00
5	D. C. Taft	" "	150 00
6	J. C. Pickard	" "	150 00
7	N. C. Ricker	" "	125 00
8	J. D. Crawford	" "	125 00
9	H. A. Weber	" "	150 00

"C"—*List of Bills*—Continued.

No.	To whom.	For what.	Amount.
10	G. E. Morrow	Salary, September	$150 00
11	E. S. Lawrence	" "	83 33
12	P. Baumgras	" "	125 00
13	S. C. Allen	" "	100 00
14	F. W. Prentice	" "	100 00
15	F. A. Parsons	" "	75 00
16	I. O. Baker	" "	75 00
17	M. A. Scovell	" "	75 00
18	C. I. Hays	" "	75 00
19	C. E. Pickard	" "	50 00
20	J. C. Lewellyn	" "	60 00
21	E. A. Kimball	" "	100 00
22	C. W. Clark	" "	50 00
23	W. D. Rudy	" "	35 00
24	A. B. Baker	" "	40 00
25	C. W. Williams	" "	30 00
26	U. S. Patent Office	Binding reports	7 80
27	Brown & Holdoway	Books	13 00
28	Mary L. Page	Drawing plans	7 94
29	H. Peddicord	Lime	16 50
30	Peterson & Lloyde	Books	8 50
31	Alex. McLean	Expense June and September meetings	50 90
32	Fuller & Fuller	Window glass	6 12
33	Agricultural Department	Farm expense, September	252 28
34	Jas. M. Smith	Work on heating apparatus	4 50
35	Chas Hendy	Calsomining and painting	31 50
36	S. W. Shattuck	Traveling expenses	64 15
37	J. D. Wilder	Surfacing blackboards	118 86
38	A. W. Busey	Work in arboretum	3 78
39	Wm. Brown	Labor on cistern	13 84
40	James M. Smith	Work on heating apparatus	48 94
41	Aaron Brown	Plastering cistern	17 87
42	Allen P. Brown	Grading	25 11
43	Wm. Adams	Grading and work on cistern	62 80
44	Seeley Brown	Repairs on pump	1 70
45	Jno. O'Neil	Work and steam fittings	15 00
46	Seeley Brown	Service as superintendent	150 00
47	Enterprise Coal Co	5 cars coal	61 60
48	C. J. Sabin	Pump	4 00
49	Walker & Stayman	Lumber	45 32
50	J. W. Shuck	Hot-air conductor	366 00
51	Yeamans & Shield	Belting	33 35
52	Ludington, Wells & VanSchaick	Lumber	28 00
53	Am. Dairymen's Association	12 reports	5 00
54	Andrew Barr	4,477 feet lumber	176 68
55	Wm. Cushing	Index N. A. Review	2 59
56	E. A. Pr tt	Painting and glazing	7 90
57	L. E. Patchin	Piano for calesthenics	5 00
58	J. B. Sober	Work on engine	4 00
59	J. T. Moore	Drawing plans	2 15
60	A. S. Robinson	Work in armory	3 50
61	M. Raysdon	Hauling	3 25
62	C. & U. Gas Co	Bill for June, July, August, September	119 40
63	I. C. R. R. Co	11 cars coal	114 20
64	H. Swannell	Chemicals	5 85
65	I. C. R. R. Co	Advanced freight	3 75
66	A. B. Baker	Sundry repairs	8 75
67	John O'Neil	Steam fittings	24 15
68	A. M. Coffeen	Wall paper	3 00
69	R. A. Sutton	23 m. brick	160 00
70	J. W. Weeks	Drayage	13 80
71	J. Reedy	Work on boiler	3 50
72	A. W. Moore	Hardware	5 02
73	National Tube Works Co	Brass tube	9 00
74	I. B & W. R. R	Brass tube	32 07
75	Covert & Greenhood	Document case	25 00
76	Robinson & Burr	Making tank	76 12
77	R. B. Harmell	Painting	90 90
78	Students' pay-roll	September, 1878	238 13
79	J. M. Gregory	Salary, September	300 00
80	T. F. Burrill	" "	150 00
81	S. W. Shattuck	" "	150 00
82	E. Snyder	" "	150 00
83	D. C. Taft	" "	150 00
84	N. C. Ricker	" "	125 00
85	J. C. Pickard	" "	150 00
86	J. D. Crawford	" "	125 00
87	H. A. Weber	" "	150 00

"C"—*List of Bills*—Continued.

No.	To whom.	For what.	Amount.
88	G. E. Morrow	Salary, September	$150 00
89	S. H. Peabody	" "	111 11
90	E. S. Lawrence	" "	83 33
91	P. Baumgras	" "	125 00
92	S. C. Allen	" "	100 00
93	F. W. Prentice	" "	100 00
94	F. A. Parsons	" "	75 00
95	I. O. Baker	" "	75 00
96	M. A. Scovell	" "	75 00
97	C. I. Hays	" "	75 00
98	C. E. Pickard	" "	50 00
99	J. C. Lewellyn	" "	60 00
100	E. A. Kimball	" "	100 00
101	C. W. Clark	" "	50 00
102	W. D. Rudy	" "	35 00
103	J. E. Gregory	Assistant in laboratory	10 00
104	A. B. Baker	Salary, October, 1878	40 00
105	C. W. Williams	" "	30 00
106	Crane Bros. Manufacturing Co	Hardware	96 67
107	" " "		34 63
108	Walker & Stayman	Desks in Chemical laboratory	340 26
109	Whitall, Tatum & Co	Glassware	549 45
110	Agricultural Department	Farm expense, October	232 81
111	James Smith	10 days work	17 50
112	Jno. O'Neil	Plumbing	151 00
113	Chas. E. Aikins	Skeletons	10 00
114	W. H. Munhall	Instruments	15 00
115	C. & U. Gas Co	Bill for October, 1878	75 30
116	Brown & Holdoway	Books	5 50
117	Lou C. Allen	Ticking	4 30
118	C. S. Barrows	Paper	2 33
119	T. J. Burrill	Expense to Springfield	10 35
120	S. T. Allen	1 vol. Am. Herd Book	8 25
121	Carl Shoenhof	Books	21 90
122	Thos. Wright	Castings	21 41
123	Enterprise Coal Co	8 cars coal	78 00
124	N. A. Williams	Cement and lime	2 85
125	Western Elect. Manufact'ing Co	Inductive coil	153 50
126	J. B. Sober	Building bridge	25 60
127	W. H. Chapman	Books	35 00
128	Houghton, Osgood & Co	Periodicals	10 00
129	J. E. Saxton & Co	Paper, mucilage, etc	6 73
130	E. A. Pratt	Glazing	1 25
131	Jno. O'Neil	Work	3 00
132	Robinson & Burr	Work and material	13 35
133	Neil House	Boarding workmen	13 50
134	E. B. Benjamin	Platinum wire	4 59
135	Whitall, Tatum & Co	Tubing	30 00
136	James Smith	Work on boiler	11 75
137	Students' pay-roll	October, 1878	245 79
138	M. E. Lapham	Lumber	34 05
139	J. M. Gregory	Salary, November, 1878	300 00
140	T. J. Burrill	" " "	150 00
141	S. W. Shattuck	" " "	150 00
142	E. Snyder	" " "	150 00
143	D. C. Taft	" " "	150 00
144	J. C. Pickard	" " "	150 00
145	N. C. Ricker	" " "	125 00
146	J. D. Crawford	" " "	125 00
147	H. A. Weber	" " "	150 00
148	G. E. Morrow	" " "	150 00
149	S. H. Peabody	" " "	166 66
150	E. S. Lawrence	" " "	83 33
151	P. Baumgras	" " "	125 00
152	L. C. Allen	" " "	100 00
153	T. W. Prentice	" " "	100 00
154	T. A. Parsons	" " "	75 00
155	I. O. Baker	" " "	75 00
156	M. A. Scovell	" " "	75 00
157	C. I. Hays	" " "	75 00
158	C. E. Pickard	" " "	50 00
159	J. C. Lewellyn	" " "	60 00
160	E. A. Kimball	" " "	100 00
161	C. W. Clark	" " "	50 00
162	W. D. Rudy	" " "	35 00
163	G. E. Gregory	" " "	10 00
164	A. B. Baker	" " "	40 00
165	C. W. Williams	" " "	30 00

"C"—*List of Bills*—Continued.

No.	To whom.	For what.	Amount.
166	C. P. White	Hay	$3 85
167	Robinson & Burr	Work	6 12
168	W. Malthy	Repairing pianos	5 00
169	U. S. Patent Office	Binding reports	10 50
170	Fuller & Fuller	Glass	18 83
171	Publishers Illini	Circulars, etc	
172	Illinois Central Railroad Co	Freight	8 83
173	T. K. Robeson & Bros	105 yards crash	5 25
174	Flemming & Doane	Work on flues	96 00
175	Architectural Department	Work and material	826 20
176	Mechanical Department	" "	145 26
177	Champaign Gazette	Printing	67 75
178	" "	Publishing proposals	2 00
179	R. B. Harmell	Painting	45 00
180	E. S. Lawrence	5 vols. Herd-book	5 00
181	R. Sutton	Brick	25 00
182	Jas. W. Christopher	Periodicals	76 85
183	Agricultural Department	Farm expense, November	231 24
184	" "	Work and material	178 07
185	Wm. Price	Paint and glass	15 85
186	" "	Painting and glazing	19 51
187	Alexander Spence	Balance on Greenhouse	174 77
188	Thos. McKinzie	Brick work	183 00
189	Yale Lock M'f'g Co	½ gross padlocks	142 50
190	Robert Excel	Pipe and hardware	90 30
191	Architectural Department	Work for other Departments	122 03
192	I., B. and W. Ry	Freight	18 24
193	T. J. Burrill	Expense to Springfield	10 00
194	M. E. Lapham	Lumber	55 84
195	Mechanical Departme t	Work for other Departments	30 91
196	Ill. Cent. Railroad donation	Freight, September, October, November	877 60
197	A. E. Foote	Books	5 65
198	Crane Bros. M'f'g Co	Bowls and hardware	259 60
199	" "	Hardware	66 37
200	Students' pay-roll	November, 1878	215 18
201	H. Swannell	Chemicals	21 94
202	Trevett & Green	Hardware	44 69
203	" "	"	107 21
204	" "	"	26 86
205	" "	Tools	41 35
206	C. and U. Gas Co	Gas for November	101 10
207	Eichberg Bros	Cord	1 50
208	Agricultural Department	Work on grounds	40 87
209	Geo. A. Wild	Specimens for cabs	150 00
210	Decker, Smith & Co	Papyrographic ink and paper	4 12
211	John O'Neil	Work and material	9 81
212	U. S. Express Co	Expressage	3 85
213	E. A. McAllister	Postage, three months	42 70
214	S. W. Shattuck	Petty expense, three months	60 99

The report was received and ordered on file. The bills presented were audited and allowed.

Prof. Burrill's request in regard to fencing and seeding of apple orchard, also planting of experimental orchard, was referred to Messrs. Gardner and Pickrell, with power to act.

A report from the Corresponding Secretary, in regard to the publication of the biennial reports of the University for the years 1875 and 1876, also 1877 and 1878, was received, and ordered on file.

Col. R. B. Mason, chairman of Committee to appoint a Professor of Mechanics, submitted the following report, which was received:

CHAMPAIGN, December 18, 1878.

To the President and Board of Trustees of the Illinois Industrial University:

Your Committee to whom was referred the employment of Professor Peabody to fill the chair of Mechanical Engineering, offered through Dr. Gregory, Regent, the position to Professor Peabody at a salary of $1,800 per year, which was declined by him. But on the urgent representation of the Regent of the importance of filling the position at once it was deemed advisable to employ Professor Peabody at a salary of $2,000 per year, and he was so employed.

R. B. MASON, *Chairman.*

Mr. A. McLean, Chairman of Building Committee, read the following report of work done on Chemical Laboratory building:

URBANA, December 18, 1878.

To the President of Board of Trustees of the Illinois Industrial University:

The undersigned, Laboratory Building Committee, would beg leave to report that we have had work done on said building since our last meeting, and the following is a detailed statement of the several accounts and warrants drawn and paid for same, amounting to three thousand three hundred forty-six and 92-100 dollars. There are still some bills to be paid,—the amount not definitely known as yet,—which we will report when paid. There is still a small balance of Laboratory appropriation unexpended, which will be applied for chairs and other furniture needed for same. We also recommend that the sum of four hundred dollars be paid to Jno. M. Van Osdel, as consulting architect in the erection of the Chemical Laboratory.

ALEX. McLEAN,
D. GARDNER,
R. B. MASON.

List of Vouchers for Amounts on Account of Appropriation for Chemical Laboratory.

Date.	No.	To whom paid.	For what,	Amount.
1878.				
Oct. 15	28	Mary L. Page	Drawing plans	$7 94
" 15	34	Jas. M. Smith	Work on heating apparatus	4 50
" 15	39	Wm. Brown	Labor on cistern	13 88
" 15	41	Aaron Brown	Plastering cistern	17 87
" 15	42	Albert Brown	Grading	25 13
" 15	43	Wm. Adams	Grading and work on cistern	62 81
" 15	44	Seeley Brown	Repairs on pump	1 70
" 15	45	Jno. O'Neil	Steam fittings and work	15 00
" 15	46	Seeley Brown	Service as superintendent build'g.	150 00
" 15	50	J. W. Schuck	Hot air conductor	366 00
" 15	51	Yeomans & Shields	Belting	33 35
" 15	59	J. T. Moore	Drawing plans	2 15
" 15	67	Jno. O'Neil	Steam fittings	24 15
" 15	69	R. A. Sutton	23,000 brick	160 00
" 15	72	A. W. Moore	Hardware	5 02
" 15	76	Robinson & Burr	Making tank	76 12
" 31	106	Crane Bros. Mf'g Co	Hardware	96 67
" 31	108	Walker & Stayman	Desks	340 26
" 31	109	Whitall, Tatum & Co	Gla sware	549 45
" 31	111	Jas. Smith	10 days' work	17 50
" 31	112	John O'Neil	Plumbing	151 00
Nov. 30	174	Flemming & Doane	Work on flues	96 00
" 30	175	Architectural Department	Work and material	298 98
" 30	176	Mechanical Department	Work and material	105 01
" 30	178	Champaign Gazette	Publishing proposals	2 00
" 30	179	R. B. Harmel	Painting	45 00
" 30	186	Wm. Price	Painting and glazing	19 51
" 30	189	Yale Lock Mf'g Co	One-half gross padlocks	142 50
" 30	198	Crane Bros. Mf'g Co	Bowls and hardware	259 60
" 30	202	Trevett & Green	Hardware	44 69
.....	....	Agricultural Department	Grading grounds	213 13
				$3,346 92

Mr. Gardner made the following report in regard to certain land sales:

To the Hon. Board of Trustees, Illinois Industrial University:

The undersigned, committee to whom was referred the sale of the 160 acres of Griggs' farm, report that I have made efforts to sell same at $40 per acre, with 8 per cent. interest on deferred payments; was offered price, with 6 per cent. interest. I now have offer of $35 per acre, with 6 per cent. interest on deferred payments.

Your committee would not advise the sale at the price offered.

Respectfully submitted,

D. GARDNER, *Committee.*

To the Hon. Board of Trustees, Illinois Industrial University:

The undersigned, committee to whom was referred communication from Prof. Morrow, on improvement of yards, building, sheds, etc., beg leave to report that I examined the premises, and consulted with Mr. Lawrence, and thought best to stone and gravel the small yard south of the Horticultural barn, and erect stable to accommodate bulls and calves, which was done at an expense, in all, of about $125. Say—

For stables, mangers, etc., about	$50 00
" two cars stone	12 00
" labor, hauling stone and gravel, and including freight on stone	55 50
" spouting barn to keep water from wood	6 50
Total	$124 00

Your committee did not recommend the building of more open sheds, there being stable room enough to meet the necessary wants. I have not examined the works since finishing, which has been done in the past week; but the Head Farmer is well pleased with the improvements, and considers them ample for the present.

All of which is respectfully submitted.

D. GARDNER, *Committee.*

The report was accepted and approved.

Prof. Peabody's report in regard to donation of a pump and stone block, was referred to the Executive Committee, as was also a request from Mr. Kimball, foreman of shops, for purchase of some vises, a drill and sheathing.

The matter of renting the Griggs farm was referred to Messrs. Gardner and Lawrence, with power to act.

Mr. E. L. Lawrence was re-appointed Head Farmer, with salary and perquisites as heretofore. His request for leave of absence was referred to the Regent, with power to act.

Prof. Peabody and the Business Agent were authorized to make certain expenditures from State appropriations for Physical Laboratory.

The Regent and Librarian were made a committee to have certain binding done, and to purchase books needed, and periodicals, the expense total not to exceed $900.

The Regent and Prof. Taft were given authority to expend the balance of State appropriations for cabinets, $480 in purchases, etc., for same.

The use of the laboratory room was granted to the Y. M. C. A. until it might be needed for other purposes.

Mr. McLean made the following motion, which was passed:

Whereas, the attention of the Board of Trustees of the University has been called by Regent J. M. Gregory and Prof. T. J. Burrill relative to annual reports to be made under act of Congress granting lands to Agricultural Colleges, representing that financial statements are not sufficient to comply with the law, therefore be it resolved, that the President of the Board be requested to examine into the requirements of the law, and, should it be found a more detailed statement is necessary under the law, that he be authorized to call the attention of the proper authorities to the matter, desiring that such an annual report be made as is contemplated by law of Congress governing same.

The following recommendations for degrees and certificates were approved:

For partial certificates—Mr. C. C. Wakefield, Mr. W. L. Williams.

For degree of B. L, School of English and Modern Languages—Mr. George R. Shawhan.

For degree of B. S., School of Mechanical Organization—Charles F. Smith.

For degree of B. S., School of Agriculture—Panajiottis Germadios.

Mr. G. A. Wild, taxidermist, was employed at a salary of $60 per month.

The request of Mr. C. E. Pickard, in regard to salary, was deferred till March meeting.

A communication from Miss Allen, in regard to a dormitory for ladies, was referred to the Committee on Appropriations and Dr. Gregory.

The Treasurer reported that $4,000 of Illinois State 6 per cent. bonds would be called in January 1st, 1879.

Referred to the President and Treasurer with power to act.

Mr. Gardner submitted the following report:

To the Honorable Board of Trustees Illinois Industrial University:

Your Committee on Buildings and Grounds Improvements report: That we have made provision for the extension of avenue from main building to old college grounds or campus. In doing so, it is necessary to procure a lot from Mrs. Chase, which is in line of said avenue. We have her proposition to exchange the lot we need for one owned by the University, lying in same block, of equal size, and directly east, as seen by plat accompanying. In the exchange we are to pay expense of transfer and any legal advice necessary. Your committee advise the acceptance of the proposition of Mrs. Chase. Your committee will use the $150 permitted by the Board for extension of avenue, for bridge and grading—say, $100 on bridge.

Now expended for lumber	$55 00	
For work	25 00	
Spikes, 1½ kegs	4 00	
Grading	16 00	
		$100 00

The balance of $50 will be required to finish avenue if exchange of lots is made as above recommended.

Respectfully submitted, D. GARDNER, *Chairman.*

The report was received, its recommendations adopted, and the committee continued, with power to act.

The following appropriations were passed:

Fuel and heating of greenhouse, to Horticultural Department	$125 00
Set of bank books for Commercial Department	25 00
Specimens for Department of Domestic Science	30 00
Advertising of farm produce and stock	25 00
Chemicals and apparatus, Chemical Laboratory	152 50
Services of Adjutant, Military Department	25 00
Dr. Gregory's expense to meeting at Freeport	12 15

The Board then adjourned.

REPORT OF THE HEAD FARMER.

UNIVERSITY FARM, December 14, 1878.

Dr. J. M. Gregory, Regent Illinois Industrial University:

I herewith present my annual report of the work of the Farm Department of the University.

The crops raised here on the whole have been satisfactory, at least in quality and quantity.

CORN—

The several pieces of corn gave the following yield:

12	acres,	61	bushels	per acre	730 bushels.
35	"	57¾	"	"	2,012 "
2	"	50	"	"	100 "
14	"	35	"	"	490 "
78	"	33	"	"	2,574 "
141	"	41 85/100	"	"	5,906 "

The crop was injured at least, I should say, twenty per cent. by the storms.

The fields giving the best yield were those where the sod was turned over last spring. Those giving the least had been the longest in corn. There were, in addition to this, 132 bushels of experimental corn.

MEADOW—

There were in all 278 acres of meadow land that was mowed, and the whole crop was secured in the best of order. This includes 150 acres of grass on the Griggs farm that was put up, in the rick, for one half the hay. There were also 20 acres of pasture mowed.

BEEF CATTLE—

At the eginning of the year there were inventoried 33 head of steers—38,150 pounds, at 3.95—$1,517.25. I purchased, mostly in April and June, 37 head, costing from 3 to 3¾ cents per pound; 16 were sold in the middle of June for $1,068.45 net.

The account is as follows:

To inventory, 33 steers, @ 3.95	$1,517 25	
" purchases, 37 steers	1,002 74	
" cost of keeping—corn @ 30 cents, and pasturage @ $1 50 per month	787 80	
By sale in June, 16 head		$1,068 45
" inventory, 15 fat steers, @ 3.75		928 13
" " 39 stockers and feeders, @ 3 cents		1,327 00
Balance	15 79	
	$3,323 58	$3,323 58

The average gain during the year was 44¾ pounds per month; 566 months gave a gain of 25,315 pounds. Though cattle have fallen in the Chicago market 25 per cent., during the year, there has been no loss on this stock, as we have pay for corn and pasture. During seven months that cattle have been fed corn, the hogs on the stock farm have been fed no corn at all

HOGS—

At the beginning of the year we had 117 hogs and pigs, that were counted worth $797 00; there are now 79, that are counted worth $320 50; the sales amount to $292 23—total $612 73. A loss of $169 27 and one year's keeping. The cost of keeping in December and January was $86; the cholera so mixed things, that no further account was kept. There has probably been a total loss on the hogs of $700. The number started with was about the same as we have usually had at the same time, for the past four years. I find sales—In 1877, were $933 83; 1876, $1,738 20; 1875, $1,217 25. An average of $1,296 42 for three years, against $292 23, minus the loss in inventory, $476 50. I do not consider hog cholera as the worst foe the hog-raiser can encounter. Had it not been for this "blessing in disguise," the price of pork would have been below the cost of production, three years ago. Notwithstanding our own loss, I still think that, with proper care against infection. and care as to conditions to prevent generating the disease, the loss will be small, and will fall on those who are trying to overdo the business by keeping large herds in too close quarters.

FINE STOCK—

This stock has, according to instructions, been charged with the cost of keeping and value of pasturage, and credited with sales, etc. For a detailed account of this, see paper marked "A." It will be seen by this, that one year ago 22 head were valued at $2,805 00—$127 22 each. At this time, or December 1, there were 33, costing $110 24 each; and this reduction has been made after the purchase of the Shorthorn bull, at $357 48, including transportation, and the loss of the old Jersey cow, by milk fever. In this account I have made no charge for my own time in the care of this stock. This, especially in the last nine months, has been something of an item. Since December 1, there has been one Shorthorn calf dropped, and Jersey bull calf sold for $44 00. This sale was made through Mr. Barber, of Decatur, and $6 00 was paid him for making the sale, at $50 00.

As our stock of both Jerseys and Shorthorns is fast increasing, I would ask for leave to have inserted in one Chicago paper and one county paper, a breeder's card, stating that we have such stock for sale. I would recommend the "Live Stock Journal" and the "Gazette," as such papers.

GRIGGS FARM—

Last year this farm was seeded to timothy, all except about ten acres, that was then too wet. One year ago the farm was in debt, after charging for work and seed and giving credit for value of pasture (which was much less than it would have been, had there been water on the place), $168. The account the present year is as follows:

By cash for hay	$260 00	
" " for pasture	21 00	
" plowing, etc., for pasture	19 00	
To work		$3 00
Balance		270 00
	$300 00	$300 00

Mr. Hedges plowed some nine acres and repaired the fences and assisted in dividing the hay, and gave $21 00 cash to pay for the pasture after the hay was cut. The farm now has a credit, above expense, of $102 00.

Accompanying this report is a communication from Mr. Hedges (Mr. Jacques being the responsible party), proposing to rent the farm for one or two years. It only varies from what I proposed to recommend, in this: that he makes it optional with himself, whether it be taken one or two years. The proposition I agreed to recommend was for two years. I would not think it advisable to make the fence, for the sake of one year's rent; but would advise renting on the terms he proposes, for two years. The fence proposed, is of barbed wire, three wires; the whole to be kept in grass. I would estimate that 4/7 of the whole amount of hay obtainable from the farm would come from that half proposed to be mown, the poorer land being taken for pasture.

For an account of expenses, and receipts, and credits, see paper marked "B." For inventory, see paper marked "C." It will be seen from the paper of receipts, that $943.13 was received for hay, and from the inventory the accounts due the farm amount to $228 43, ($174.90 of which is now paid) $100 of this item should be either included in the receipts for hay, making $1,043.13, or else in the inventory of hay, making $947 worth of hay on hand. This was overlooked till the books were made out. It makes no difference in the result, only showing the proper credit to the hay account.

The item of credit from the Horticultural department includes $200 credit given the Agricultural department for my personal service to the Horticultural department. By reference to my report to Prof. Burrill, it will be seen that the horticultural work has yielded a profit the past year. If the orchard and forest be taken from this account, the first of which is non-productive, and the other partially so, and credit be given for work at the greenhouse, a profit will be shown amounting to $12 per acre for all land occupied. By comparing receipts with expenses a deficiency of $2,656.18 is found. This can be accounted for by the increase of cattle by purchase and otherwise in the year. Last year we had, all told, 61 head. Now we have 117, an increase of 51 head.

For a showing of permanent improvements, see paper marked "D." In the tile draining I am unable to show on the map what has been done, from the fact that a part of the work was done after the corn was up and the surveying was left till fall. Now, on account of the snow I am unable to follow the courses of the ditches. It is the intention to complete this in the spring.

I append, from the papers, a printed statement describing our method of obtaining water. The difference in cost then given and here allowed is on account of work done in making some alterations. I first conceived this idea when I first went upon the stock farm, or during the first summer, on account of the peculiarity and favorable conditions then offered for such an arrangement. There is a well there within 200 feet of the divide between the waters of the Wabash and the Mississippi, five feet deep, that with this arrangement would have furnished water for 200 head of cattle during the drouth of 1874.

For an inventory of permanent property, teams and tools, see book kept for this purpose accompanying this report.

For a showing of the item of repairs, see paper marked "E." It is the aim to keep tools, etc., in good repair. There is no account here made of the work done on the farm in the way of repairs. For instance, new timbers were put to the hay scales, and oak was used in place of pine, and a brick foundation made. The brick, as there had been none before, were charged to permanent improvements, the lumber to repairs, and the work, done by myself and the farm hands, to general expense account.

For an account of experimental work see paper marked "F."

Work has been furnished on demand, notice being given the evening previous, when anything new was to be commenced. Charges have been made at the rate of 12½ cents per hour, or 25 cents per hour for team and man. For a single hour 15 cents has been charged. This is all paid for by the farm, but is shown to exhibit our gains (if such can be found).

The summing up of accounts may be made as follows:

To inventory of December 1, 1877, salable property	$7,906 25	
" inventory of December 1, 1877, teams and tools	2,357 00	
" expenses of the year	6,911 47	
By present inventory, salable property		$9,782 89
" present inventory, teams and tools		2,269 00
" sales cash and department credits		4,255 29
" permanent improvements		1,201 95
" experiments		99 00
Balance	433 41	
	$17,608 13	$17,608 13
Showing present balance—		
To expenses of the year	$6,911 47	
By receipts of the year		$4,255 29
" balance in treasury December 1, 1877		3,922 54
Present balance	1,266 36	
	$8,177 83	$8,177 83

As regards the poor showing for our labors I can add but little to what has been shown. Any one engaged in any enterprise, the probable outcome of which was the production of something, whatever that might be, will need no explanation. The farm has never, since my acquaintance with it, produced more than the past year. In 1874, when I showed a profit of over $3,000, the accounts were kept on the same basis as the present year, and the profits were as real—with 160 acres less land—as the small amount here shown. Early in the season I foresaw that it would be a close run to save ourselves, and I have never been so "mean" in saving every cent as I have been for this year. I submit the case as it is, hoping that bottom may be reached sometime, when we may go up with a bound that may surprise even ourselves. Respectfully,

E. L. LAWRENCE, *Head Farmer.*

FINE STOCK ACCOUNT.

1877.			
Dec.	15	To date, 180 bushels oats	$18 00
		" 2 tons hay	14 00
		" 30 bushels corn	10 50
		" labor	9 00
1878.			
Jan.	1	To 16 days labor, $1.15	18 40
		" 32 bushels corn, 30 cents	9 60
		" 1,000 pounds hay	3 00
March	1	" 60 days feed, 120 bushels corn, 30 cents	36 00
		" " " 4,200 pounds meal, 70 cents	29 40
		" " " 1,920 pounds bran, 80 cents	15 36
		" " " 3,000 pounds hay	9 00
		Labor	60 00
April	1	To 30 days feed, 76 pounds corn daily	10 50
		" 88 pounds meal, daily	18 00
		" 44 pounds bran, daily	10 50
		" 100 pounds hay, daily	9 00
		" oil cake	10 00
		" 30 days labor, 50 cents	15 00
May	1	" 100 pounds meal, daily, 30 days, 70 cents	21 00
		" 100 pounds hay, daily	9 00
		" labor, 30 cents	9 00
June	1	" 75 pounds meal, daily	18 00
		" 30 pounds hay, daily	3 00
		" labor, 30 cents	9 00
		" pasture	30 00
July	1	" June same as May	60 00
August	1	" July same as June	60 00
Sept.	1	" 30 days, 3 bushels oats, daily	15 00
		" 12 pounds meal, daily	2 88
		" pasture	30 00
October	1	" 36 bushels oats	6 46
		" 36 bushels corn, 25 cents	9 00
		" 720 pounds meal	5 40
		" hay	2 00
		" pasture, 20 head	30 00
		" labor	9 00
Nov.	1	" 89 bushels corn	22 25
		" 930 pounds meal, 60 cents	5 58
		" 1½ tons hay	6 00

FINE STOCK ACCOUNT—Continued.

Nov. 1877.	1	To labor, 40 cents daily	$12 40	
		" 20 head to pasture	20 00	
Dec.	1	" 92 bushels corn	23 00	
		" 900 pounds meal, 60 cents	5 40	
		" 3 tons hay	12 00	
		" pasture	15 00	
		" labor, 50 cents daily	15 00	
		" other expenses—extra labor at fa r	5 00	
		" " " recording stock	4 00	
		" " " halters	2 00	
		" " " bull rings	1 50	
		" " " freight on Jersey bull	9 40	
		" cost of short-horn bull	300 00	
		" cost of procuring same, freight, etc	57 48	
		" investment of Dec. 10, 1877, 22 head at $127.22	2,805 00	
		By service of bulls—Short-horn $20; Jersey $147		$167 00
		" sale of 2 Short-horn bull calves		100 00
		" sale of Jersey bull		400 00
		Balance cost of 13 Short-horn cows, 1 Short-horn bull, 2 Short-horn year heifers, 4 Short-horn cow calves, 5 Short-horn bull calves, 3 Jersey cows, 1 Jersey heifer 1¾ years, 1 Jersey cow calf, 3 Jersey bull calves, 1 Jersey bull—34 head at $110.24		3,638 01
		Total	$3,945 01	$3,945 01

AGRICULTURAL D PARTMENT.

1878.				
Dec.	1	To cash for pasture	$88 65	
		" " " bull service	167 00	
		" " " hogs	292 23	
		" " " potatoes	5 25	
		" " " hay	943 13	
		" " " old rails	11 55	
		" " " work	38 75	
		" " " straw	1 45	
		" " " hide	2 85	
		" " " vinegar	75	
		" " " r nt of land	8 50	
		" " " tile	6 48	
		" " " veal calf	6 08	
		" " " fat cattle	1,103 40	
		" " " millet seed	2 95	
		" " " stone	9 00	
		" " " rye	95 00	
		" " " wheat	24 85	
		" " " Jersey bull	40 00	
		" " " Short-horn bull calf	50 00	
		" " " corn	93 50	
		" " " cobs	1 90	
		" " " apples	15 43	
		" " " other sales	1 17	
		Total cash sales		$3,011 17
		To credit warrants Hort. Dep	$476 80	
		" " " Chem. Lab	401 98	
		" " " B. & G., F. & L., etc	365 34	1,244 12
		Total		$4,255 29

EXPENSE ACCOUNT.

1878.				
Dec.	1	Paid for labor and board of hands	$2,887 58	
		" " railroad freight and express charges	111 50	
		" " shoeing, etc	30 45	
		" " baskets	2 00	
		" " cattle (stockers)	1,486 56	
		" " traveling expenses to Chicago and New York	40 73	
		" " feed, bran and oil meal	22 95	
		" " oats	21 15	
		" " general repairs	70 59	
		" " drain tile	393 07	
		" " hardware (part for repairs)	67 62	
		" " seed	34 65	
		" " lumber	177 35	
		" " fence posts	49 00	

EXPENSE ACCOUNT—Continued.

1878.				
Dec.	1	Paid for colt	$15 00	
		" " gates	13 00	
		" " boot in horse trade	5 00	
		" " brick for hay scales	8 40	
		" " threshers	23 29	
		" " harness repairs	12 50	
		" " gas pipe	20 49	
		" " paint	72 38	
		" " Shorn-horn bull	300 00	
		Head Farmer's salary	999 96	
		All other expenses	46 25	
		Total	$6,911 47	

INVENTORY OF SALABLE PROPERTY.

1878.				
Dec.	2	15 fat steers, 24,740 pounds, average 1,650 pounds, at $3.75	$927 75	
		39 stockers and feeders, 44,300 pounds, average 1,135 pounds, 3 cents	1,329 00	
		18 grade cows and heifers 16,520 pounds, average 917 pounds, 3 cents	495 60	
		7 grade calves, 2620 pounds, average 374 pounds, 3 cents	78 60	
		2 milch cows	90 00	
		1 half Jersey cow	60 00	
		1 half Jersey calf	10 00	
		1 three-fourths Jersey calf	30 00	
		84 head of cattle		$3,020 95
		11 breeding sows, P. C., $7.50	$82 50	
		1 fat barrow, 300 pounds, 2 cents	6 00	
		1 boar, 400 pounds	8 00	
		22 pigs, at $2	44 00	
		16 pigs, at $1	16 00	
		8 Berkshire sows, $10	80 00	
		18 Berkshire pigs and shoats, $3	54 00	
		2 Berkshire boars	30 00	
		79 hogs		320 00
		140 tons hay in barn, at $4	$560 00	
		82 tons hay in stack, $3.50 (60 sold)	287 00	
		222 tons hay		847 00
		20 tons straw		30 00
		5,620 bushels corn in crib, 25 cents	$1,405 00	
		50 bushels selected seed, 50 cents	25 00	
		5,670 bushels corn		1,430 00
		110 bushels rye, 30 cents		33 00
		80 bushels potatoes, 35 cents		28 00
		200 gallons cider, 15 cents		30 00
		6 cider barrels		6 00
		12 acres winter wheat, at three dollars		36 00
		25 acres fall plowing		35 00
		Accounts ($174.90 since paid)		228 43
		Short horns and Jersey cattle at cost, 33 head		3,638 01
		2 spring colts		50 00
		Total		$9,782 89

IMPROVEMENTS.

1878.				
Dec.	1	Paid for tile	$393 07	
		" " work laying	293 22	
		Hauling and distributing	67 25	
		Surveying ground and overseeing work	40 00	
		Total cost of ..... rods		$793 54

IMPROVEMENTS—Continued.

1878.				
Dec.	1	*Fence.*		
		Paid for one car lumber from Chicago	$101 40	
		Hauling and distributing	5 00	
		Paid for lumber to Lapham	27 20	
		Hauling	2 00	
		Paid for posts	49 00	
		Making, hanging and painting two gates	8 00	
		Paid for making fence	37 00	
		Total cost of 183 rods of fence and two gates		$229 60
		Two automatic gates, paid maker	$13 00	
		Labor, hauling, etc	6 00	
		Total		19 00
		Water Works.		
		Paid for pipe	$20 49	
		" " tank	9 75	
		" " making and filling ditch	9 00	
		Labor, grading, etc	20 00	
		Total		59 24
		Bull and Calf Stable.		
		Cost of lumber	$30 87	
		Hauling	2 00	
		Nails and door hanging	7 00	
		Labor	9 00	
		Total		48 87
		Hay pens		5 75
		Grading about barn with cinders		6 00
				$1,161 95
		Freight on one car lumber		32 00
		Brick for foundation to scales		8 00
		Total		$1,201 95
		REPAIRS FOR YEAR.		
		Cost of paint and brushes for barn	$79 80	
		" labor, painting	35 00	
				$114 80
		Wagon repairs	$11 25	
		Reaper and mower repairs	23 25	
		Harness repairs	12 50	
		*All other repairs	49 63	96 63
		Total		$211 43
		EXPERIMENTAL DEPARTMENT TO AGRICULTURAL DEPARTMENT.		
1877.				
Dec.	8	To mulching wheat	$1 58	
	10	" " "	45	
	22	" hauling manure	1 50	
1878.				
Feb.	1	" " " (two teams)	4 50	
	2	" " "	1 25	
	5	" " "	50	
	10	" feeding cattle one week	5 00	
March	8	" work on wheat	15	
	11	" sowing wheat	38	
	15	" plowing for oats	2 50	
	15	" work on wheat, cutting stalks	50	
	16	" plowing for oats	1 25	
	18	" " "	2 50	
	19	" paid cash for seed	1 05	
	19	" sowing and harrowing (two teams)	4 50	
	20	" rolling wheat and oats	2 00	

*This last item includes new tools in the place of those broken or worn out, but does not include lumber and nails in the repair of fences.

EXPERIMENTAL DEPARTMENT TO AGRICULTURAL DEPARTMENT—Continued.

1878.				
March	23	To cultivating	40	
	29	" sowing wheat	50	
April	2	" " "	60	
	6	" work (students)	$1 00	
	8	" two-horse team	60	
	9	" three-quarters day team	1 88	
	12	" plowing for corn (three horses	3 50	
	12	" " " "	1 75	
	16	" " " "	1 00	
	17	" " "	2 50	
	20	" hauling manure (two teams)	3 50	
	22	" harrowing	30	
	30	" "	1 20	
May	1	" work (students)	80	
	1	" harrowing	30	
	2	" "	30	
	4	" " and marking	2 00	
	6	" marking	1 25	
		" planting	1 40	
	7	" "	3 30	
	11	" cultivating and hoeing	40	
	15	" work on beets	2 25	
	21	" planting corn	2 25	
	23	" " "	45	
		" rolling	30	
	28	" cultivating corn	1 25	
	29	" " "	2 50	
June	4	" " "	2 50	
	5	" " "	1 25	
	7	" " " and planting	1 00	
	13	" " "	2 50	
	14	" " "	90	
		" hoeing corn	75	
		" " beets	1 00	
	16	" " "	2 50	
	23	" cultivating corn	2 50	
		" mowing	2 00	
		" putting up hay	2 00	
		" cutting rye and binding	1 25	
		" hoeing corn	25	
	26	" hauling hay	5 00	
		By four tons hay, at $3.00	.....	$12 00
		To harvesting wheat	1 50	
July	1	" work on beets	1 25	
	2	" harvesting wheat	2 50	
		" cultivating corn	1 88	
		" thinning corn	2 50	
		" setting beets	25	
	3	" cultivating and hoeing corn	2 50	
	5	" " corn	90	
		" marking and planting corn	90	
		" hoeing corn	3 13	
	6	" cultivating corn	90	
		" hoeing corn	75	
	8	To stacking wheat	2 38	
		" harvesting wheat	1 00	
		" hoeing corn	3 75	
	10	" harvesting wheat	50	
	12	" hoeing beets	25	
	15	" harvesting oats	5 75	
	16	" cultivating corn	95	
	18	" harvesting wheat,	25	
		" hoeing beets	63	
	22	" harvesting oats	75	
		" hoeing beets	63	
		" " corn	1 25	
	23	" mowing weeds, etc	63	
	30	" threshing 48 bushels wheat, 10 cents	4 80	
August	1	" " 7 " rye	70	
		" hauling and threshing 170 bushels oats	8 50	
		By 7 bushels rye, 40 cents	.....	2 80
		" 150 " oats, 15 cents	.....	22 50
	5	To cultivating corn	50	
	19	" plowing, for wheat	50	
	20	" " "	1 25	
	22	" " "	1 88	
	23	" " "	2 50	
	24	" " "	1 25	
	26	" " "	2 50	
September	6	" harrowing	1 25	
	9	By 12½ bushels wheat for seed, 80 cents	.....	10 00

EXPERIMENTAL DEPARTMENT TO AGRICULTURAL DEPARTMENT—Continued.

1878.				
September 6	To husking corn		70	
	" hauling wheat from city		25	
	" express charges on wheat, cash		$1 65	
10	" drilling and rolling		2 50	
14	" gathering corn (2 men)		1 50	
16	By cash, for wheat sold			$12 00
	To mowing weeds		25	
	" plowing		35	
October 2	" weighing cattle		40	
5	" sowing wheat		50	
17	" cutting corn		40	
29	" gathering beets		1 25	
	" husking corn (2 teams, 5 men)		5 38	
November 1	" " "		1 63	
4	" " "		13	
14	" plowing		1 00	
	By 132 bushels poor corn, 15 cents			19 80
	" straw			7 50
15	To plowing (2 teams)		3 35	
	By cash, for wheat sold			12 85
	To hauling and selling wheat		50	
	" plowing		2 00	
18	" " (3 horses)		2 50	
	" " (2 ")		50	
			$174 00	$99 45
	Bills paid by B. Agent and charged—			
	To medicine for hogs	$4 25		
	" seed wheat	2 00		
	" disinfectants	60		
	" ice	60		
	" seeds	5 35		
	" express	1 65		
			14 45	
	To superintending work in July and August, during the absence of Prof. Morrow		10 00	
	Balance			99 00
			$198 45	$198 45

E. L. LAWRENCE, *Head Farmer*,

REPORT OF HORTICULTURAL DEPARTMENT.

ILLINOIS INDUSTRIAL UNIVERSITY,
URBANA, ILL., December 14, 1878.

Dr. J. M. Gregory, Regent Illinois Industrial University:

SIR: I respectfully submit the following report of the Horticultural Department for the year ending December 1, 1878. I also append a report from Mr. Lawrence, Foreman.

T. J. BURRILL, *Professor of Botany and Agriculture.*

GREENHOUSE.

The greenhouse and its contents are now in good condition, and give promise of continuing so during the winter, whatever the weather may prove to be.

Settlement has been reached between the contractors for the brick work and Mr. Spence, without loss or inconvenience to the University.

During the past summer the iron pipes for the hot water burst in numerous instances at the joints, and gave much trouble and caused considerable expense in refitting and repairing. The cause of this difficulty is still unknown, except that it was due to the force exerted by the swelling of the packing material. The pipes were made by J. Mott, of New York, who has gained the reputation of manufacturing the best in the country; and the packing material is claimed to be the same as that in common use, consisting of iron filings and other substances, causing the former to rust. This pipe and the rust joint was agreed upon in the contract with Mr. Excel, who put in the heating apparatus. The first break occurred after the fire went out in the spring. It has been claimed that the disaster is in part due to the leaking of water from the pipes, but it is the custom of some to withdraw the water entirely during the summer from the same pipe with the same packing in the joints. It has also been suggested that the proportions of the material used for packing may have caused the trouble, but it would seem that however slow the rustin , the result would ultimately be the same. An occasional joint has been known to break elsewhere, but no such general difficulty has been heard of.

The repair has been made by cutting off the broken part and substituting other pieces, mostly much stronger than the previous ones, and by putting around those not yet cracked, a strong iron band. Advantage has been taken of the disjointing of the pipes to make some changes, which the experience of last year suggested, so that the working of the apparatus is now considerably improved, and it is believed to be durable. Mr. Excel did the work of repairing—the other expenses fall upon the Department.

The garden connected with the greenhouse is now in good order for next year's use—its value having been very evident during the past summer, though the management was for the future good rather than for the time.

BUILDINGS AND GROUNDS.

The lawn mowers, one horse, and one hand machine, aided greatly in keeping the grass in good order. The appearance during the year, of the lawn and trees, was considerably better than ever before. The latter have made good growth, but they would be improved by receiving, this winter, a top dressing of well decomposed manure. The Maples on Green street were so treated during the summer. The flower beds made a very effective display; some of them were very brilliant during the whole season.

The grading around the new Chemical laboratory is completed, having been done under the superintendence of Mr. S. Brown, as directed by Mr. Gardener. The seeding has been delayed until the surface may may be considered permanent by the settling of the earth. As the walks and drives will have to be excavated somewhat, these have also been left for future construction.

A bridge over the creek in the aboretum has been constructed, and the roadway graded.

ORCHARD.

Very little fruit was obtained from the apple orchard, and but few specimens from the small amount produced were perfectly sound. Other orchards in the vicinity, with rare exceptions, did but little if any better, but many others do present a better appearance in the uniformity and healthfulness of the trees. It cannot be expected that a thousand varie-

ties of untried fruits will succeed so well as a few chosen kinds; yet people forget this fact when comparing this experimental orchard with others. The land is, in many places, too wet for apples, and the trees suffer accordingly. Some are plainly injured by the exposure of their roots in plowing.

The orchard can never become a profitable one in the ordinary sense; yet the great value of even one variety of fruit, better for the locality than any usually planted, should such a one be found, warrants the continuance of the trial. But the trees are now so large that a limited number of cattle and hogs pasturing among them would scarcely do any damage. There are evergreens which might be molested, and the planting of young trees to fill up spaces would be prevented, but, on the whole, it is here recommended that a fence be put across the east side, and the land prepared for pasturage.

A small orchard of well selected kinds of fruit, for illustration and profit, would be a very desirable addition to the horticultural equipments. This might be started on the dry ground south of the veterinary building, now used as a nursery for young trees. The propagation of nursery stock would not be interfered with for years in the same area, and some kinds of small fruits and cultivated crops might be grown among the trees continually. Trees will thrive upon this land, and can be kept in good order. There is one objection to such a plantation of fruit trees, viz: the liability of the fruit to be stolen, which is increased as the site is nearer and more accessible from town. But better watch can be kept in the locality named than elsewhere on the farm, unless it be near the farmer's house. Two acres for apples would be quite sufficient, allowing about eighty trees which should be of not more than eight kinds. The trees are now on hand or can be procured by exchange, so that the first cost of the plantation would not be noticeable.

In such an orchard, various experiments as to cullure, etc., could be carried out which are impracticable in the present one. It would, if properly treated, furnish good fruit, and help to remove the unjust odium attached by unthinking persons to the experimental orchard now beginning to bear.

THE NURSERY.

During the year, several additions have been made to the stock of young trees in the nursery. Several thousand apple trees have been started from grafts made by students last winter as a part of their class work. Other seedlings were collected in the forests, and others still obtained from seed. The sales made last spring were not large, nor the prices high. Complaint was made by the nurserymen in the vicinity that these sales interfered with their proper business, but upon inquiry it was ascertained that agents from foreign nurseries had sold considerable stock of the same kind at lower prices. It is probable that the average price asked by these home nurserymen is fully as low as that received for plants at the University grounds. The first question which visitors often ask is, "Do you make these things pay?" And it is considered creditable to make the sales cover the cost; yet, those who complain say there should be no sales at all.

Upon the whole, it appears to me advisable to continue such work as is required for illustration, and to sell the products for whatever the market rates may be.

INVESTIGATIONS.

At all times during the year, vacations as well as during term time, whenever opportunity presented, investigations of problems in vegetable physiology and pathology have been prosecuted. Most of these are intricate and require much time and very thorough and close study. Some of these have reached conclusion or very nearly so. Others are still held for further experiment and demonstration.

I append the accounts of three diseases of cultivated plants, the causes and cures of which have been very little or not at all understood.

THE CURL OF THE PEACH LEAF.

Soon after the leaves of Peach trees burst from the buds in spring time, a swollen, blistered appearance is presented, and as they grow the shape becomes variously distorted, the texture is changed, becoming rigid and brittle. Not long afterward these affected leaves decay, wither and fall off. In the latter part of the year healthy leaves are produced and the tree continues to thrive. The disease is not fatal but does considerable injury, reducing growth, flavor of the fruit, etc., besides causing a very undesirable appearance.

The cause is a parasitic fungus heretofore only known upon the leaves as *Ascomyces deformans*, and referred to as an anomally because the fruit only had been found. The new contribution I have to make is that mycelium (vegetative threads), not only penetrated through and through the leaf, but also through the tissues of the young bark, and that in the latter case it is perennial, giving origin, each spring, to a crop of spores. The young leaves, while still in the buds, are infested with the fungus, and the bark of the young twig, as soon as it is formed, is likewise preyed upon. As these parts expand the poisonous mycelium is carried along, and when the leaves are fully expanded the fungus fruit is produced on their surfaces as a thin, white stratum, more or less mealy in appearance. Under the microscope this white substance is found to be composed of oblong transparent sacks (sporangia) filled with spores. After the annual production of this crop of spores, the perennial mycelium may be found at any time during the year in the bark of the young twigs, but it seems to be dormant, so that the production of healthy leaves later in the season is not interfered with.

The affected twigs can be easily distinguished by the diseased appearance of the bark, and can thus be pruned away. This is the proposed remedy. It is still possible that the disease may be disseminated by the spores from orchard to orchard, but the slow spreading of the parasite warrants the belief that little trouble can come from this source. A careful selection and cutting away of the affected limbs of last year's growth will reduce if not entirely eradicate the parasite.

The Red Cedar is preyed upon by quite a different fungus (*Gymnosporangia macropus*), whose fruit in spring time has the appearance of yellow balls with jelly-like sprangling arms over the whole surface. The foregoing of the Peach parasite shows that the mode of living is similar to that of the Cedar fungus, whose life history has long been known and which may be exterminated by proper pruning.

BLACK RUST OF VERBENAS.

Florists have suffered great losses and more annoyance from a disease of Verbenas called the *Black Rust* to distinguish the malady from that called *Mildew*, which is white. Notwithstanding the difference in the names and the greater difference in the appearance of the two diseases, they have been confounded with each other in published accounts and proposed remedies. Even specialists to whom specimens have been sent, have returned accounts which clearly show the two diseases were not distinguished. This mildew on the leaves of cultivated Verbenas was some years ago determined by myself to be *Erysiphe Communis*, a fungus found on many plants. The black rust is now determined to be caused by a *mite*, a small spider-like thing, invisible to the naked eye. Others have heretofore announced this as a theory, and have no doubt seen the mites; but nothing conclusive has been published, and florists do not yet know the foe that they are vainly trying to fight. The mite itself has never been described, a figure given by an author on floriculture not being accurate enough to show that the real depredator had been seen at all. Other mites are frequently found running over leaves of every kind, and some of these may have been taken for the much smaller one, which causes the difficulty.

Affected plants, especially the younger portions of them, have a dark, purplish color; they grow slowly, look sickly and scarcely flower at all. An entirely new observation is that these plants in beds out of doors are likewise injured, and that the mite lives throughout the summer and until the ground freezes in autumn on them. In these situations the purplish color is not so much confined to the buds, young stems and small leaves; the whole plant is more or less tinged, and the mites are likewise found on the older parts. After a time the older leaves have a whitish, scaly and ragged appearance, finally becoming hard and dry. Such plants bloom little—are in fact worthless.

The mite is a very peculiar one, belonging almost surely to an undescribed genus of the family *Tyroglipidæ*, which includes the common cheese mite. It probably passes its whole existence upon the leaves, or in winter hibernates in the perfect state under cover of rubbish on the ground. From the beds out of doors it is transferred to the greenhouses with the plants or cuttings.

This last fact, together with the truth that the disease is caused by an insect-like parasite, suggests the following proposed remedy: 1st, select plants in autumn free from mites, as indicated by their fresh and green appearance; or, if this can not be done, dip the plants in water at a temperature of 120° Fahrenheit two or three times at intervals of a day or two. 2d, syringe the affected plants with a half pint of coal oil in three gallons of water, taking care to mix the two by forcing the water from the syringe into the vessel and immediately refilling from the agitated liquid. The application must be made with force, so as to reach all parts of the plants.

THE PEAR-LEAF BLISTER.

We give this name to a peculiar disease of pear leaves first traced to its origin by a German naturalist twenty-one years ago. Though widely disseminated in our country, no mention has heretofore been made, except by the writer, of its identity with the European malady, and no one else has to my knowledge pointed out the cause of the disease as it occurs with us. I am able, also, to add an important item in the life history of the mite-parasite (for such it is), not previously published.

In spring-time the young leaves are spotted with red and are slightly distorted. Sometimes the spots are few and scattered, sometimes very numerous and conspicuous. At a later time the spots become brown by the death of the tissues. Upon very close inspection with a good hand magnifier, a minute hole can be seen in the center of the spot on the underside of the leaf. Dissecting the affected portion of the leaf and using the compound microscope with a power of a hundred diameters, numerous flesh-colored mites can be seen which slowly and clumsily drag themselves about by four legs which project forward. Scheuten, the German naturalist referred to, called the mite *Typhlodromus pyri*, but there does not appear any good reason for separating this from other similar mites belonging to the genus *Phytoplus*, hence the proper name for this is no doubt *Phytoplus pyri*. Scheuten and others have supposed the form seen was the young of other forms sometimes found associated with them, but this is abundantly refuted, especially by the observation of the insect in its egg-producing and winter state. The new contribution alluded to is the discovery that in autumn before the leaves fall, the most of the mites creep out of the leaf-galls down the leaf-stalk and pass the winter between the scales of the buds. They may be found in this situation now, (December 17, 1878,) and after keeping them in a warm room may be seen crawling about as in summer.

The proposed remedy is to prune and burn affected limbs as fast as observed. In this way the tree may soon be freed from the minute enemy. They are so sluggish and clumsy in their movements that the journey down the leaf stock must be a great one for them, not to speak of creeping from tree to tree. Still it is possible that occasional distribution takes place through some of the mites remaining in the leaves until they fall and are blown about by the winds. The more obvious method of dissemination over the whole country is by the use of affected buds by nurserymen. The mites have doubtless come to America in this manner from Europe, and have since spread with the trees. There is no more question about the destruction of this mite than of its relative, which chooses the human skin for its habitation,—the itch mite. Neither originate spontaneously: they are produced from eggs laid by parent mites. A tree once cleared remains so until the pest is again introduced.

FINANCES.

The books of the Business Agent show that the department has now a very little balance in its favor, about $6.00. There will be, before the next meeting of the Board, a charge of fifty dollars ($50.00) salary of Foreman, and the cost of coal for the greenhouse, some sixty (60) or more dollars. The income during the same period will be very little if any. Had it not been for the unlooked for disaster with the heating pipes at the greenhouse, the department would have been able to pay its way until sales began again in the spring. Under the circumstances, I very respectfully ask a special appropriation of one hundred and twenty-five dollars ($125.00) for the current expenses of the department. I may state here that no credit has been received. upon the books, for plants used in the ornamentation of the grounds, which at the usual rates, would much more than cover the sum named.

The total cost of repairs and improvements,—the latter about twenty-five dollars,—of the greenhouse heating apparatus, has been about the amount now asked for. If this expense may be charged against some other account no appropriation will be required for the Horticultural department now.

RECAPITULATION OF MATTERS REQUIRING ACTION.

1st. The preparation of the apple orchard for pasturage by seeding as required, and fencing east side.

2d. The planting of a small orchard with well chosen varieties of apples for fruit and illustrating kinds of treatment, impossible with the present one.

3d. A special appropriation of one hundred and twenty-five dollars ($125) for current expenses (salary of foreman and coal) during the winter.

REPORT FROM THE FOREMAN.

URBANA, ILL., Dec. 7, 1878.

Prof. T. J. Burrill:

I herewith present a statement showing the expense and income of the several branches of the Horticultural work: The strawberries in the spring made a fine showing for a large crop, which was cut off at least one-half by the frost. What was left was of poor quality. The raspberries were a fair crop, but only about one-half of the last year's crop, which was extra. The blackberries were good. There was enough of all for the market.

Of the nursery stock, all the fruit trees offered were disposed of. The forest and evergreen trees went off slowly.

We are now ready to commence the thinning of the forest trees, as has been directed. I would suggest the propriety of leaving a block of two or three or more varieties without thinning, as an experiment, as I am not thoroughly satisfied that the trees have attained a sufficient hight for this operation, or whether it would not be best to let them thin themselves, as nature, sometimes at least, selects better than man.

I recommend for your consideration, that the apple orchard be enclosed for a pasture, running a fence across the east side so as to leave two rows of apple trees and one row of evergreens east of the fence. Water could probably be obtained by the use of the syphon, as is now in operation in the present pasture.

STATEMENT SHOWING EXPENSE AND INCOME.

1878.			
Dec. 7	Berries Dr. to cash and work	$73 34	
	" Cr. by cash sales		118 78
	Grapes to work	12 30	
	" by cash		14 45
	Nursery to work	125 27	
	" by cash and department credits		365 00
	Rhubarb to work and R. R. freight	13 35	
	" by cash sales		15 54
	Garden to work	12 23	
	" by cash sales*		7 90
	Forest to work	40 19	
	" by cash and department credits		36 90
	NON-PRODUCTIVE.		
	Orchard to work	10 93	
	Greenhouse to work	18 84	
	Superintendent's salary	200 00	
	Balance, profits	52 12	
	Total	$558 57	$558 57

*Of the products of the garden there is now on hand for sale 25 bushels of beets and a quantity of parsnips. Deducting the non-productive labor we should have a profit of $81.89.

Respectfully submitted,

E. L. LAWRENCE.

MEETING OF THE BOARD OF TRUSTEES, MARCH, 1879.

The Board assembled in the University parlors, on Tuesday, March 11, 1879, at 3:30 P. M.

Present: Messrs. Byrd, Fountain, Gardner, Mason, McLean, Millard, Pickrell and Scott.

Absent: Governor Cullom, Messrs. Cobb and Brown.

A dispatch was received from the President of the Board, Hon. E. Cobb, expressing his regrets at being prevented from attending this meeting.

On motion of Mr. Gardner, Mr. J. H. Pickrell was nominated chairman.

The oath of office was then administered to the newly appointed members, Messrs. Scott and Millard, by Judge Brown.

The minutes of the last meeting were then read and approved.

The Regent then read the following report:

REGENT'S REPORT.

MARCH 11, 1879.

To the Trustees of the Illinois Industrial University:

GENTLEMEN: The occurrence of your twelfth annual meeting makes it my duty again to present you a statement of the condition of the University, and of the progress and wants of the several departments. As this meeting occurs in the midst of the College year, the statistics can only be given of the incomplete terms.

ATTENDANCE.

The number of students present during the fall term was: Men, 299; women, 67; total, 366. Winter: Men, 275; women, 67; total, 342. Total number of students enrolled this year, 399.

The Class work of the present term, and the time employed by the several professors, instructors and assistants, are fully shown in the term reports herewith laid before you.

THE COLLEGE OF AGRICULTURE.

The work in the two schools of this College, the School of Agriculture and the School of Horticulture, continues to progress favorably under the charge in chief of Professors Burrill and Morrow. The energy and industry shown by these gentlemen in their work give promise that these important schools will win more and more upon the attention of the great industrial classes, whose interests they seek to promote. The day will come when a stern necessity will drive our farmers to the study of more scientific methods of cultivation, and this College will secure the patronage it deserves. Even now, if its instructions could be brought home to our farmers, they would save hundreds from bankruptcy, and would increase the profits of agriculture to an extent which would repay to the State tenfold the cost of its maintenance.

Prof. Morrow, with my hearty concurrence, has visited and addressed several meetings of agriculturists in different counties, and has laid before them the nature and value of the education provided here. I have also aided in this work. I believe you will approve these efforts, though they require an occasional absence from classes.

The Farmers' Institute held during this term was the most successful of all those held under the auspices of the University. The attendance was large, the lecture rooms being often crowded during the lectures.

The work of Mr. Scovell in the Department of Agricultural Chemistry, both in his special class and in the analyses made in the laboratory, is adding to the breadth and enhancing the value of the agricultural instruction. Mr. Scovell gives promise of great usefulness in this department.

The work of Mr. Hayes in the Greenhouse and Horticultural classes also deserves mention. He has, during this term, a class of six young ladies taking lessons in the management of house plants. He is providing also an ample supply of bedding plants for the grounds, and a surplus for sale.

The Arboretum and Botanical garden will also receive special attention this spring. The report from Prof. Burrill calls your attention to some wants in the Horticultural department, and asks an appropriation for trees, and so forth.

The work of Dr. Prentice in teaching the principles of Veterinary Science, including the anatomy and physiology of the domestic animals, is by no means the least important work done in the College of Agriculture. The students trained under him will not only be better prepared for the business of stock husbandry, so important in this State, but many of them will be able to serve as Veterinary surgeons and physicians. In the clinic of diseased animals treated at our Veterinary stables and elsewhere during the fall and winter terms, there have been 65 cases. These cases have been examined and prescribed for in the presence of the classes. The interest felt in this department of instruction may call for its further development into a full School of Veterinary Science at no distant day.

The report of E. L. Lawrence, Head Farmer, shows a prosperous condition of the farms under his efficient management. The drainage effected the past year has reclaimed about 60 acres of land, at a cost of about $30.00 per acre. Additional drainage is contemplated the coming season.

THE COLLEGE OF ENGINEERING.

This College, embracing the Schools of Mechanical Engineers, Civil Engineers, Mining Engineers, and of Architecture, is under the chief charge of Prof. S. H. Peabody, who represents both Mechanical and Mining Engineering, Prof. N. C. Ricker, Architect, and Prof. J B. Webb, C.vil Engineer. now in Europe on leave. I know of no more competent or earnest instructors than these in their several departments. They are ably supported in their work by I. O. Baker, Asst. in Engineering and Physics; J. C. Lewellyn, Asst. in Architecture, and foreman of Wood Working Shops; E. A. Kimball, the excellent foreman of the Machine Shops, and by C. W. Clark. Asst. in Civil Engineering.

The present Senior Class shows four students in Mining Engineering, and we may expect to see this department of our work increase. The vast coal fields and other mining interests of our State, certainly demand its vigorous development. The new laboratory now fitted up with its smelting and assay furnaces, will, when supplied with its stamp, furnish ample facilities for metallurgical study. It will be necessary, as I have stated in former reports, to fill either the Chair of Physics, or that of Mining Engineering, to make our teaching force in this department equal to its needs. The work, it is true, is all done, and done well, by the present force, but it is done by overworking our men, who are allowed too little time for study and preparation.

I call attention again to the ceiling and other improvements needed in the shops, and to apparatus required in the Physical Laboratory. The communication from Prof. Peabody will tell you the immediate wants of the Physical Laboratory.

A large and much needed improvement might be made in the rooms devoted to Physics, by moving the partition wall between the Physical Laboratory and Lecture room about fifteen feet to the south, and making the central room the lecture room. The Laboratory would then afford ample room for work, and be well lighted. This change would involve only the expense of taking down and reconstructing the partition, and the supply of one additional door. In time, and as soon as convenient, new cases will be required. I earnestly recommend this change, and as it ought to be made during the summer, plans and estimates ought to be prepared, for which an order of the Board is asked.

COLLEGE OF NATURAL SCIENCES.

This College, as now organized, includes the School of Chemistry, the School of Natural History and the School of Domestic Science. These schools are under the chief charge of Prof. Weber, Prof. Burrill, Prof. Taft, and Miss L. C. Allen. They have as assistants M. A. Scovell, W. D. Rudy, Geo. A. Wild, with some temporary assistants in the Chemical Laboratory. The work is being prosecuted with a success which speaks more than words can for the ability and fidelity of the several instructors in charge. The School of Chemistry is deriving already large benefit from its new and spacious Laboratory. The number of students in Chemistry has greatly increased, and the work das been done with unusual despatch and success. The communication from Prof. Weber will bring to your notice some of the current wants in the Chemical Laboratory.

In the School of Natural History, a large increase has been made during the year in its cabinets and material of instruction. Through the energy of Mr. Wild, and with the aid of classes taught by him in Taxidermy and Osteology, there have been added to the collections during the year 205 specimens, collected by him in the Rocky Mountain region, embracing 65 new species, and including all the western ruminants, such as the bison, elk, mountain sheep, deer and antelope, and also many of the rodents and smaller carnivors. These specimens include both skins and skeletons. Something of the value of his work may be seen from the prices of the following specimens prepared by him and his classes:

25 skeletons, averaging each $15.00	$375 00
Group of deer and antelope	175 00
Mountain lion, mountain sheep, black tailed deer, $65 each	195 00
90 birds, 40 new species, at 75c	67 50
7 mammals at $8.00	56 00
Total	$868 50

Mr. Wild has taught a class of sixteen students in Taxidermy, and has now a class of 16 students in Osteology. As these studies are necessary to collectors and curators of Museums, it seems desirable that they should be introduced into the course in Natural History. The important work performed by Pro. Burrill and his students in Microscopy and in Cryptogamic Botany, deserves honorable mention. I ask attention again to the request of Prof. Burrill for a new objective of more recent construction and of higher defining power. The cost of the best objective will be about $70, and no other ought to be purchased than the best.

The School of Domestic Science has slowly but surely won its way to public recognition, and I am glad to say that it is now attracting to instruction our best and most talented and thoughtful young women. It is also receiving the commendations of many of the best thinkers and observers among our publicists, men and women. The communication of Miss Allen will call your attention to two points, that of her rank and of her salary, which I ought, perhaps, in justice, to have urged upon your attention at an earlier day. The erection of the chair, with its proper title, is an act of justice to the University and the School, as well as to herself. In several cases already, in leading universities and colleges in the country, women hold professorships, which they fill with honor and usefulness. The question of salary, raised by Miss Allen, is in accordance with an understanding given her when she first assumed her place, and is now the more justly due her as she has spent her vacations and a large part of her salary in prosecuting special studies and making investigations for the benefit of her School, and for the improvement of the Calisthenic exercises, the charge of which was an extra burden laid upon her, and accepted by her out of regard to the general interests of the University, and of the young lady students. I believe that her requests will be regarded as so reasonable as to need no arguments of mine to support them. The increase of rank is asked to take effect at once; the salary is requested to begin with the next College year.

The question of a Domestic Science building, and home for women students, is still in the hands of your committee, no favorable opportunity having occurred to bring it before the Legislature, if, indeed, it was expected by the Board that the committee should make such application. Plans and estimates have been prepared for a suitable building for the purpose, and some progress has been made in securing information to show the feasibility of making such a building self-sustaining. This has been kept in view as a cardinal requisite in the enterprise. I trust that it will still receive from the Board of Trustees the consideration which its importance demands. It is certain that some such provision for women students must ultimately be made, and the sooner it is made, the better for our work in this direction.

COLLEGE OF LITERATURE AND SCIENCE.

This College now includes the School of Ancient Languages and the School of English and Modern Languages. These schools are under the chief charge of Prof. J. C. Pickard, Prof. E. Snyder, Prof. S. W. Shattuck, and Prof. J. D. Crawford, with the assistance of the several instructors in Science. The work of both of these schools is progressing satisfactorily, under the competent and earnest corps of instructors. As they are devoted largely to general education, they attract that large body of students who have not yet fixed upon their calling, or who seek simply a liberal education, for any and all purposes. They participate in the advantages of all the general collections and facilities of instruction, and have therefore fewer special wants to lay before you.

The unattached and partial Schools of Designing and Drawing, under Prof. Baumgras, of Commercial Science under Mr. V. A. Parsons, and of Military Science, under Major Dinwiddie, continue to work prosperously, and to lend their important aid to the other schools, and to the general work and order of the University. They have no special needs to be urged at the present meeting, but I call attention to the communication of Prof. Dinwiddie, Prof. of Military Science.

The Librarian's Report shows the addition of 218 volumes to the Library since the last meeting of the Board. The purchase of books, from the State appropriation, has not yet been consummated, but the order is already in the hands of a dealer, in New York.

J. M. GREGORY, *Regent.*

The report was received.

Mr. C. E. Pickard's request, in regard to salary, was postponed to June meeting.

Adjourned till Wednesday, 9 o'clock A. M.

SECOND DAY'S SESSION.

The reports of the Treasurer, J. W. Bunn, Esq., and of Prof. S. W. Shattuck, Business Agent, were then read, and received:

MR. J. W. BUNN, TREASURER,

To Illinois Industrial University.

	DR.			
1878.				
Dec. 17	To balance			$14,251 70
1879.				
Jan. 2	" amount received of J. O. Cunningham (Barnett & Burton, for interest)		$641 63	
	" interest on Champaign county bonds		4,600 00	
	" interest on Chicago 7 per cent. water bonds		875 00	
Feb. 28	" interest on Illinois 6 per cent. bonds		930 00	
	" amount received on account of tuition	$692 00		
	" amount received on account of fees and room rents	1,541 00		
	" amount received from Agricultural department	2,134 87		
	" amount received from Mechanical department.	750 01		
	" amount received from Architectural departm't.	243 66		
	" amount received from Horticultural departm't.	53 40		
	" amount received from Chemical department	343 81		
	" amount received from fuel and lights	98 98		
	" amount received from buildings and grounds	39 00		
	" amount received from library	1 95		
	" amount received from physical laboratory	5 10		
	" amount received from Ill. C. R. R. donation	468 95	6,372 73	13,419 36
				$27,671 06
	CR.			
1878.				
Feb. 28	For amount paid on account of board of expense		$217 98	
	" amount paid on account of salaries		7,777 62	
	" amount paid on account of buildings and grounds		52 36	
	" amount paid on account of fuel and lights		831 48	
	" amount paid on account of stationery and printing		166 67	
	" amount paid on account of fixtures and furniture		12 99	
	" amount paid on account of Mechanical department		578 56	
	" amount paid on account of Architectural department.		376 52	
	" amount paid on account of Agricultural department		1,404 14	
	" amount paid on account of Horticultural department		190 50	
	" amount paid on account of Chemical department		232 00	
	" amount paid on account of Military department		3 50	
	" amount paid on account of library and apparatus		4 93	
	" amount paid on account of incidentals		53 38	
	" amount paid sundries—			
	Preparatory department	$580 00		
	Physical laboratory	13 22	593 22	
	" amount paid on State appropriations—			
	Cabinet cases	$111 57		
	Chemical laboratory	731 87		
	Buildings and grounds	633 18		
	Chemical and Physical lab'ies	24 30		
	Cabinets	399 15		
	Mech'l and Achitectural shops	574 02		
	Books and publications	387 86	2,861 95	$5,357 83
	By balance			12,313 23
				$27,671 06

URBANA, March 12, 1879.

JOHN W. BUNN, *Treasurer.*

CHAMPAIGN, ILL., March 11, 1879.

President Board of Trustees Illinois Industrial University:

SIR: I have the honor to make the following report, as Business Agent, for the three months ending February 28, 1879.

Paper "A" is a statement of the appropriations for the six months ending February 28, with the receipts and expenditures under the same. Paper "B" is a statement of the State appropriations to date. Paper "C" is the list of vouchers for warrants drawn, and of of bills presented for auditing.

Respectfully submitted.

S. W. SHATTUCK, *Business Agent.*

Current Appropriations and Receipts.

Item.	Appropri't'd	Receipts.	Expended.	Balance.
Board expense	$300 00		$289 23	$10 77
Salaries	17,310 00		14,967 55	2,342 45
Buildings and grounds	100 00	$80 65	64 39	116 26
Fuel and lights	3,000 00	249 13	2,064 30	1,184 83
Stationery and printing	325 00		302 18	22 82
Fixtures and furniture	100 00		99 23	77
Mechanical department	260 68	1,080 68	1,279 04	62 32
Architectural "	109 61	1,255 34	1,261 67	103 28
Agricultural "	1,152 17	3,028 13	2,413 47	1,766 83
Horticultural "	321 53	138 69	460 22	—6 01
Chemical "	258 12	353 11	525 20	86 03
Military "	50 00		47 43	2 57
Library and apparatus	50 00	1 95	8 48	43 47
Incidentals	200 00	15 50	186 61	28 89
Sundries—				
Cabinets	11 44		6 25	5 19
Architectural department, furniture	39 00			39 00
Physical laboratory, balance	198 55	5 10	28 41	175 24
Food specimens, Domestic Science.	30 00			30 00
Preparatory department		1,696 50	1,270 00	426 50
State Appropriations			8,166 21	
Fees and room rents		3,810 00		
Illinois Central R. R. donation		4,346 55		

State Appropriations.

Item.	Appropriated	Expended.	Unexpended.
Buildings and grounds	$5,000 00	$4,658 34	$341 66
Chemical and Physical laboratories	2,000 00	1,799 93	200 07
Mechanical and Architectural shops	3,000 00	2,447 46	552 54
Library cases	1,000 00	1,000 00	
Books and publications	3,000 00	2,286 59	713 41
Cabinet cases	4,500 00	1,953 98	2,546 02
Cabinets	2,000 00	1,917 59	82 41
Chemical laboratory	40,000 00	39,950 98	49 02
Greenhouse	2,500 00	2,500 00	
Taxes on lands	4,306 02	4,306 02	
	$67,306 02	$62,820 89	$4,485 13

Warrants Drawn since December 1, 1878.

No.	To whom.	For what.	Amt.
215	D. Gardner	Expense to meeting	$33 78
216	J. M. Gregory	" "	12 15
217	T. T. Fountain	" "	17 10
218	R. B. Mason	" "	19 90
219	Alex. McLean	" "	54 75
220	J. H Pickrell	" "	11 40
221	J. M. Gregory	Purchase of books	44 04
222	J. M. Gregory	Salary, December, 1878	300 00
223	T. J. Burrill	" "	150 00
224	S. W. Shattuck	" "	150 00
225	E. Snyder	" "	150 00
226	D. C. Taft	" "	150 00
227	J. C. Pickard	" "	150 00
228	N. C. Ricker	" "	125 00
229	J. D. Crawford	" "	125 00
230	H. A. Weber	" "	150 00
231	G. E. Morrow	" "	150 00
232	S. H. Peabody	" "	166 66
233	E. L. Lawrence	" "	83 33
234	P. Baumgras	" "	125 00
235	L. C. Allen	" "	100 00
236	F. W. Prentice	" "	100 00
237	F. A. Parsons	" "	75 00
238	I. O. Baker	" "	75 00
239	M. A. Scovell	" "	75 00
240	C. I. Hays	" "	75 00
241	C. E. Pickard	" "	50 00
242	J. C. Llewellyn	" "	60 00
243	E. A. Kimball	" "	100 00
244	C. W. Clark	" "	50 00
245	D. W. Rudy	" "	35 00
246	A. B. Baker	" "	40 00
247	C. W. Williams	" "	30 00
248	C. E. Patchin	" "	25 00
249	J. E. Gregory	" "	10 00
250	W. A. Mann	Instruction in Gymnasium	15 00
251	W. A. Thompson	Adjutant service, Fall term	25 00
252	Agricultural department	Farm expense, December, 1878	111 81
253	Students' pay roll	Work, December, 1878	164 84
254	Emory Cobb	Expense to 3 meetings	23 65
255	E. P. Benjamin	Chemical apparatus	115 71
256	J. M. Gregory	Salary, January, 1879	300 00
257	T. J. Burrill	" "	150 00
258	S. W. Shattuck	" "	150 00
259	E. Snyder	" "	150 00
260	D. C. Taft	" "	150 00
261	J. C. Pickard	" "	150 00
262	N. C. Ricker	" "	125 00
263	J. D. Crawford	" "	125 00
264	H. A. Weber	" "	150 00
265	G. E. Morrow	" "	150 00
266	S. H. Peabody	" "	166 66
267	E. L. Lawrence	" "	83 33
268	P. Baumgras	" "	125 00
269	L. C. Allen	" "	100 00
270	F. W. Prentice	" "	100 00
271	F. A. Parsons	" "	75 00
272	I. O. Baker	" "	75 00
273	M. A. Scovell	" "	75 00
274	C. I. Hays	" "	75 00
275	C. E. Pickard	" "	50 00
276	J. C. Llewellyn	" "	60 00
277	E. A. Kimball	" "	100 00
278	G. A. Wild	" "	60 00
279	C. W. Clark	" "	50 00
280	W. D. Rudy	" "	35 00
281	A. B. Baker	" "	40 00
282	C. W. Williams	" "	30 00
283	J. E. Gregory	" "	10 00
284	J. M. VanOsdel	Architect services	400 00
285	G. A. Wild	Specimens for cabinets	230 00
286	J. O'Neil	Work on heating apparatus	45 30
287	Robinson & Burr	" " "	21 90
288	R. H. Smith & Co	Dating stamp	5 19
289	D. VanNostrand	Books	1 47
290	Enoch Robinson	"	3 12
291	Bacchus Oil Co	Oil	17 65

Warrants Drawn—Continued.

No.	To whom,	For what.	Am't.
292	Brane, Breed & Co.	Boiler fixtures	12 36
293	Enterprise Coal Co	10 cars coal	128 00
294	Jno. S. Scott	Stationery	17 72
295	Fuller and Tuller	Diamond glass-cutter	6 87
296	R. A. Sutton	6 M brick	48 75
297	U. S. Patent Office	Binding reports	7 80
298	I., B. and W. R. W	Freights	62 77
299	Thos. Lindsey	Sand	2 50
300	I., B. and W. R. W.	Freight	5 30
301	Rich'd Cor	Digging well	67 00
302	C. E. Patchen	Use of piano	2 80
303	Fairbanks, Morse and Co	Scales	24 30
304	R. B. Harmell	Work on Library P. O.	12 00
305	P. F. Van Everen	Marking letters	9 28
306	R. Blumm	Blow pipe	75
307	Crane Bros. Manufacturing Co	Hardware	76 70
308	" " "	"	8 32
309	Agricultural department	Hauling and leveling	213 13
310	Thos. Wright	Castings	56 73
311	Agricultural department	Farm expense, January	109 35
312	Students' Pay-roll	January, 1879	264 03
313	J. M. Gregory	Salary, February	300 00
314	T. J. Burrill	" "	150 00
315	S. W. Shattuck	" "	150 00
316	E. Snyder	" "	150 00
317	D. C. Taft	" "	150 00
318	J. C. Pickard	" "	150 00
319	N. C. Ricker	" "	125 00
320	J. D. Crawford	" "	125 00
321	H. A. Weber	" "	150 00
322	G. E. Morrow	" "	150 00
323	S. H. Peabody	" "	166 66
324	E. L. Lawrence	" "	83 33
325	P. Baumgras	" "	100 00
326	L. C. Allen	" "	100 00
327	I. O. Baker	" "	75 00
328	C. I. Hays	" "	75 00
329	F. W. Prentice	" "	100 00
330	M. A. Scovell	" "	75 00
331	T. A. Parsons	" "	75 00
332	C. E. Pickard	" "	50 00
333	J. C. Llewellyn	" "	60 00
334	E. A. Kimball	" "	100 00
335	G. A. Wild	" "	60 00
336	C. W. Clark	" "	50 00
337	W. D. Rudy	" "	35 00
338	A. B. Baker	" "	40 00
339	C. W. Williams	" "	30 00
340	Campbell Bros	Wrenches	2 00
341	Jno. O'Neil	Work on heating apparatus	18 45
342	Jno. O'Neil	Work on pipes	3 00
343	C. and N. Gas Co	Bill, December and January	166 20
344	R. B. Harmell	Work and material	1 75
345	Robinson and Burr	Hardware	6 37
346	Geo. A. Wild	Expenses in cabinets	18 30
347	Darling, Brown and Sharp	Tools	16 20
348	Trevett & Green	Hardware	18 36
349	J. M. Smith	Brick work on furnace	30 70
350	J. W. Smith	Mason work	2 92
351	C. E. Patchin	Salary winter term	25 00
352	J. B. Weeks	Drayage	9 25
353	Fred. Brown	Flower pots	11 18
354	Hutchinson & Jones	18 head of cattle	594 00
355	M. Lukanitsch	Files	7 34
356	Enterprise Coal Co	18 cars coal	206 00
357	Besore Bros.	Poplar lumber	45 00
358	Champaign County Gazette	Blank books and printing	51 40
359	Champaign County Gazette	Binding	170 80
360	Crane Bros. Manufacturing Company	Hardware	18 56
361	Agricultural department	Farm expenses, February, 1879	263 64
362	Henry & Kahn	Oil, brooms, etc	3 63
363	J. E. Saxton & Co	Paper	8 00
364	I O. Baker	Expense in laboratory	5 05
365	Luddington, Wells & Van Schick	Lumber	186 50
366	Sweitzer & Moody	Repairs on flag and drum	2 50
367	J. H. Pickrell	Expense to meeting	5 25
368	M. E. Lapham	Lumber	38 61
369	W. F. Pratt	Repairs on roofs	26 40

Warrants Drawn—Continued.

No.	To whom.	For what.	Am't.
370	H. Peddicord	Lime	11 75
371	C. C. Harris	Pipe tongs	3 25
372	H. C. Core	1 clock	2 50
373	Crane Bros. Manufacturing Company	4 vices	40 48
374	Illinois Central Railroad Company	Freight, Nov., Dec. and Jan.	468 95
375	Agricultural department	Work for others	178 10
376	H. Swannell	Chemicals, etc	42 09
377	Trevett & Green	Hardware	5 80
378	R. Blum	Pipe	13 55
379	Peterson & Lloyde	Stationery, etc	12 73
380	W. A. Moore	Pump, etc	25 78
381	W. A. Moore	Hardware	12 16
381	W. A. Moore	Hardware	26 78
383	The Ilini	Advertising	33 33
384	N. E. Subscription Agency	Periodicals	154 47
385	Architectural department	Work for other departments	20 86
386	Architectural department	Work and material	170 75
387	Mechanical department	Work for other departments	31 20
388	Mechanical department	Work and material	553 08
389	E. McAllister	Postage	30 00
390	Students' Pay-roll	February	273 14
391	S. W. Shattuck	Petty expenses, Dec., Jan., Feb.	49 71
392	Lindsey and Locke	Board expense	40 00

URBANA, ILL., February 28, 1879.

S. W. SHATTUCK, *Business Agent.*

The bills presented for payment were audited and allowed.

It was ordered that estimates and plans for contemplated changes in the Physical Lecture room be submitted to the Board at its next meeting.

On request of Prof. Weber, $150 was assigned for the purchase of chemicals and apparatus from receipts of Chemical department.

It was voted that the rank of Miss Lou C. Allen, be made that of Professor of Domestic Science, and that her request for increase of salary be deferred to the June Meeting.

A bill of work and sundry items from the Mechanical department against the publishers of the "*Illini*," amounting to $51.97, was donated to this periodical.

The following appropriations were passed:

APPROPRIATIONS FROM CURRENT FUNDS FOR THE SIX MONTHS ENDING AUGUST 31, 1879.

Board expense	$300 00
Salaries	15,635 00
Fuel and lights	1,000 00
Stationery and printing	600 00
Buildings and grounds	200 00
Incidental expense	200 00
Furniture and fixtures	100 00
Library	50 00
Military department	50 00
Agricultural department	1,766 83
Horticultural department	
Mechanical department	62 32
Architectural department	103 28
Chemical department	86 03
Architectural department, furniture	39 00
Specimens, Domestic science	30 00
Physical laboratory	175 24
Cabinets	5 19
For labels, etc., Horticultural department	60 00
For repairs of tank, Mechanical department	15 00
For microscope and object glass	70 00
Total	$20,547 89

The Board then proceeded to the election of officers, and the following were elected unanimously:

E. Cobb, to be President for one year.

J. M. Gregory, to be Regent for two years.

J. W. Bunn, to be Treasurer for two years.

The election of Secretaries was postponed until June meeting.

Messrs. Cobb, Gardner and Scott were appointed Executive Committee.

Col. Mason was granted leave of absence.

Adjourned till 2:30 P. M.

The Board assembled at the hour appointed.

It was voted that the Faculty be authorized to prepare and publish the annual Catalogue, 4,000 copies, and to make such slight alterations in courses of studies as may be deemed necessary or desirable.

A report from Miss C. E. Patchen, on attendance and receipts in Musical department, was read and approved.

The following report from the Committee on Ladies' Dormitory was received.

To the Honorable Board of Trustees Illinois Industrial University:

Your committee to whom was referred communication on Domestic Science and Ladies Hall ask leave to report—

That we have considered carefully the subject presented, and heartily approve the plans and recommendations, and would be glad to see them in successful operation, believing that it wonld add to the interests and benefits of the Department of Domestic Science. We see the need of the additional building to carry out more fully the system of education recommended; but at this time, we receive no encouragement from those in power for getting means to erect buildings and put same in operation. Your committee trust that we shall in the future be able to carry out the wishes of the report.

All of which is respectfully submitted.

D. GARDNER,
ALEX. McLEAN,
J. H. PICKRELL,
J. M. GREGORY.

The Regent and Business Agent were appointed a committee to advertise the University judiciously, not to exceed the appropriation.

The Regent was authorized to go to Springfield to appear before the Committee on Appropriations of the State Legislature.

Mr. Gardner reported the leasing of the 160 acres of the Griggs farm, for two years, at $3 per acre.

The meetings of the Literary Societies were so regulated as to close their exercises punctually at 10:30 P. M. in September, October, March, April, May and June, and at 10 o'clock P. M. during November, December, January and February.

Report from Lieut. Dinwiddie in regard to target-stops was deferred to June meeting.

The following report was received:

To the Honorable Board of Trustees Illinois Industrial University:

We the undersigned, Committee on Orchard and Fencing, would respectfully report that we do not deem it advisable to make any additional fences at present.

Very respectfully,
D. GARDNER,
J. H. PICKRELL.

Mr. McLean offered the following preamble and resolution, which were adopted:

WHEREAS, J. H. Pickrell, an old and efficient member of this Board ever since its organization, has placed in the hands of the Governor his resignation as such member, to take effect March 15, 1879; therefore, be it

Resolved, That the thanks of the Board of Trustees of Illinois Industrial University are hereby tendered to J. H. Pickrell, Esq., for his valuable services, counsel and interest in contributing to the success of this Institution, and that this resolution be made a part of the records of this Board.

Lieut. Dinwiddie's request to be relieved from duty here was referred to the Executive Committee and the Regent, with power to act.

On motion, it was resolved that the thanks of this Board are hereby tendered to the President, Regent and Treasurer for their services and counsel during the past year.

Mr. Millard moved that the Regent be and is hereby directed to submit to the Attorney-General of the State of Illinois the constitution, rules and by-laws of the students' organization of the Illinois Industrial University, and to ask of him a written opinion whether the system of students' government under said constitution and by-laws is in conflict with the laws of the State of Illinois.

The Executive Committee was instructed to mature a plan for leasing wild lands belonging to the University, and report to the June meeting.

Messrs. McLean, Fountain and Millard were appointed a standing Committee on Endowment and Income.

Adjourned.

MEETING OF THE BOARD OF TRUSTEES, JUNE 11, 1879.

The Board met at the University parlor, at 3 o'clock P. M.

Present—Messrs, Cobb, Gardner, Mason, McLean, Millard and Scott.

Absent—Governor Cullom, Messrs. Brown, Byrd, Conkling and Fountain.

The records of the last meeting were read and approved.

Mr. Millard then presented the following report from the committee on endowment and income:

To the Trustees of the Illinois Industrial University:

GENTLEMEN: Your committee, the undersigned, appointed at the last meeting to investigate the question of income for the University, beg leave to report, as follows:

Your Regent suggested to the Board three possible sources by which the revenue of the University might be increased:

First—An increase of term fees.

Second—The application of the College and Seminary Funds, granted to and held by the State.

Third—The enactment of a law granting to the University a fraction of a mill tax on the valuation of taxable property in the State.

Your committee deem it their duty to say that the one need of the University at the present time is a larger annual income for the proper support and maintenance of the Institution in all its departments.

The State of Illinois has accepted the donation of lands made by Congress in 1862, and has generously appropriated money at different times to erect buildings and establish the University on a broad basis.

The assumption of the trust and the investments of the moneys thus far appropriated seem to make it obligatory upon the State to maintain this Institution to the full extent of its designed usefulness, and your committee fully believe that when the condition of our University is properly placed before the Legislature of this State, prompt action will be taken to aid the University, and place it upon a sound and permanent financial footing.

As to the first suggestion, the increase of term fees, your committee cannot recommend any action in that direction, as such relief, if relief it be, must be of little aid, and your committee feel that it would result in actual loss and discredit to the University. The nearer a free school, the better its credit and usefulness. We recommend no increase of term fees.

As to the second suggestion, viz: Seminary or College Funds, your committee report the following facts:

In the year 1818 Congress passed an act entitled "*Enabling the People of Illinois to form a State Constitution.*"

In Sec. 6 of that Act, it is provided that certain propositions be offered to the convention of Illinois Territory for their free acceptance, or rejection, and if accepted, shall be obligatory upon the United States and the State.

One of the propositions was in terms as follows:

"3d. That five per cent. of the net proceeds of the lands lying within such State, and which shall be sold by Congress, from and after the first day of January, 1819, after deducting all expenses incidental to the same, shall be reserved for the purposes following, viz:

Two-fifths to be disbursed under the direction of Congress in making roads leading to the State, the residue to be appropriated by the legislature of the State for the encouragement of learning, of which *one-sixth part* shall be exclusively bestowed on a college or university."

Also another proposition, numbered "Fourth," viz: "That 36 sections, or one entire township, which shall be designated by the President of the United States, together with the one heretofore reserved for that purpose, shall be reserved for the use of *a seminary of learning*, and vested in the legislature of said State, *to be appropriated* solely to the use of such *seminary* by the said legislature." Rev. Stat. 1874, pp. 29, 30.

These offers were duly accepted by the convention, August 26, 1818.

Of the first named, or College Fund, there now exists	$156,613 32
Of the Seminary Fund, there is the sum of	59,838 72
Total	$216,452 04

These funds have been used by the State for ordinary revenue purposes, the State paying six per cent. interest on them; and this interest is distributed equally between the Normal schools, at Normal and Carbondale. (See Auditor's letter—Exhibit "A.")

This principal, first named fund, the State holds, as a trustee, and under the terms of the trust is obliged to "*exclusively bestow on a college or university:*" and the Seminary Fund, to be appropriated solely to the use of a *seminary of learning*. Board of Education *vs.* Greenbaum & Sons, 39 Ill. p. 619.

In 1861, by act of the legislature, the unsold seminary lands, amounting to between four and five sections, were donated to the Agricultural College at Irvington.

And it appears from the case of Attorney-General *vs.* Illinois Agricultural College et al., 85 Ill. Rep., p. 516, as well as by the Biennial Report of the Attorney-General, October 1, 1878, that the Trustees of this College sold, and realized from said lands $58,000; $30,000 of which was invested in the purchase of a College farm, at Irvington, Illinois, and the erection of College buildings thereon.

The balance of the $58,000 seems to have been expended by the College authorities; and the corporators having failed to comply with the trust, a decree was entered in Washington county circuit court, April 27, 1878, vesting the State with the title to the farm, consisting of about 560 acres. The legislature of last winter has provided for the sale of these lands, and the proceeds will be added to the Seminary Fund.

There is no way of applying these several funds to any college or seminary of learning, except by action of the Legislature. The State of Illinois contains but one institution which seems to embrace in its scope of higher education, the precise object for which these two funds were designed and to which they were limited, and that institution is the Illinois Industrial University.

Your committee, however, are of the opinion that it would be impolitic at the present time to ask the Legislature to apply the funds or their income to the University, as it would conflict with the interests of the Normal Schools.

As to the third suggestion, your committee have to report, that they have examined somewhat carefully the question of a mill tax to support the University, and have come to the following conclusions: Without some permanent income the Legislature must be called upon every session for an appropriation to sustain the buildings and grounds of the University. The appropriations of the last Legislature will merely float the institution for two years without adding to our permanent improvements, or aiding us in the support of our educational force. This constant application to every Legislature for support, brings with it more or less political opposition, and to some extent prejudice against the University, besides the uncertainty that must always accompany such biennial demands.

The State of Wisconsin, in 1876, passed an act (a copy of which is herewith presented for inspection) to provide permanently for deficiencies in the University fund income. Under this act annual appropriations have been done away with, and according to the report of the Secretary for the fiscal year ending September 30, 1878, the State tax under this law, being 1-10 of a mill on each dollar of the assessed valuation of the taxable property in the State, was $42,359.62. The same law applied to the equalized valuation of all taxable property in the State of Illinois, for the year 1878 would have produced for our University a like sum at 1-20 of a mill tax, or one-half the rate assessed in the State of Wisconsin.

This fraction of a mill tax would be less felt by the people at large than regular appropriations. It would be a permanent source of income. It would be evenly distributed throughout the State.

A one-twentieth of a mill tax for the University, with the income from its securities now belonging to the Institution, would produce an income that would keep up the buildings grounds and supply us with a full corps of Professors and teachers, and eventually enable us to make such improvements as will be needed from time to time.

Your committee therefore recommend that the question of a mill tax be presented to the friends of our institution, and the public by such methods as will win friends to such legislation, and that an organized effort be made at the next Legislature to secure such a law.

S. M. MILLARD, *Chairman Committee.*

The report was received and placed on file.

On motion of Mr. McLean, a recess was taken until 7 P. M.

EVENING SESSION.

The board convened as per adjournment.
Present as before.
Dr. Gregory read the following report, which was received.

REPORT OF REGENT.

To the Trustees of the Illinois Industrial University:

Through another college year our great work has moved on quietly and in good order, the University, fountain-like, pouring its silent streams of light and learning into the minds of its hundreds of students, to be by them, in due time, diffused in a thousand ways throughout the communities of the State. Are we not liable some times to forget the real importance and grandeur of our work in our watchfulness over the machinery with which it is performed? The real power of a great University, such as this has now become, can scarcely be overestimated. Standing related on the one side to the gigantic school system of the State, and inspiring that system to better and higher work, it stands connected on the other side, by means of its graduates, with the great leading industries and professions of the people, sending its annual company of recruits to swell their ranks or fill the vacancies which death constantly makes in the working battalion of men. Falling like showers and running as hidden streams, Learning and Science enter the great fields of the public life, and only in the lapse of time, and by the greener and larger growths, are their presence and power made known.

The work of the term has been done, in most cases, with the usual fidelity and success. The number in attendance, as is usual in the spring terms, has been less than in the fall and winter terms. The total attendance for the year has been larger than in any former year, amounting to 417. The numbers in the several courses and classes can be seen by reference to the reports of the Professors and Instructors. Reference is also made to the annual catalogue for interesting information in regard to the residence, college and classification of our students.

FACULTY AND ASSISTANTS.

1. I recommend for the coming year the re-appointment of Charles E. Pickard as Teacher of English and Ancient Languages in the Preparatory classes. I repeat the recommendation of last year that his salary be made at least $60 a month.

2. I recommend also the re-employment of F. W. Parsons as book-keeper and as teacher of book-keeping, and repeat the recommendation for the increase of his salary. This will be necessary if you wish to retain his services longer. I ask attention to his statement and request for leave of absence during the summer.

3. M. A. Scovell is at present Instructor in Agricultural Chemistry. By your usage, the Instructors and Assistants are appointed annually and for one year only. Their salary is counted for ten months. As Mr. Scovell has now approved himself as a good and valuable Instructor for some years, and as his services will be needed permanently in this department, I respectfully recommend that he be raised to the rank of Assistant Professor, with such salary as your funds will permit. His permanent appointment would, according to precedent, make his present salary continue through the year and thus give him an increase of $150 per annum.

4. If the resignation of Prof. Webb, which is now before you, be accepted, I respectfully, and with the concurrence of the Faculty, recommend that Mr. I. O. Baker be raised to the rank of Assistant Professor, and be assigned to the chair of Civil Engineering, with such salary as your funds will allow. The remark made of Mr. Scovell will hold also in the case of Mr. Baker.

5. I recommend the re-appointment of Mr. Charles I. Hayes as Assistant in Botany and Horticulture. Mr. Hayes is under service the entire year, and his salary is paid the twelve months. If the salaries already asked be increased, that of Mr. Hayes ought also to be increased.

6. I recommend the re-appointment of Mr. F. W. Prentice as Teacher of Veterinary Science. Dr. Prentice has thus far held the post of Lecturer, with no requirements except to give a daily lecture, and conduct a clinic during one or two terms. But he has, of his own good will, given two hours a day to his classes, and conducted a clinic throughout the year. The interest in Veterinary Science has of late so largely increased, and its importance to the stock growers of the country is beginning to be so largely appreciated, that a pressure begins to be felt upon us to develope this part of our work into a full school of Veterinary Science with power to grant the usual degrees. A report upon this subject, made by Prof. Morrow to the Faculty, and communicated herewith, gives some interesting and important facts. If our plans were not already as large as our present means will justify, I should urge this matter upon your immediate attention. As it is, I simply recommend that the rank of Dr. Prentice be raised to that of Professor of Veterinary Science, and that the increase of instruction in this department be provided for as soon as funds can be obtained. I ask attention to Dr. Prentice's report of cases and his request.

The other appointments are understood to be permanent, and I do not, therefore, ask any attention to them, except to repeat my recommendntions heretofore made, for an increase of the salaries of those whose long servi e entitles them to be ranked in common

with the other Professors. I ask your attention in this regard to the papers of Professors Crawford and Ricker. The request of Prof. Allen was laid over by you to the present meeting.

In making these requests, I do not forget the embarrassments under which you labor for the want of funds, nor do the Faculty wish to crowd unduly their claims upon your attention. They ask that their cases shall be justly considered and that such measures shall be taken as may, at the earliest day, meet their rightful expectations. I ought to say that some of them have refused larger salaries elsewhere, out of love for the University here, and have thus established a stronger claim on your generous regard.

I shall take the liberty, in another paragraph, to call your attention to a feasible plan for increasing our income.

NEW APPOINTMENTS ASKED.

1. I have heretofore asked the early filling of another chair in the College of Engineering. After a careful consultation with the professors in that College, it is believed that the present wants of the College will be best met by the appointment of an instructor in right-line drawing. In case you conclude to fill the place, I am prepared to nominate to you as a suitable candidate, Mr. Charles Hildebrand, formerly of the Sheffield School, and now in Germany.

2. I recommend the appointment of Henry M. Beardsley, as assistant in the Chemical Laboratory for the coming year, in place of W. D. Rudy, who is to leave, and with the same salary now paid Mr. Rudy.

3. The continuous employment of George A. Wild, as Curator and Taxidermist for the coming year, is deemed desirable. Mr. Wild has also done work in the preparatory classes, and has been paid in part from that fund. The diminished State appropriations for the collections will require that his salary, after this year, shall be provided for from the general fund.

COLLEGE OF ENGINEERING.

1. You will be gratified to see from the report of Prof. Peabody, that the shop practice classes in mechanical engineering, are larger than in any former term. This success has made important some changes in the shop, which Prof. Peabody has detailed in his report and to which I ask your favorable attention. Plans are submitted by him for the enlargement of the foundry, the blacksmith shop and the lumber sheds.

2. Mr. Baker, of the School of Civil Engineering, asks for the purchase of an additional chain for the field classes. The cost will be $15. It seems necessary.

3. Prof. Ricker, Dean of the College of Engineering, asks that the northeast corner basement room be allowed that College as a laboratory for copying work, and that an appropriation of $30 be made for a sink and other fixtures. The room has been used as a store room, and can be spared for this purpose. Prof. Ricker also asks authority for Mr. Baker to purchase, from the money received for regulation paper, a new supply of paper.

4. Prof. Ricker asks for his school, that of Architecture, $100 from the State appropriation for the shops for additional tools for the use of the shop practice classes. He also asks for the employment of Mr. Spencer, now in the shop, as foreman of the wood working shop for the coming year.

PHYSICAL LABORATORY.

Plans are hereby submitted for the changes in the Physical Laboratory, recommended in my report last March. These changes will cost $300 or $350, but they are so important to the work of this department that they ought to be made without hesitation. They will give to our Physical Laboratory room, more commensurate with its importance. I ask also that Prof. Peabody be authorized to expend the small balance of the former State appropriation and what is necessary of the new appropriation for the repairs of apparatus and the purchase of such new apparatus as may be needed for the coming year.

CHEMICAL LABORATORY.

1. Our new Laboratory, with its spacious rooms and improved facilities, has added greatly to the volume as well as to the value of our work in this branch. More students have worked in the laboratory and more work has been done by each student. The Professor asks for two additional desks, affording sixteen additional working places for students in the Quantitative Laboratory. Cost, $300.

Prof. Weber asks also for the specimen case, heretofore mentioned to you, for the large recitation room. The cost is estimated at $150

The usual appropriation for the purchase of chemicals and desk apparatus is also asked for. Amount required, $497.65.

SCHOOL OF HORTICULTURE.

1. Prof. Burrill's report communicates interesting information concerning this department, and asks for liberty to change the walk west of main building to gate. I think the change desirable, but plank better than gravel, as many students enter by that walk, and the gravel is not as clean, especially in winter.

2. He asks also for a connection to be made with the tank in the main building, for water supply for the greenhouse. If the water closets be removed, as contemplated, and the new ones be earth closets, the tanks may afford the supply asked, but not otherwise.

SCHOOL OF AGRICULTURE.

Prof. Morrow's report contains no new requests. He asks leave of absence during the summer months, to enable him to make some observations which will be of great use to him in his instructions, upon the agriculture of Great Britain and France. I cordially second this request, believing it always desirable to allow our professors the widest opportunities for study and observation in other, and especially European countries.

The paper of Head Farmer Lawrence shows the prosperous condition of the interests under his charge.

THE LIBRARY.

The Librarian reports an addition of 587 volumes during the year, and an outstanding order for some hundreds more. He asks for the authority to procure the usual summer binding of periodicals and other books. This will be necessary.

2. He asks also that the purchase of the new books provided for by the State appropriation, be made as far as practicable this summer. Our usage has been to make up full lists for the several departments and to give this order to the lowest bidder. A difficulty has been found in this plan in the delay it occasions. It is believed that a contract can be made with some respectable dealer to furnish, at a fair discount, the books ordered during the year as they may be wanted. In this case, it would be desirable to lodge with the Regent, Librarian and Business agent, as heretofore, authority to make such contract, and purchases thereon, as they may be wanted.

NEW WATER CLOSETS AND BOILERS AND VENTILATION.

The Legislature appropriated to the University the various sums asked by you, except the $500 asked for by the Military Department, and $1.000 of the $2,000 asked for the Natural History collections.

An appropriation of $2,500 having been made for the construction of new water closets, and for the new ventilation of the main building, plans for such water closets and ventilation have been carefully considered and will be laid before you. The propo ed closets are designed to be used as earth closets, but they can readily be turned into water closets proper if at any time it should be deemed desirable.

The ventilation will demand especial care, and it is judged desirable in order to obtain the best results, to separate the corridors and some of the large rooms of the basement and first floor from the general plan, and warm and ventilate them as a separate system.

The boilers ought to be put in during vacation, so as not to hinder or interrupt our work in the autumn.

THE MILITARY DEPARTMENT.

I ask attention again to the requests of the Professor of Military Science and Tactics for provision for target practice. Something ought also to be done to provide the band with several new instruments, as the failure of the legislative appropriation leaves them unprovided for. Our band are doing us a daily service in our chapel assembly which asks for your favorable regard.

THE UNIVERSITY FUNDS.

I cannot forbear to ask your serious attention again to the absolute and increasing need for a larger income to support our work, and save the University from serious if not fatal harm. We are already grinding between the upper and nether mill-stones. Laying out our plans at the outset, on a scale commensurate with the wants we were called upon to satisfy, and with the funds we supposed would be at our disposal; we have seen those funds shrink in their interest-bearing power, till we have been crippled for ordinary expenditures; and we are obliged to confront the stern certainty of still further shrinkage. You have already once cut down the pay of faithful professors, and we have made up for the loss of others by increasing the work of those who have remained. To-day we need at least two more men in professor's chairs, and several assistants in departments now in operation; but instead of the aid we need to see coming to our help, we are obliged to contemplate a possible further reduction of our forces, if not also the sad relinquishment of ground we have begun so well to occupy. With limited funds, but hopeful of the future, you have reared here a University which in twelve years has attained a larger growth than the Michigan University attained in twenty-five, or than Harvard attained in two hundred. You have planted a true American State University, one that may fairly and fearlessly claim for itself a place in the first rank of State Universities of this country. But to hold this place it is absolutely essential that your treasury shall be recruited with new funds, and a more liberal income.

Two sources alone seem accessible to us; first, *State aid* by a tax such as Michigan and Wisconsin have grated to their Universities, and second, by an increase of fees. I am compelled to recommend the increase of fees, at least until the State aid shall be given. In this increase we shall but follow the example of all our predecessors. If notice is given a sufficient time beforehand, no serious complaint will be made by our patrons, and the attendance will not be affected unfavorably. The simple doubling of the present term fee will add about five thousand dollars a year to our income, and relieve our most pressing wants.

But our relief is not to be sought wholly in the increase of our fund, it is equally important at the present moment, at least, that we curtail all needless expenses. I know of no points, however, where such expenses can be found, if it is not in some of the incidentals, the expenditures for lights, for fuel and for the merely subordinate services of janitors. The expenditure for gas and fuel can be lessened, to the University, at least, by requiring the literary societies to pay, as they do in all other universities and colleges, for the lighting and warming of their halls. The arrangement can easily be made for this, and the effect may be further useful by leading them to practice economy in these items such as they now seem quite disinclined to. It is also believed that we are paying more for the mere sweeping and care of the buildings than such unskilled labor demands. There are several candidates for this work who are well recommended, and who are anxious to take the places for much less than is now paid. At least three hundred dollars a year can be saved on the care of the main building alone. Our higher necessities compel me to call your attention to this subject.

UNIVERSITY EXAMINATIONS.

In accordance with the plan proposed at the March meeting, I have made the necessary correspondence to open, if you so order, summer examinations for candidates for the University in several parts of the State. The places proposed are Chicago, Rockford, Rock Island, Quincy, Peoria, Paxton, Springfield, Belleville, DuQuoin, and Olney. Aurora and Ottawa are also under consideration. Some of these points may need to be changed, on further correspondence. The meetings should be held as soon as they can be sufficiently advertised, perhaps the last two weeks in July and the first two in August. Each examination should be attended by two members of the faculty, and should continue in session two days, at least.

J. M. GREGORY, *Regent.*

Treasurer J. W. Bunn read the financial report; which, on motion was received and placed on file:

JOHN W. BUNN, TREASURER,

In account with Illinois Industrial University.

1879.	DR.		
March 12..	To balance		$12,313 23
March 31..	" amount received on account, Fees and room rents	$926 00	
	" " " " Tuition in preparatory department	1,450 00	
			1,376 00
April 1....	" interest on Sangamon county bonds	$1,250 00	
	" " Douglas county school district bonds	450 00	
			1,700 00
May 31....	" amount rec'd on account of Architectural Department	$407 27	
	" " " " Mechanical "	650 55	
	" " " " Agricultural "	1,632 13	
	" " " " Horticultural "	292 23	
	" " " " Chemical "	388 91	
	" " " " Buildings and grounds	51 10	
	" " " " Library	1 00	
	" " " " Printing and stationery	100 00	
	" " " " Fuel and lights	107 55	
	" " " " Ill. Cent. R. R. donation	358 35	
	" " " " Fees and room rent	1,056 28	
	" " " " Tuition in preparatory department	465 00	
			5,510 37
			$20,899 60

1879.	CR.		
May 31....	By amount paid for Board expense	$89 95	
	" " " Salaries	7,771 94	
	" " " Fuel and lights	501 33	
	" " " Stationery and printing	374 14	
	" " " Building and grounds	22 95	
	" " " Incidental expense	39 18	
	" " " Furniture and fixtures	93 48	
	" " " Library and apparatus	11 61	
	" " " Mechanical Department	692 59	
	" " " Architectural "	474 95	
	" " " Agricultural "	1,214 49	
	" " " Horticultural "	248 32	
	" " " Chemical "	397 32	
	" " " Military "	40	
	" " " Physical Laboratory	53 33	
	" " " Cabinets	1 90	
	" " " Preparatory Department	485 00	
	" " " Illini	56 97	
			$12,529 85

State Appropriations—			
By amount paid on account of Buildings and grounds....	$289 58		
" " " Chemical and Physical Laboratory.....	73 20		
" " " Mechanical and Architect'l Shops.....	309 20		
" " " Books and publications...	469 21		
" " " Cabinet cases.....	501 79		
" " " Cabinets.....	142 66		
" " " Chemical Laboratory.....	14 70		
" " Taxes on Lands in Nebraska and Minnesota.....	2,298 52		
		$4,098 86	
Balance.....	.....	4,270 89	
		$20,899 60	

URBANA, June 10, 1879. JOHN W. BUNN, *Treasurer.*

On motion, the Chair appointed Messrs. McLean, Scott and Millard, a committee to examine the vouchers in the hands of the Treasurer.

Treasurer Bunn presented the contract, duly signed by Messrs. Bunn and Gardner on behalf of this Board, and by the Chairman and Clerk of the Board of Supervisors of Champaign county, stipulating that $20,000 of said county bonds therein described be carried by the Board of Trustees until May, 18—, provided that said bonds shall draw ten per cent. per annum.

The following resolution was offered by Mr. Millard, and adopted:

Resolved, That the Executive Committee be and hereby are authorized to demand and use all necessary means to collect from the county of Champaign the balance of the loan, about two thousand dollars, due the Illinois Industrial University.

On motion of Mr. Gardner, the bond of J. W. Bunn, Treasurer of this Board was fixed at one hundred thousand dollars, and the Executive Committee authorized to receive and approve the same.

The following resolution was offered by Mr. Gardner, and passed;

WHEREAS, $30,000 of Pike County bonds mature and will be paid July 1, 1879; be it

Resolved, That the Treasurer be and he is hereby authorized to reinvest said amount to best advantage, and report his action to this Board.

Professor S. W. Shattuck presented the following report, which was received:

Hon. Emory Cobb, President Board of Trustees Illinois Industrial University:

SIR: I have the honor to make the following Financial Report for the three months ending June 1st, 1879.

Paper A, is a statement of current appropriations, receipts and expenditures passing through my hands.

Paper B, is a statement of State appropriations of July 1st, 1877, and of July 1st, 1879.

Paper C, is a list of warrants, drawn since the March meeting of the Board. Those from 528 to 572 are drawn at this time.

Paper D, is a list of several bills presented for approval. 102, Dr. Gregory can inform you of. No. 3, is for a surgical instrument very much needed by Dr. Prentice in his department work. No. 4, is for work done and materials furnished, but not authorized.

Respectfully submitted,

S. W. SHATTUCK, *Business Agent.*

"A"

Current Appropriations and Receipts.

For what expended.	Appropri't'd	Receipts.	Expended.	Balance.
Board expense	$300 00		$89 97	$200 03
Salaries	15,635 00		7,771 94	7,863 06
Fuel and lights	1,000 00	$107 55	501 33	606 22
Stationery and printing	600 00	100 00	374 14	325 86
Buildings and grounds	200 00	1 10	22 95	228 15
Incidental expense	200 00		39 18	160 82
Fixtures and furniture	100 00		93 48	6 52
Library and apparatus	50 00	1 00	11 61	39 39
Mechanical department	77 32	650 55	692 59	35 28
Architectural "	142 28	407 27	474 64	74 60
Agricultural "	1,766 83	1,632 13	1,214 49	2,184 47
Horticultural "	60 00	292 23	248 32	103 91
Chemical "	86 03	388 91	397 32	77 62
Military "	50 00		40	49 60
Sundries—Dom. Science specimens, $30				
Physical laboratory, bal. $175 24			53 33	121 91
Cabinets, $5.19			1 90	3 29
Microscope objectives, $70				70 00
Preparatory department		915 00	485 00	430 00
Illini	56 97		56 87	
Illinois Central R. W. donation		358 35		
Fees and room rents		1,982 28		
State appropriations			4,098 86	

"B"

State Appropriations.

July 1st, 1877.	Appropri't'd	Expended.	Unexp'nded
Taxes on lands	$4,306 02	$4,306 02	
Buildings and grounds	5,000 00	4,947 92	$52 08
Chemical and physical laboratories	2,000 00	1,873 13	126 87
Mechanical and architectural shops	3,000 00	2,756 66	243 34
Library cases	1,000 00	1,000 00	
Books and publications	3,000 00	2,755 80	244 20
Cabinet cases	4,500 00	2,455 77	2,044 23
Cabinets	2,000 00	2,060 25	
Chemical laboratory	40,000 00	39,965 68	34 32
Greenhouse	2,500 00	2,496 34	3 66
	$65,298 52	$62,610 07	$2,748 70
July 1st, 1879.			
Taxes on lands	$2,298 52	$2,298 52	
Buildings and grounds, per annum	2,500 00		
Chemical and physical laboratories, per annum	1,000 00		
Mechanical and architectural shops, " "	1,500 00		
Books and publications, per annum	1,500 00		
Cabinets (one year)	1,000 00		
Water closets, etc	2,500 00		
Heating apparatus	3,000 00		

"C."

List of Bills for which Warrants have been Drawn.

No.	To whom.	For what.	Amount.
393	Alex. McLean	Expense to meeting	$20 70
394	S. M. Millard	" "	19 90
395	J. J. Byrd	" "	16 65
396	R. B. Mason	" "	3 50
397	J. H. Pickrell	" "	7 75
398	T. T. Fountain	" "	15 00
399	Photo Engraving Company	Electrotype, Chem. Lab	27 95
400	S. H. Peabody	Petty expense, Lab	2 90
401	J. M. Gregory	Salary, March, 1879	300 00
402	T. J. Burrill	" "	150 00
403	S. W. Shattuck	" "	150 00
404	E. Snyder	" "	150 00
405	D. C. Taft	" "	150 00
406	J. C. Pickard	" "	150 00
407	N. C. Ricker	" "	125 00
408	J. D. Crawford	" "	125 00
409	H. A. Weber	" "	150 00
410	G. E. Morrow	" "	150 00
411	S. H. Peabody	" "	166 66
412	E. L. Lawrence	" "	83 33
413	P. Baumgras	" "	125 00
414	Lou. C. Allen	" "	100 00
415	F. W. Prentice	" "	100 00
416	F. A. Parsons	" "	75 00
417	I. O. Baker	" "	75 00
418	M. A. Scovell	" "	75 00
419	C. I. Hays	" "	75 00
420	C. E. Pickard	" "	50 00
421	J. C. Llewellyn	" "	60 00
422	E. A. Kimball	" "	100 00
423	Geo. A. Wild	" "	60 00
424	C. W. Clark	" "	50 00
425	W. D. Rudy	" "	45 00
426	A. B. Baker	" "	40 00
427	C. W. Williams	" "	30 00
428	Jno. Stott	Stationery	20 75
429	Hatch, Holbrook & Co	Lumber	42 50
430	G. C. Willis	Muslin	6 00
431	Ill. Cent. Railroad Co	Advanced freight	2 30
432	D. Weeks	75 fence posts	7 50
433	Stillwell & Bierce	Heater back	7 14
434	Jerry Reed	Repairs on boiler	21 20
435	Henry & Kariher	Soda, soap, etc	8 21
436	Mechanical Department	Work, coal, etc., for Illini	52 19
437	Architectural Department	" " "	4 78
438	Agricultural Department	Farm expense, March	300 84
439	U. S. Patent Office	Binding reports	7 80
440	L. E. Patchin	Use of piano	2 00
441	John O'Neil	Work	13 65
442	B. D. Harmel	Work on desk	3 50
443	Decker, Smith & Co	Papyrographic paper	4 25
444	F, W. Christern	Books	79 13
445	J. E. Sartan	Paper	4 53
446	E. B. Benjamin	Chemical apparatus	61 27
447	Students' pay-roll	March, 1879	311 87
448	C. and U. Gas Co	Bill for February	39 00
449	J. M. Gregory	Salary, April	300 00
450	T. J. Burrill	" "	150 00
451	S. W. Shattuck	" "	150 00
452	E. Snyder	" "	150 00
453	D. C. Taft	" "	150 00
454	J. C. Pickard	" "	150 00
455	N. C. Ricker	" "	125 00
456	J. D. Crawford	" "	125 00
457	H. A. Weber	" "	150 00
458	G. E. Morrow	" "	150 00
459	S. H. Peabody	" "	166 66
460	P. Baumgras	" "	125 00
461	L. C. Allen	" "	100 00
462	F. W. Prentice	" "	100 00
463	E. L. Lawrence	" "	83 33
464	F. A. Parsons	" "	75 00
465	I. O. Baker	" "	75 00
466	M. A. Scovell	" "	75 00
467	C. I. Hays	" "	75 00
468	C. E. Pickard	" "	50 00

"C"—*List of Bills*—Continued.

No.	To whom.	For what.	Amount.
469	E. A. Kimball	Salary, April	$100 00
470	G. A. Wild	" "	60 00
471	C. W. Clark	" "	50 00
472	W. D. Rudy	" "	25 00
473	A. B. Baker	" "	40 00
474	C. W. Williams	" "	30 00
475	Enterprise Coal Co	8 cars coal	98 40
476	R. S. Wilbur	Hauling coal	19 10
477	Frank K. Robeson	Crash towels	4 40
478	Larrabee & North	Hardware	27 66
479	" "	"	2 68
480	Agricultural Department	Farm expense	328 13
481	G. A. Wild	Expense in Museum	25 02
482	Brown & Holdoway	Books	6 00
483	P. Henderson & Co	Seeds	2 42
484	Thos. Meehan	Planks	16 37
485	D. S. Covert	Locks	25 24
486	Thos. Wright	Castings	64 05
487	Carl Shoenhof	Books	15 15
488	J. M. Gregory	Expense to Springfield	6 45
489	N. E. Glass Works	Physical apparatus	17 42
490	C. & U. Gas Co	Gas for February and April	158 40
491	American Express Co	Charges for express	12 35
492	H. K. Vickroy	Plants	4 00
493	E. B. Benjamin	Chemical apparatus	62 48
493	½ " "	Physical apparatus	20 45
494	Students' pay-roll	April, 1879	271 01
495	Walker & Stayman	Lumber	9 95
496	W. F. Pratt	Repairs on roof	75 70
497	C. J. Sabin	Tubing	1 00
498	Walker & Mulliken	Matting	51 20
499	N. S. Spencer	Instructing S. P. Class	37 50
500	D. S. Covert	Yale locks	15 84
501	Crane Bros. Manufacturing Co	Hardware	43 74
502	J. M. Gregory	Salary, May, 1879	300 00
503	T. J. Burrill	" "	50 00
504	S. W. Shattuck	" "	150 00
505	E. Snyder	" "	150 00
506	D. C. Taft	" "	150 00
507	J. C. Pickard	" "	150 00
508	N. C. Ricker	" "	125 00
509	J. P. Crawford	" "	125 00
510	H. A. Weber	" "	150 00
511	G. E. Morrow	" "	150 00
512	S. H. Peabody	" "	166 66
513	P. Baumgras	" "	125 00
514	L. C. Allen	" "	100 00
515	T. W. Prentice	" "	100 00
516	E. S. Lawrence	" "	83 63
517	T. A. Parsons	" "	75 00
518	I. O. Baker	" "	75 00
519	M. A. Scovell	" "	75 00
520	C. I. Hays	" "	75 00
521	C. E. Pickard	" "	50 00
522	E. A. Kimball	" "	100 00
523	G. A. Wild	" "	60 00
524	C. W. Clark	" "	50 00
525	W. D. Rudy	" "	35 00
526	A. B. Baker	" "	40 00
527	C. W. Williams	" "	30 00
528	Agricultural Department	Expense, May	285 60
529	C. I. Hays	Cash paid for labor	5 15
530	Brown & Holdoway	Books	5 50
531	Western Elect. Manufact'ing Co	Battery cups	1 50
532	Zell, Francis & Co	1 barrel alcohol	16 00
533	Stearns & Co	1 barrel stucco	2 00
534	Alonzo Reddick	9½ days' work	9 50
535	J. W. Bunn	Taxes on lands	2,298 52
536	Ill. Cent. Railroad donation	Freight for February, March, April	358 35
537	L. A. Walden	Work on grounds	10 50
538	A. B. Baker	Cash paid for labor	15 00
539	N. S. Spencer	Instruction in shop	50 00
540	R. S. Wilbur	Hauling coal	3 60
541	Trevett & Green	Hardware	25 45
542	Fuller & Fuller	Glass and alcohol	67 37
543	Fuller & Fuller	Glass	9 94
544	J. E Saxton & Co	Paper and zinc	6 00
545	Thos. Wright	Instruction in shop	24 75

"C"—*List of Bills*—Continued.

No.	To whom.	For what.	Amount.
546	A. E. Foote	Smithsonian Reports	$9 00
547	E. S. Ritchie & Son	Physical apparatus	33 83
548	Larrabee & North	Hardware	6 95
549	E. B. Benjamin	Platinum dishes	9 93
550	Leggat Bros.	Books	335 03
551	W. A. Moore	Hardware	3 26
552	" "	" "	3 15
553	Agricultural Department	Work on grounds	40 40
554	" "	Work for other departments	128 33
555	I. B & W. R. R	Freight	12 90
556	U. S. Patent Office	Binding reports	7 80
557	Students' pay-roll	May, 1879	291 37
558	Crane Bros. M'f'g Co	Hardware	11 44
559	H. Swannell	Chemicals	140 31
560	Mechanical Department	Work and material	310 53
561	" "	" "	168 85
562	Architectural Department	" "	68 68
563	" "	" "	268 04
564	Champaign Gazette	4,000 catalogues, envelopes, etc	267 50
565	H. T. Hall	Fruit-boxes, etc	8 25
566	Horticultural Department	Work on grounds	28 33
567	Peterson & Lloyde	Books	3 80
568	" "	Paper, etc	4 65
569	C. E. Patchin	Use of piano	2 00
570	E. W. McAllister	Postage	43 13
571	S. W. Shattuck	Petty expenses 3 months	77 48
572	Buildings and grounds	920 feet pipe	32 20

Mr. Lorado Taft presented his account, of $27 50, for instruction in clay moulding; which, on motion, was allowed, and ordered to be paid.

Mr. W. A. Thompson presented his account, for services as adjutant in the Military Department, of which $15 was allowed, and ordered to be paid.

The bill of E. H. Sargent & Co., of $25 50, was also allowed, and ordered to be paid.

The Board then adjourned, to meet at 8 o'clock A. M.

THIRD DAY'S SESSION.

The Board assembled at the hour appointed; present, as yesterday.

The Executive Committee made the following report in regard to renting University lands, in Nebraska; which was adopted, and the blank in the same, on motion of Mr. Millard, ordered to be filled by the Executive Committee:

To the Honorable Board of Trustees Illinois Industrial University:

The Executive Committee, to whom was referred the leasing of land owned by the University in Nebraska and Minnesota, report that we have had under consideration the same, and find, from information from Mr. Pickrell and other sources, that the plan substantially pursued by the State of Nebraska, in leasing her school lands, is as good as we can recommend; and would further recommend that a commission be appointed to put the lands under lease, in Nebraska and Minnesota, as soon as practicable, on best terms possible.

All of which is respectfully submitted.

EMORY COBB,
D. GARDNER,
JAS. R. SCOTT.

The recommendations of the Faculty, for conferring degrees and certificates on those entitled to them, were approved, and the following degrees and certificates granted:

Class of 1879.

O. W. Hoit, Elisha Lee; Bachelor of Science, School of Agriculture.

R. B. Coburn; Bachelor of Science, School of Mechanical Engineering.

H. P. Bourne, F. S. Milton; Civil Engineering.

J. H. Gunder, W. P. Kemble, Isaac Kuhn, W. Thompson; Bachelor of Science, School of Mining Engineering.

Miss Mary L. Page; Bachelor of Science, School of Architecture.

Miss Augusta E. Butts; Bachelor of Science, School of Natural History.

Miss Isabel Hale; Bachelor of Science, School of Domestic Science.

Lorado Taft, Henry M. Beardsley, Miss Minnette C. McAllister; Bachelor of Literature, School of English and Modern Languages.

S. Cecil Stanton, Arthur Swannell, W. N. Butler, C. L. Whitmire, W. P. Johnson, F. E. Walker, Nettie Kimberlin; Certificates.

Other Students.

George R. Shawhan; Bachelor of Literature, School of English and Modern Languages.

Charles A. Smith; Bachelor of Science, School of Mechanical Engineering.

Emma C. Piatt, Sarah Deardorf; Bachelor of Science, School of Domestic Science.

Emma Page; Master of Literature, School of English and Modern Languages.

Henry S. Reynolds; Master of Science, School of Natural History.

C. C. Wakefield, W. L. Williams, Wm. Collins; Partial certificates.

Colonel Mason was, upon motion, granted leave of absence.

The Board adjourned to 2:30 P. M.

AFTERNOON SESSION.

The Board met on time; present as before, Mr. Fountain arriving, instead of Colonel Mason, excused.

The Auditing Committee made the following report, which was approved:

To the Honorable Board of Trustees Illinois Industrial University:

The committee to whom was referred the report of the Treasurer, beg leave to report that they have carefully examined the books and vouchers, and find that warrants numbered 442 to 827, inclusive, and warrants numbered 1 to 392, inclusive, issued from March 1, 1878, to March 1, 1879, have been paid and canceled.

Respectfully submitted.

ALEX. McLEAN,
JAS. R. SCOTT,
S. M. MILLARD,
Committee.

On motion, Prof. Baker was authorized to purchase certain regulation paper for Civil Engineering Department, with collections in his hands now, and report the purchase and sales of said paper from time to time to the Business Agent.

On motion of Mr. Millard, the recommendation of Prof. Burrill in regard to walks on west side of main building was referred to Messrs. Scott and Gardner, with power to act.

Mr. Gardner, Prof. Crawford and the Business Agent were authorized to have the binding of books for the library done on best terms that can be made.

On motion of Mr. Millard, the Regent, Librarian and Business Agent were authorized to draw on State appropriation to the amount of $500 for such new books as may be needed, and report from time to time to the Board.

Adjourned to 7:30 P. M.

EVENING SESSION.

The Board met at 7:30 P. M.

Major Dinwiddie made an oral report on target practice, need of new band instruments, etc., for the Military Department, which was received.

The Treasurer made the following report, enumerating the bonds in which the Endowment Fund is invested:

SPRINGFIELD, ILL., June 6, 1879.

Bonds belonging to the Illinois Industrial University:

Champaign county	8	per cent.	bonds	$115,000 00
Morgan county	8	"	"	25,000 00
Kankakee county	10	"	"	30,000 00
Pike county	10	"	"	30,000 00
Pike county	10	"	"	5,000 00
Sangamon county	10	"	"	25,000 00
Menard county	7	"	"	10,000 00
Sangamon county	8	"	"	11,000 00
Illinois	6	"	"	27,000 00
Illinois School District, Douglas county,	10	per cent.	bonds	9,000 00
Champaign county	10	per cent.	bonds, in hands Prof. Shattuck	2,000 00
Chicago	7	per cent.	bonds	25,000 00
				$314,000 00

All the bonds except the Illinois 6 per cent. bonds have printed notice on them as follows:

TAKE NOTICE.—This bond is the property of the Illinois Industrial University, and no sale, transfer or assignment of the same will be valid without the written signatures of Regent, President and Recording Secretary of said University endorsed hereon.

SPRINGFIELD. JOHN W. BUNN, *Treasurer.*

Upon motion, the following recommendations of the Regent, in regard to Professors, Assistants and Instructors, were concurred in:

Selim H. Peabody, Professor of Mechanical Engineering and Physics, $2,000 per annum.

Fernando A. Parsons, Instructor in Bookkeeping and Bookkeeper, $900 per annum.

Ira O. Baker, Assistant Professor of Civil Engineering, $900 per annum.

Melville A. Scovell, Assistant Professor of Agricultural Chemistry, $900 per annum.

Charles I. Hays, Assistant Professor in Horticulture and Botany, $900 per annum.

Charles E. Pickard, Assistant in English and Ancient Languages, $60 per month for 10 months.

E. A. Kimball, Foreman in Machine shops, $1,200 per annum.

Chas. Hildebrand, Instructor in Drawing, $90 per month for 10 months.

Henry M. Beardsley, Assistant in Chemical Laboratory, $35 per month for 10 months.

George A. Wild, Curator of Museum and Taxidermist, $60 per month for 10 months.

Nelson S. Spencer, Foreman of Carpenter shop, $30 per month for 10 months.

On motion of Mr. Scott, Dr. F. W. Prentice was appointed Professor of Veterinary Science.

Mr. McLean moved that the question of building new privies be referred to the Executive Committee. Adopted.

On motion of Mr. Scott, Mr. McLean was added to the committee.

Upon motion of Mr. Millard, the entire matter of heating, drainage and purchase of engine boiler was referred to the Executive Committee and Mr. McLean.

The consideration of Major Dinwiddie's request for targets, etc., was postponed to September meeting.

On motion of Mr. Scott, the Regent and Business Agent were made a Committee on Advertising.

On motion of Mr. Scott, the bill of W. T. Pratt, for painting roof of Drill hall, was laid over till next meeting.

Leave of absence, during vacation, was granted to Professors Morrow, Burrill and Taft; also to Mr. Parsons.

On motion of Mr. Fountain, the election of Secretaries and Business Agent was postponed to the next regular meeting.

The subject of supplying water to the green-house was referred to the Executive Committee, as also was the employment of janitors.

On motion of Mr. Scott, Prof. Morrow and Mr. Lawrence were authorized to purchase one Jersey bull, at a cost not to exceed $75.00.

Regent Gregory and Miss Allen were granted leave of absence till 1st of November, 1879.

Mr. Millard moved that Prof. Peabody's request for changes in Physical Laboratory and wants in Mechanical shops, and Prof. Weber's request for additional desks in Chemical Laboratory, be referred to the Executive Committee and Mr. McLean. Carried.

The Chairman of the Executive Committee reported that Major Wm. A. Dinwiddie had withdrawn his resignation laid before this Board at the March meeting.

The Major's request for additional pay from University funds was laid over until next meeting.

The purchase of a Surveyor's chain for the Department of Civil Engineering was ordered, and $15 appropriated for same.

Prof. Ricker's request for $30 to furnish east tower room in basement for Photographical work was granted; also Prof. Weber's demand for $497.60 for usual purchase of chemicals for next school year.

Adjourned.

E. COBB, *President.*

E. SNYDER, *Recording Secretary.*

MEETING OF THE BOARD OF TRUSTEES, SEPTEMBER, 1879.

The Board met in the University Parlor, on Tuesday, September 9, 1879, at 3 o'clock P. M.

Present—Messrs. Cobb, Gardner, Mason, Scott, and Treasurer Bunn.

A letter from Mr. McLean was read by the Secretary, informing the Board that sickness in his family would prevent attendance at this meeting.

No quorum being present, the Board adjourned till 8 o'clock Wednesday morning.

SECOND DAY'S SESSION.

The Board met as by adjournment.

Present—Messrs. Cobb, Gardner, Millard, Mason and Scott.

Absent—Governor Cullom, Messrs. Byrd, Conkling, Fountain and McLean.

The record of last meeting of the Board was read and approved, as also was the record of the meeting of the Executive Committee of June 7, 1879.

The following paper from Dr. J. M. Gregory, was read by the Secretary, and ordered to be placed on file:

To the Honorable Trustees of the Illinois Industrial University:

GENTLEMEN:—The ocean that rolls between me and the University does not diminish my interest in its affairs, nor my solicitude for its prosperity. I shall regret my absence from your coming meeting as it will prevent my rendering the ordinary assistance which I have always striven to lend to your important deliberations. Allow me to take the occasion to express my own profound sense of the value of the gratuitous labors which you so generously render the State in the case of this, its chief institution of learning. As no one knows better than myself, the difficulties which surround you, and the constant succession of embarrassments and obstacles which you are obliged to encounter and overcome, so no one can better appreciate the generous public spirit which leads you to devote so much of valuable time and still more valuable effort, to the charge which the State imposes upon you. Let me hope that the continued prosperity and growth of the institution whose destinies you guide, may continue in the future, as in the past, to give you that satisfaction and reward which the State otherwise fails to afford you.

If in any case myself or my colleagues shall, in our solicitude for the University, and in our deep sense of its needs, seem unmindful of the difficulty of your labors, and shall urge, too strenuously, our wishes, or our wants, let it not be supposed that we forget the responsibility under which you act, or doubt, in the least, the generosity or wisdom of your councils and your plans. Posterity will certainly recognize the value of your work, and repay it with gratitude and praise.

THE GREAT WANT.

All observation and reflection impress upon me the urgent necessity there is for an increase in the teaching force of the University. This is really its greatest need. Whether compared with the best institutions of our own country, or the great universities here in Europe, or considered in relation to the time, aims and uses of a university, it must be evident to every intelligent mind that we cannot properly do the work planned for us, nor

maintain the standing which, as a State University, we ought to maintain, while the members of our Faculty are crowded with such continuous class-room labor. In our best American institutions, one or two lessons or lectures a day are counted as the utmost of profftable requirement of a first-class professor, and in Germany no professor gives more than one lecture a day, and many give only two or three a week. It is this that enables them to make that profundity of investigation and high attainment in their branches which have given to the German universities their eminent standing, and attached to them the best students from all quarters of the globe.

I would not ask that the work of our professors should be reduced to this amount, for much of it is, at present, necessarily elementary in character, and requires but little of special preparation, though it necessarily occupies the time and exhausts the strength of the professor.

But no one who understands the nature and the exhausting demands of high scholarship will expect professors to attain it who are required to give four or five hours a day to the instruction of classes. Before the University can attain the rank and reputation we all desire for it, its teaching force must be so increased that its leading professors, who represent branches of instruction, shall have ample leisure and strength for extensive study and investigation—such study and investigation as can alone place them among the great masters and authorities in their several branches.

A true university must be a fountain of learning as well as a school of instruction. It must be a place where knowledge and science are discovered and perfected, as well as a center for its dissemination. It is the presence of great masters, men of genius and learning and leaders of thought, which everywhere makes and marks the true university. Great numbers of students prove nothing unless they are attracted by the presence of great teachers. It is the presence of Curtius, Helmholtz and Renke, and not its three thousand students, which gives to Berlin University its world-wide renown. The three thousand students are but the natural fruit and consequence of the great teaching which the university presents.

I know well that years must elapse before our young institution, in the midst of our young though thriving State, can hope to attain such dignity and distinction. But will not a wise Board of Trustees, understanding the real scope and high importance of their work, keep these grander aims always in mind?

Does not duty to the great interests of learning, and to the great future of Illinois, justly demand that we shall plan and work steadily, not simply to establish and maintain a high school, but to give to the State, at the earliest possible hour, a true University—a center of learning and of education of the highest grade—a fit crown for the vast and costly system of public education which already so honors our State; a University none the less because it takes for its high mark and its ultimate purpose the discovery and diffusion of light for the great industrial activities and movements by which the life of our people is maintained and the public weal and political importance of our State are secured?

Restricted by your narrow means, you have naturally been led to inquire whether the teachers already employed are doing all that each one is able to do, and sometimes, perhaps, to award your praise to those who work the most hours or teach the largest classes. But before a true University can arise, the question must be rather as to the thoroughness and high character of the work done, than as to the number of hours through which it is spread.

It is the aim of a University to lead well prepared students to the summits of learning, rather than to collect and conduct great numbers of immature minds along the lower and elementary paths. It should not encounter the rivalry of high schools, by intruding into their fields and attempting to do their work, but should inspire these high schools with a noble impulse to do their highest and best, by opening above them a field of learning so large, so rich, so attractive, and so useful, as to give to the high school pupils a new motive for their work in the preparation it provides for the higher and greater work of the University.

These views may seem to some of you too elevated, if not also too vague, and I may be suspected of entertaining dreams of an impracticable character; but I know full well that the scholarship of the State and of the age will testify to the justness of my views, if they do not second the urgency of my appeal for this special Institution. The advancing science and scientific needs of the country will not allow the State to pass through another quarter of a century without at least one institution which may thoroughly represent the highest learning. The history of the States around us and east of us sufficiently proves this; and it is for you, as Trustees, to say whether the Industrial University shall meet this want, or whether the friends of higher learning in the State shall be left to demand the establishment of another State University.

I am well aware that it is not the work of a day which I describe, and it is not by the resolutions of a single meeting that you can accomplish it; but it ought to lie before us clearly defined as our perpetual aim, and the necessary steps for its attainment should be well understood and constantly held in mind. No prominent appointment should be made but with reference to the capacity of the appointee to fill worthily a university chair, and the men already on the ground should, as far as possible, be allowed the time and facility to prosecute their higher studies. No man is worthy to remain among us in the occupany of a prominent chair who will not eagerly employ every leisure hour allowed him in the prosecution of his studies and in the advancement of science.

OUR NEED OF FUNDS.

I trust I shall be pardoned if I again call the attention of the Board to the vital and pressing necessity for an increase of the current revenues of the University. The views above presented only make more obvious the need of more funds. I am glad to recognize the interest already assured in this question, and the active measures already on foot to secure the needed increase of income; nor do I dissent at all from the view that an appeal should be made to the Legislature of the State to imitate the worthy example of other States. But my sense of the immediate pressure of our needs compels me to ask

again the attention of the Board to the feasibility of a partial relief by an increase of the fees. I can only reiterate my conviction that by giving a term's notice, you can double the ordinary incidental fees, without hardship to the students, and without danger to the attendance. The amount of relief gained will be so considerable as to justify the experiment, and with a discretionary power lodged with the Business Agent to accept the notes of students unable to pay cash, all objections on the ground of hardship to indigent students would be removed. I believe that the members of the Faculty quite commonly concur with me in this opinion. It seems evident that our wants are likely to be too pressing to allow us to wait safely till another Legislature can convene, and a legislative enactment can be put in force, even if obtained without delay; and to me it seems that the course proposed will rather help than hinder the appeal to the General Assembly. Having discharged my duty in again calling your attention to this important matter, I cheerfully entrust it to your wisdom, and await with confidence, though not without anxiety, your decision. The Business Agent will give you the figures, showing probably increase of income from the change proposed.

The Business Agent will also, doubtless, call attention to other immediate wants of the University, which at this distance I cannot so well know. I need only mention the following:

1. Miss Patchen having notified me of her resignation of her position of music teacher and choir leader, I would respectfully nominate Miss Jennie Mahan to fill the place for the coming year, or term, if you should deem it best to make the appointment for so short a time. She is highly recommended by Miss Patchen for the place, and has a good reputation as an excellent musician. If your funds would allow the payment of a salary, and if it were the policy of the University to give any great prominence to this merely ornamental study, it might be important to secure the services of an older and more experienced teacher, but I judge that Miss Mahan will prove herself equal to the demands which will be made upon her.

2. I recommend that the appropriation for the payment for the Universal instrument, to be manufactured by Ertel & Sons, be renewed. I have visited the manufacturers, and find that the delay in finishing the instrument is due to the fault of the chief clerk or director, who failed to give the necessary orders, and left the establishment some months ago, without notifying his successor of the work to be done. The instrument can be completed in a few months.

3. I would recommend also the continuance of the appropriation made to the School of Domestic Science for specimens for the Food collection. Opportunities now occur to obtain numerous and valuable specimens at great advantage.

Tendering to the Board my continued respect and service, I respectfully ask the acceptance of this as my quarterly report.

J. M. GREGORY, *Regent.*

The following report from Prof. S. W. Shattuck, as Regent, *pro tem*, was read and received:

CHAMPAIGN, ILL., September 9, 1879.

Hon. Emory Cobb, President Board of Trustees Illinois Industrial University:

SIR: I hand you herewith the Regent's report, received by me yesterday. I would also, as Regent, *pro tem.*, make the following report:

Mr. C. Hildebrand, appointed Teacher of Drawing, at your last meeting, has accepted the same.

In this connection, I request your attention to the communication of Mrs. Hays. It seems desirable that the demand for Art instruction should be met in some such way, but I hesitate to make any definite recommendation in the matter, as the Regent may have other plans.

I lay before you several applications for the position held by Miss Patchen. This I should not have done, with the recommendation of the Regent before you in favor of Miss Mahan, if I had not promised, in replies to applicants, that I would do so.

The status of students, in the Preliminary year, is at times brought in question. Are they members of the University before matriculation, in the meaning that they shall be allowed to wear the University dress, or required to perform military duty?

The indications are that a large number of new students will come to the University this fall. This would require, no doubt, additional teaching force in the Preliminary year. Authority for the employment of such is asked for. Also, permission for the Faculty to employ a teacher of Elocution, without expense to the University.

Attention is asked to the quarterly reports from the several Professors and heads of departments, herewith enclosed.

Prof. Burrill's requests for two small appropriations, of $25 00 each, should be granted; also, that of Prof. Baker, for the continuance of one for a chain, $15 00.

I trust that notice will be taken of Gen. C. B. Comstock's good will for the institution, in connecting it with the triangulation of the United States Lake Survey, as reported by Prof. Baker.

Prof. Weber's request for the employment of a third assistant, is approved. It is essential for the good working of the Laboratory.

Prof. Ricker's, also Prof. Taft's requests, for small appropriations, or assignments, I know to be reasonable, and desirable.

Prof. Morrow's report gives points of interest.

The Head Farmer's report shows the Farm to be in a prosperous condition.

The Faculty recommend to the Governor, subject to your approval, the following named students for Captain's commissions in the Illinois National Guard: Coburn, R. P.; Thompson, William, Swannell, Arthur; Walker, F. E., and Johnson, W. P.

Respectfully submitted.

S. W. SHATTUCK.

The chairman of the Board, Hon. Emory Cobb, called the attention of the Board to the death of one of its members, Judge A. M. Brown, of Villa Ridge, Ills., and appointed the following committee to draw appropriate resolutions: Messrs. Scott, Gardner and Millard.

The committee reported the following resolutions, which were adopted :

IN MEMORIAM.

WHEREAS, Our esteemed associate and worthy member, Judge A. M. Brown, has been removed by death:

Resolved, That in him this University loses one of its foremost friends—a prominent and efficient member of this Board for twelve years, whose services were marked by high appreciation of the interests of education and the proper development of the Institution.

Resolved, That this University, as well as the State of Illinois, in his death has lost one of its truest servants and most worthy citizens.

Resolved, That we do hereby express to his family our most heart-felt sympathy in their great bereavement.

Resolved, That the Recording Secretary forward a copy of these resolutions, neatly engrossed, to the family of the deceased; and that he set apart a page in our record book, appropriately headed and bordered, as an obituary page, in honor of our deceased member, on which these resolutions shall be copied; and that the Corresponding Secretary have a like page prepared in the current published transactions of the University.

JAMES R. SCOTT,
D. GARDNER,
S. M. MILLARD,
Committee.

The following report and papers were laid before the Board by Professor S. W. Shattuck, Business Agent:

Hon. Emory Cobb, President Board of Trustees Illinois Industrial University:

DEAR SIR—As Business Agent of the University, I offer the following report for the three months ending September 1, 1879:

Paper "A" is a statement of the current appropriations with expenditures and collections under the same for the past six months.

Paper "B" is a showing of the State appropriations both of 1877 and 1879, giving the amounts appropriated, those received by the University Treasurer, expenditures from the same with balances.

Paper "C" is a list of warrants drawn since the last meeting of the Board, with vouchers for them from 692 to 747, inclusive, which are presented for auditing.

Orders are out for books for an amount to more than cover the balance of the State appropriation of 1877.

The State balance in favor of the Chemical Laboratory of $17.00 is required for curtains—authority for their purchase is requested.

All of the current appropriations show balances unexpended which you are requested to reappropriate as usual.

The summer vacation has been a very busy one, because of the many changes and repairs authorized by the Board which have been carried out under the immediate supervision of Professors Ricker and Peabody. I believe the results will show the work to have been well done. It is expected everything will be in order by the 15th inst.

The recommendations made by Maj. Willett for improved ventilation have been followed in the main and applied to the two tiers of rooms in the towers. It was not thought best to carry out his plans in full, even to the extent that the money in hand would permit. Said recommendations and plans are paper "D" of this report.

With a new substantial building of brick for earth closets, a 75-horse power Root boiler now being put in, and many changes in heating coils and air ducts, the University is in better condition than ever before in regard to heating and ventilation.

Authority was given for the purchase of a new steam pump for the main building at a cost of $150.00. Such a purchase was made with the privilege of returning if not perfectly satisfactory. Upon trial of the same, and the representation of Prof. Peabody and Mr. Baker, I recommended the purchase of a more powerful one at a greater cost. I consider this matter an essential one, especially as our building is not insured.

No repairs have been made upon the roofs of the building the past summer. They are needed at once.

The Janitor of the Dormitory has given notice that he shall leave about the last of September. I recommend that the building be put in charge of a student janitor or janitors with the express notice that if order is not observed the building will be closed at the end of the term. The income from it has not equaled the expenses for the past two years.

The question of special fee, given in the catalogue, has been raised several times. Was it intended to be in addition to the incidental fee?

"A."

Current Appropriations and Receipts.

For what expended.	Appropriated.	Receipts.	Expended	Balance.
Board expenses	$300 00	.....	$173 75	$126 25
Salaries	15,635 00	.....	14,811 75	823 25
Fuel and lights	1,000 00	$164 92	963 94	200 99
Stationery and printing	600 00	100 90	643 68	57 22
Buildings and grounds	300 00	83 60	46 27	237 33
Incidental expenses	200 00	.....	97 64	102 36
Furniture and fixtures	100 00	.....	95 48	5 52
Library and apparatus	50 00	1 00	24 14	26 86
Military Department	60 00	.....	48 38	11 62
Agricultural Department	1,766 83	2,462 13	2,781 22	1,447 74
Horticultural Department	60 00	563 35	543 73	79 62
Mechanical Department	77 32	1,983 54	2,019 46	41 40
Architectural Department	142 28	1,454 43	1,586 07	10 64
Chemical Department	86 03	615 69	646 00	55 52
Sundries—Domestic Science Specimens	30 00	.....	.....	30 00
Physical Laboratory	175 24	.....	72 53	102 71
Cabinets	5 19	27 50	27 35	5 34
Surgical Department	25 50	.....	25 50	.....
Preparatory Department	.....	1,015 00	640 00	375 00
Illini	56 97	.....	56 97	.....
Photo Room	30 00	.....	2 25	27 75
Premium on Bonds	1,500 00	.....	1,500 00	.....
Illinois Central Railroad Donation	.....	694 30	.....	.....
Fees and room rents	.....	2,115 28	.....	.....
State appropriations	.....	.....	9,074 76	.....

"B."

State Appropriations.

July 1, 1877.	Appropriated.	Received.	Expended	Balance.
Taxes on lands	$4,306 02	$4,306 02	$4,306 02	.....
Buildings and grounds	5,000 00	5,000 00	5,000 00	.....
Chemical and Physical Laboratories	2,000 00	2,000 00	2,000 00	.....
Mechanical and Architectural shops	3,000 00	3,000 00	4,000 00	.....
Library cases	1,000 00	1,000 00	1,000 00	.....
Books and publications	3,000 00	3,000 00	2,908 01	$91 99
Cabinet cases	4,500 00	4,500 00	2,661 24	1,838 96
Cabinets	2,000 00	2,000 00	2,000 00	.....
Chemical Laboratory	40,000 00	40,000 00	39,988 00	17 00
Green-house	2,500 00	2,500 00	2,500 00	.....
	$67,306 02	$67,306 02	$65,358 27	$1,947 75
July 1, 1879.				
Taxes on lands	$5,000 00	$2,289 52	$2,298 52	$2,701 48
Buildings and grounds	5,000 00	2,500 00	867 01	1,632 99
Chemical and Physical Laboratories	2,000 00	1,000 00	302 63	697 27
Mechanical and Architectural shops	3,000 00	1,500 00	145 49	1,354 51
Books and publications	3,100 00	1,500 00	.....	1,500 00
Cabinets	1,000 00	1,000 00	101 94	898 06
Ventilation and Water Closets	2,500 00	2,500 00	947 48	1,552 52
Heating Apparatus and Boiler	3,000 00	3,000 00	1,874 54	1,125 46
	$24,500 00	$15,298 52	$6,537 61	$11,462 39

"C."

List of Warrants Drawn.

No.	To whom.	For what.	Amt.
573	E. H. Sargent	Chemical apparatus	$25 50
574	The Illini	Advertising and postage	18 41
575	Crane Bros. Manufacturing Company	Hardware	10 48
576	W. A. Thomson	Services as Adj't	15 00
577	Lorado Taft	Instruction in modeling	27 40
578	T. T. Fountain	Expense to meeting	22 50
579	Alex. McLean	" "	21 10
580	S. M. Millard	" "	21 85
581	Wm. A. Dinwiddie	" in Military Department	37 03
582	A. B. Baker	" on building	5 00
583	J. M. Gregory	Salary, June, 1879	300 00
584	T. J. Burrill	" "	150 00
585	S. W. Shattuck	" "	150 00
586	E. Snyder	" "	150 00
587	D. C. Taft	" "	150 00
588	J. C. Pickard	" "	150 00
589	N. C. Ricker	" "	125 00
590	J. D. Crawford	" "	125 00
591	H. A. Weber	" "	150 00
592	G. E. Morrow	" "	150 00
593	S. H. Peabody	" "	166 66
594	P. Baumgras	" "	125 00
695	L. C. Allen	" "	100 00
596	T. W. Prentice	" "	100 00
597	E. L. Lawrence	" "	83 33
598	F. A. Parsons	" "	75 00
599	I. O. Baker	" "	75 00
600	M. A. Scovell	" "	75 00
601	C. I. Hays	" "	75 00
602	C. E. Pickard	" "	50 00
603	E. A. Kimball	" "	100 00
604	G. A. Wild	" "	60 00
605	C. W. Clark	" "	50 00
606	W. D. Rudy	" "	35 00
607	C. E. Patchen	Instruction in choir	25 00

Warrants Drawn—Continued.

No.	To whom,	For what.	Am't.
608	A. B. Baker	Salary, June, 1879	$40 00
609	C. W. Williams	" "	30 00
610	Andrew Barr	Oak and ash lumber	12 59
611	L. H. Waldron	6½ days' work	6 50
612	A. M. Coffeen	Stationery	2 35
613	C. W. Barrows	Piano for commencement	2 00
614	Agricultural department	Farm expense, June	281 40
615	Tribune Co	Advertising	17 28
616	L. W. Walker	Sundries	2 00
617	Baker and Coffee	Policeman service	4 00
618	C. W. Williams	Sundries	4 75
619	Emory Cobb	Expense to meeting	15 35
620	Wm. Price	Wall paper, and hanging	7 02
621	N. S. Spencer	Service in Architectural shops	20 83
622	R. B. Harmel	Varnishing cases	75 00
623	C. and N. Gas Co	Bill for May and June	102 90
624	Thos. Wright	Castings	29 75
625	Chicago Evening Journal	Advertising	11 15
626	Geo. C. Shoemaker	Mowing University grounds	2 00
627	Students' pay roll	June	313 26
628	J. M. Gregory	Salary, July	300 00
629	T. J. Burrill	" "	150 00
630	S. W. Shattuck	" "	150 00
631	E. Snyder	" "	150 00
632	D. C. Taft	" "	150 00
633	J. C. Pickard	" "	150 00
634	N. C. Ricker	" "	125 00
635	J. D. Crawford	" "	125 00
636	H. A. Weber	" "	150 00
637	G. E. Morrow	" "	150 00
638	S. H. Peabody	" "	166 66
639	P. Baumgras	" "	125 00
640	L. C. Allen	" "	100 00
641	E. L. Lawrence	" "	83 33
642	F. A. Parsons	" "	75 00
643	C. L. Hays	" "	75 00
644	E. A. Kimball	" "	100 00
645	A. B. Baker	" "	40 00
646	C. W. Williams	" "	20 00
647	D. B. Tunnell	Excavating	4 60
648	L. H. Walden	2 4/10 days' work	2 40
649	James Smith	Mason work	13 12
650	Fairbanks & Co	1 inspirator	30 00
651	F. W. Christern	Books	1 50
652	S. H. White	Advertising	5 00
653	F. A. E. Starr	"	1 50
654	Thos. Wright	Castings	50 40
655	Kankakee Stone and Lime Co	Door-sills, etc	19 60
656	Frank M. Tracy	Premium on Pipe county bonds	1,500 00
657	Henry & Karicher	Soap, soda, etc	13 70
658	Illinois Central Railroad Company	Freights	11 44
659	Larrabee & North	Hardware	37 95
660	Agricultural Department	Expenses, July	270 81
661	L. B. and W. Railroad Co	Freight on boiler	103 50
662	Abendroth & Root	1 boiler	1,140 00
663	J. H. Green	Standard barometer	51 50
664	Enterprise Coal Co	14 cars coal	127 40
665	Smith & Morvin	Brooms	2 50
666	M. F. Lapham & Co	36 posts	4 50
667	Luddington, Wells & Van Schick	Lumber	257 93
668	Students' Pay-roll	July	436 66
669	Leggat Bros	Books	128 21
670	Luddington, Wells & Van Schick	Lumber	172 27
671	Crane Bros. Manufacturing Co	51 pounds hemp	4 84
672	" " "	Hardware and pipes	242 40
673	J. M. Gregory	Salary, August, 1879	300 00
674	T. J. Burrill	" "	150 00
675	S. W. Shattuck	" "	150 00
676	E. Snyder	" "	150 00
677	D. C. Taft	" "	150 00
678	J. C. Pickard	" "	150 00
679	N. C. Ricker	" "	125 00
680	J. D. Crawford	" "	125 00
681	H. A. Weber	" "	150 00
682	G. E. Morrow	" "	150 00
683	S. H. Peabody	" "	166 66
684	P. Baumgras	" "	125 00
685	Mrs. L. C. Gregory	" "	100 00

Warrants Drawn—Continued.

No.	To whom.	For what.	Am't.
686	E. L. Lawrence	Salary, August, 1879	$83 33
687	T. A. Parsons	" "	75 00
688	C. I. Hays	" "	75 00
589	E. A. Kimball	" "	100 00
690	A. B. Baker	" "	40 00
691	C. W. Williams	" "	30 00
692	Adolph Sturm	Veneering woods	26 43
693	Champaign County Gazette	Printing	39 00
694	N. A. Williams	Cement, fire-brick and lime	61 08
695	J. E. Stanton & Co	Stationery	5 00
696	Sutton & Sheldon	Brick	351 52
697	" "	Brick and sand	4 50
698	A. Peddicord	Lime, cement, etc	19 25
699	C. A. Spencer & Sons	Apparatus	78 00
700	Hatch, Holbrook & Co	Lumber	6 25
701	C. W. Williams	Brooms	4 80
702	Crane Bros. Manufacturing Company	120 pounds rod, brass	9 60
703	Enterprise Coal Co	10 cars coal	94 80
704	Jno. R. Stott	Stationery	10 75
705	J. S. Smith	Work and material	6 68
706	J. C. Sedgwick	" " coils	51 80
707	F. W. Pratt	" " "	43 40
708	B. P. Mann	Insect pins	5 00
709	Agricultural department	Farm expense, August	725 48
710	E. L. Lawrence	Picking berries	45 13
711	C. W. Williams	Work on heating apparatus	22 62
712	A. T. Hall	Fruit-boxes	5 85
713	S. H. Peabody	Expenses on examination trip	101 95
714	Trevett & Green	Hardware	28 62
715	" "	"	5 32
716	H. Swannell	Chemicals	216 73
717	Crane Bros. Manufacturing Company	Castings	23 86
718	Jno. B. Weeks	Hauling	16 00
719	The Inter Ocean	Semi-weekly one year	2 50
720	Crane Bros. Manufacturing Company	Hardware	30 70
721	R. S. Wilbur	Coal	7 20
722	R. B. Harmel	Painting and Kalsomining	160 64
723	Ill. Cent. Railroad donation	Freight, May, June and July	335 95
724	Mechanical Department	Work for other departments	122 36
725	Architectural Department	" " " "	17 11
726	Mechanical Department	Work and material	726 78
727	Architectural Department	" " "	927 61
728	Horticultural Department	Work on grounds	55 38
729	M. E. Lapham	Lumber	25 50
730	"	"	34 16
731	Leggat & Bros	Books	20 00
732	Walker & Stayman	Chemical Laboratory desks	300 00
733	Students' pay-roll	August	536 48
734	Agricultural Department	Work	61 25
735	" "	Work on grounds	31 10
736	" "	Hauling	10 05
737	" "	Work	105 09
738	A. Mulliken	Band instruction	10 00
739	R. B. Harmel	Painting	18 00
740	E. W. McAllister	Postage	45 00
741	S. W. Shattuck	Petty expenses, 3 months	74 06
742	Workmen's pay-roll	August	10 15
743	" "	"	57 50
744	Wm. Skinner	Work	10 50
745	N. E. Stevens	Advertising	5 00
746	Architectural Department	Instruction sh ps	60 00
747	Mechanical Department	" "	60 00

The following resolutions were adopted:

Resolved, That the Board of Trustees of the Illinois Industrial University hereby express to General D. B. Comstock, U. S. A., Superintendent of the U. S. Lake Survey, their heart-felt thanks for the kindness and courtesy shown to this Institution by determining the geodetic coördinates of its position, in connection with the system of triangulation now in progress under his direction; also for many valuable additions of charts and maps to the University Library.

Resolved, That this Board desires to express to General Comstock their high appreciation of the advantages resulting to this University, through the employment of its students under the superintendence and direction of so eminent an engineer.

Upon motion of Mr. Gardner, it was voted that the students in the preliminary year be not required to wear the uniforms.

The Faculty were authorized to employ a teacher of elocution without expense to the University. Mr. C. C. Barnes was employed as third assistant in their Laboratory, with $15 per month in fall and winter, and $10 per month for spring term.

The recommendations of the Faculty for the following students, graduates of 1879, to receive captain's commissions in the Illinois National Guard, were approved:

Messrs. R. P. Coburn, Wm. Thompson, F. E. Walker, Arthur Swannell, W. P. Johnson.

Mr. Gardner was appointed a committee to settle the difference with Mr. Percival, in regard to fence line between his lands and the University farm, with power to act and arrange.

The following resolution was offered by Mr. R. B. Mason, and passed:

Resolved, That the Board do not deem it judicious to increase the salary of the Head Farmer. That they appreciate the services of Mr. E. L. Lawrence and should regret to lose his valuable experience on the University Farm, but consider it injudicious to incur additional expense in its management.

Treasurer J. W. Bunn made his quarterly statement of receipts and expenditures, which was received:

ILLINOIS INDUSTRIAL UNIVERSITY,

In account with John W. Bunn, Treasurer.

1879.	Cr.		
June 10....	By balance	.....	$4,270 89
"	" interest on Menard county bonds	.....	700 00
June 15....	" " Morgan county bonds	.....	2,000 00
July 1.....	" " Pike county bonds	$3,500 00	
"	" " Champaign county bonds	4,600 00	
"	" " Sangamon county bonds	880 00	
"	" " Chicago, 7 per cent	875 00	
"	" " Illinois 6 per cent bonds	810 00	
			10,665 00
	" amount received from State to pay taxes on lands in Nebraska	$2,298 52	
	By amount received from State for buildings and grounds	2,500 00	
	By amount received from State for Chemical and Physical Laboratories	1,000 00	
	By amount received from State for Mechanical Shops	1,500 00	
	" " " " Library and museum	1,500 00	
	" " " " Geological, Mineralogical and Geological Cabinets	1,000 00	
	" " " " Water closets, drainage, etc	2,500 00	
	" " " " Engine, boiler and steam pipe for heating apparatus	3,000 00	
			15,298 52
Aug. 30....	By amount rec'd on account of Architectural Department	$1,047 16	
"	" " " " Mechanical "	1,332 99	
"	" " " " Agricultural "	830 00	
"	" " " " Horticultural "	269 12	
"	" " " " Chemical "	226 78	
"	" " " " Fuel and lights	57 38	
"	" " " " Buildings and grounds	32 50	
"	" " " " Printing and stationery	90	
"	" " " " Fees and room rent	133 00	
"	" " " " Tuition	100 00	
"	" " " " Ill. Cent. R. R. donation	335 95	
			4,393 28
			$37,327 69

Treasurer's Statement—Continued.

	DR.		
1879.			
August 30.	By amount paid for Salaries	$7,039 81	
" " "	Board expense	83 80	
" " "	Building and grounds	23 32	
" " "	Fuel and lights	462 61	
" " "	Stationery and printing	269 54	
" " "	Furniture and fixtures	1 00	
" " "	Mechanical Department	1,326 87	
" " "	Architectural "	1,111 12	
" " "	Agricultural "	1,566 73	
" " "	Horticultural "	295 41	
" " "	Chemical "	248 88	
" " "	Military "	47 98	
" " "	Library and apparatus	12 53	
" " "	Incidental expense	58 46	
			$12,548 06
" " "	Physical Laboratory	$19 20	
" " "	Photograph Rooms	2 25	
" " "	Surgical apparatus	25 50	
" " "	Preparatory Department	155 00	
" " "	Cabinets	25 45	
			227 40
" " "	Premium on Pike county bonds		1,500 00
	State Appropriations:		
	By amount paid on account of Books and publications	$152 21	
	" " " Cabinet cases	205 47	
	" " " Buildings and grounds	919 09	
	" " " Chemical Laboratory	17 32	
	" " " Cabinets	11 69	
	" " " Mechanical and Architect'l Shops	418 83	
	" " " Water closets, drainage, etc	947 48	
	" " " Engine, boiler and steam pipe for heating apparatus	1,874 54	
	" " " Chemical and Physical Laboratory	429 50	
			$4,976 13
			$19,251 59
	Balance		18,076 10
			$37,327 69

URBANA, September 9, 1879. JOHN W. BUNN, *Treasurer.*

A communication from Mr. Jas. Chatfield, in regard to certain bonds of Kankakee county, being read and received, the following resolution was offered by Mr. Willard, and adopted by the Board:

Resolved, That this Board does not consider itself under any obligation, moral or legal, to compromise the interest on the Kankakee County Bonds, and therefore decline to offer any terms of compromise. That the Treasurer is hereby authorized to communicate with the Board of Supervisors of said County, and to report any action or proposition from said Supervisors to the Executive Committee, and that this Committee are hereby authorized to act in the premises if it becomes necessary before the next meeting of the Board.

The following assignments from State Appropriations were made:

For Gravel walks	$25 00
" Flower pots	25 00
" Botanical cabinet	25 00
" New turning lathe	75 00
" Running expense, fall term, per month	20 00
" Repair of case	10 00
" Partition in modelling room	20 00
" Curtains Chemical Laboratory	17 00
" Pump in new building increased to	275 00

Adjourned to 2:30 P. M.

AFTERNOON SESSION.

The Board assembled at 2:30 P. M.

Mr. Gardner and the Business Agent were appointed a committee to act on the matter of needed repairs on roofs, the amount of such repairs not to exceed $400 (from State Appropriation for Buildings).

Mr. Gardner and the Business Agent were appointed a committee to advertise for a tenant and were given authority to rent the Dormitory.

The Executive Committee reported that the bond of the Treasurer, Mr. J. W. Bunn, had been received and approved. The report was adopted.

The following report was presented by Mr. Gardner, from Committee on Binding for Library:

To the Board of Trustees Illinois Industrial University:

There were sent in June to the Gazette office in Champaign, two hundred volumes of periodicals to be bound, and old books to be rebound or repaired.

The price for binding is to be the same as last year, seventy-five cents a volume; the repairing in proportion.

D. GARDNER,
J. D. CRAWFORD, *Librarian.*

The following appropriations from the current funds of the University were made:

APPROPRIATIONS FROM CURRENT FUNDS,

For the six months ending February 29, 1880.

Board expense		$300 00
Salaries		16,555 00
Fuel and lights	$3,000 00	
Stationery and printing	200 00	
Buildings and grounds	100 00	
Incidental expense	200 00	
Fixtures and furniture	100 00	
Library	50 00	
Military Department	50 00	3,700 00
Agricultural Department	1,447 74	
Horticultural "	79 62	
Chemical "	55 52	
Mechanical "	41 40	
Architectural "	10 64	1,634 92
Special: Collection of Specimens of Food	30 00	
Fitting of Photo. Room	15 00	
Surveyor's chain	15 00	
Drafts protested	400 09	460 09
Physical Laboratory		102 71
Total		$22,752 72

Mr. D. Gardner, chairman of the committee appointed to employ janitors, made the following oral report:

That the committee have continued Mr. Williams as janitor of the Dormitory, at $20 per month, under the supposition that the engagement may end at the close of the fall term.

That Mr. A. B. Baker be continued janitor of the main building, at a salary of $40 per month; his duties and obligations to be similar to those he has had in the past; also, that the committee consider it essential to the safety and good working of the heating apparatus that it should be inspected thoroughly several times each day, and that Mr. Baker is expected to perform this duty, being responsible to the Mechanical Department for the same; and that $20 of this salary are for this service.

Adjourned till 7:30 P. M.

EVENING SESSION.

The Board met, as by adjournment.

The following resolution, offered by Mr. Millard, was passed:

Resolved, That the Board of Trustees feel that it is important to give to the public any useful information respecting the progress of the University; that we believe the members of the Faculty can, without inconvenience to themselves, greatly aid the reputation of this Institution. Therefore the Board respectfully recommend, and request the individual members of the Faculty to give to the press of the State such items of interest in their respective departments as they shall deem of sufficient importance to be published.

An amount of $400.09, for certain protested drafts, was ordered to be charged to profit and loss for the time being.

Mr. Cobb, chairman of the Executive Committee, reported that, in the opinion of the committee, it is not desirable at present to lease University lands in Nebraska.

The report was accepted, and its recommendation approved.

On motion of Mr. Scott, Prof. S. W. Shattuck was allowed the sum of $300 for extra services as Business Agent, for past services.

A communication from Mr. Parsons, Bookkeeper, was taken up, and the following resolutions were adopted:

Resolved, That it is the opinion of the Board that the course of studies in the "School of Commerce" is more extensive than practicable to teach at the present time; but that, in the absence of the Regent, it is deemed improper to make changes in the same, or the salary.

The resolution to repeal last clause in by-laws was postponed until the next meeting, for want of presence of the majority of the Board to act on same.

The appointment of a music teacher was, on motion of Mr. Millard, postponed to the next regular meeting.

The Regent was authorized to provide for the leading of the University choir.

The consideration of an application from Mrs. M. Hays, in regard to teaching of drawing and painting, was postponed until next meeting.

Adjourned.

E. SNYDER,
Recording Secretary.

EMORY COBB,
President.

MEETING OF THE BOARD OF TRUSTEES, DECEMBER 16, 1879.

The Board met in the University parlor, at 4 o'clock P. M., President E. Cobb in the chair.

Present—Messrs. Cobb, Fountain, Gardner, Mason, Millard and Scott.

Absent—Governor Cullom, Messrs. Byrd, Conkling and McLean.

The Secretary read letters from Messrs. Conkling and McLean, regretting their inability to attend this meeting.

The records of last meeting were read and approved.

Regent J. M. Gregory then presented the following report, which was received:

REGENT'S REPORT.

To the Trustees of the Illinois Industrial University:

GENTLEMEN: I have the honor to present to you my quarterly report of the condition and wants of the University. Absent, by your permission, till the first of November, I found, on my return, the University in the midst of successful work; instructors and students quietly and earnestly pursuing the great work which brings them together.

The figures given you below will show an attendance a little larger than that of any former term, and, if the entries of the winter term shall equal those of former years, the total attendance of the year will be much higher than that ever before enrolled.

We have a large number of students absent, teaching, or at work in other employments, but who are known to have the intention to return, and who may be counted, as they count themselves still, as students of the University; but by our usage they never appear on our rolls or in our catalogues, if not present during the year.

Report of Attendance, Fall Term, 1879.

	Males.	Females.	Total.
Number of students in College of Agriculture	17	.....	17
" " " " " " Engineering	53	.....	53
" " " " " " Natural Science	34	10	44
" " " " " " Literature and Science	66	32	98
Not classified in any college	7	5	12
Post graduates	1	2	3
Students entering before Fall Term, 1879, not yet matriculated	24	6	30
Students entering Fall Term, 1879, matriculated, mentioned above	30	15	45
Students entering Fall Term, 1879, unmatriculated	101	23	124
Total attendance	303	78	381
Attendance by classes.			
Post graduates	1	2	3
Senior class	23	8	30
Junior class	49	14	63
Sophomore class	49	6	55
Freshman class	57	19	75
Non-matriculated and preparatory	125	29	154
Total attendance	303	78	381

Of the non-matriculated students, many are engaged in making up some one or more deficiencies, which will enable them to matriculate at the close of this term. So far as these students have declared their intentions, their proposed courses of study are as follows:

	Males.	Females.	Total.
College of Agriculture	14	.....	14
" " Engineering	26	.....	26
" " Natural Science	14	5	19
" " Literature and Science	20	8	28
Undecided or elective in course	51	16	67
Totals	125	29	154

As you are aware, the organization of the University includes four colleges; the College of Engineers, the College of Agriculture, the College of Natural Science, and the College of Literature, Science and Art. I shall best present to you the present condition and prospective wants of the University by presenting those of each college separately.

COLLEGE OF AGRICULTURE.

This College comprises the two departments or Schools of Agriculture proper, and Horticulture. The school of Agriculture has, as special instructors, G. E. Morrow, Professor of Theory and Practice of Agriculture, Dr. F. W. Prentice, Professor of Veterinary Science, and M. A. Scovell, Assistant Professor of Agricultural Chemistry, together with E. L. Lawrence, Head Farmer.

The department or school of Agriculture has, as special instructors, T. J. Burrill, Professor of Horticulture and Botany, and C. I. Hays, assistant in these branches. Mr. Hays also has charge of the greenhouses, the University grounds and the Botanical garden. As the instructors in each school give aid to the others, it will be seen that the College of Agriculture is well provided with instructors for its various studies. Besides these the other professors of the University give instruction in their special branches, as required by the agricultural students. The College has, for illustration, the two farms, stock and experimental, with the several varieties of stock, the orchards, forest plantations, nurseries, gardens and greenhouses, as well as the collections and apparatus in Agricultural, Horticultural, Veterinary and Botanical science, and a large library of special works in Agricultural science, and Literature which, though not so large as we may deserve, is probably larger than any other library of the kind west of the Alleghany Mountains. This statement of the resources of the Agricultural College will show how fully the Trustees have met one of the main requirements of the law of Congress. These provisions ought to appeal to the agricultural population of the State for a still larger patronage and still more cordial support. Beside the work done in the Colleges by the several teachers in their well filled classes, lectures have been given during the current term to the whole body of Agricultural students, and all others who chose to attend, and Prof. Morrow is completing arrangements for another session of the Annual Agricultural Institute, to be held at the University in the latter part of January. Some of the leading agriculturists of the State have recently expressed their desire for the re-establishment of the Agricultural Institutes formerly held by the professors of the University in different sections of the State. I ventured to assure them of our readiness to resume such work as soon as the Legislature shall make the necessary appropriations, and these gentlemen have expressed the determination to secure, if possible, a renewal of the legislative appropriations formerly made for these institutes. It must be evident that agricultural education has lost none of the importance that it had when the congressional law of 1862 was passed; but every year, with the increase of population and the severer taxing of our soil for food supplies for ourselves and Europe, the necessity increases for the diffusion of those sciences which may increase our harvests without wasting our soil. Steady and persistent efforts to diffuse agricultural knowledge will tell with multiplying effect upon the future prosperity of our State, and may save us from one of those industrial and financial catastrophes which have too often overtaken older States and countries. Although the farmers of the State have not responded as frequently as you may have hoped to the efforts made in their behalf, yet the progress of events will inevitably bring to the Agricultural College the support that it needs, and the high estimation which is its due, if wise and never-ceasing efforts be made to extend its advantages and to increase the sphere of of its influence. This is among our first and permanent duties.

The report of the Head Farmer lays before you some interesting and important facts. I concur w th him and Prof. Morrow in asking that additional representatives of approved breeds of stock shall be added to the collection. The College ought to have the means of exhibiting to its students the great varieties of neat cattle, swine and sheep, that their characteristics may be studied and their qualities well understood.

COLLEGE OF ENGINEERS.

The College of Engineers embraces the four departments or Schools of Mechanical Engineering, Civil Engineering, Mining Engineering and Architecture. It has as special instructors, S. H. Peabody, Professor of Mechanical Engineering, who gives instruction also in Mining Engineering; N. C. Ricker, Professor of Architecture; I. O. Baker, Professor of Civil Engineering; Mr. Hildebrand, Teacher of right-line Drawing together with Mr. E. A. Kimball and Mr. N. S. Spencer, respectively, foremen of the machine shops and wood-working shops. These instructors are assisted in the necessary scientific instruction by the several Professors of cognate departments. The teaching force of this College doubtless needs to be reinforced at the earliest day by additional instructors, but the work done trough the indefatigable energy and industry of the teachers on the ground is probably us good as that in other American institutions of like character, and,

in some respects, surpasses other institutions. The apparatus of the College of Engineering consists of the two shops for wood-working and wire-working, with all their machinery, foundry and blacksmith shop partly under our control, the Physical Laboratory with its rich apparatus and the mechanical, mining, and architectural cabinets of models and and various apparatus, together with the sets of instruments for the practical field work of the Engineers. This College, like that of Agriculture, was especially named in the act of Congress, and experience proves its practical value to the great manufacturing interests of the State, to which it is destined to give important aid in their coming development.

COLLEGE OF NATURAL SCIENCE.

The College of Natural Science includes, as at present organized, the School of Chemistry and that of Natural History. The School of Domestic Science has also been catalogued with this College, though assigned by the by-laws to the College of Literature and Science. The College has as its special instructors T. J. Burrill, Professor of Botany and Entomology; H. A. Weber, Professor of Chemistry; D. C. Taft, Professor of Geology and Zoology; Lou Allen Gregory, Professor of Domestic Science; C. G. Hayes, Assistant in Botany; M. A. Scovell, H. M. Beardsley and C. C. Barnes, Assistants in Chemical Laboratory; and G. A. Wild, Taxidermist. The apparatus of the College includes the several Chemical Laboratories and collections, the botanical and entomological collections, the Natural History Museum and Laboratory and a variety of valuable apparatus, both for investigation and illustration. The Chemical Laboratories are among the best on this Continent, and the different collections are steadily growing in value and importance. These Schools, besides furnishing trainings for special departments of scientific and professional labor, afford indispensable aid to all the other courses of instruction. The Natural History of the State, including as it does the study of its material wealth and resources and the conditions of its material progress and improvement, must always demand the serious attention of both Government and people. All the great civilized countries have from time to time appointed Commissioners for repeated scientific investigations of the resources of the soils, minerals and living growths, and such surveys will, doubtless, demand at an early day the enlightened attention of our own Legislature. In such surveys our College of Natural History will prove a valuable if not indispensable aid. To prepare for this, a more vigorous and active work should be instituted to secure as far as possible good specimens, well classified and properly named, in all the departments of Natural History and Geology, The work already done furnishes an excellent starting point for that yet to come.

The steps now in progress to furnish the School of Domestic Science with illustrative food collections and other appropriate cabinets for the decorative and useful household arts, will give to this important department increased facilities and higher esteem.

COLLEGE OF LITERATURE AND SCIENCE.

This College embraces the two Schools of Ancient Language and Literature and of English and Modern Languages. The special instructors include the Regent, Professor of Philosophy and History; S. W. Shattuck, Professor of Mathematics; E. Snyder, Professor of Modern Languages; J. C. Pickard, Professor of English Language and Literature; J. D. Crawford, Professor of Ancient Languages, and C. E. Pickard, Assistant in English and Ancient Languages. The aim of this College was to meet that requirement of the law of Congress expressed in the words, "Without excluding other classical and scientific studies." It is designed also to give to students in technical courses that literary and scientific instruction, which shall make them better representatives and exponents of their several departments. It affords also to students fitting themselves for the teacher's work, or the service of the press and other literary employments, the instruction that they need, and gives opportunity for general education to that considerable body of students who are not yet prepared to select any special calling. It especially favors female students by affording them fields of education appropriate to their wants and tastes. The Schools of Military Science, of Commercial Science, and of Drawing and Design are special in character and more limited in their course and aim than the regular Schools mentioned as departments under the several Colleges. That of Military Science is required in order to give due efficiency and force to that instruction of Military Tactics required by the law of Congress. The question as to the value and effect of military education in Colleges has long been practically settled for us by the success which has attended this department. With few exceptions the students have met the requirements laid upon them, and the general effect upon their physical development and culture and the discipline and good order of the Institution has abundantly compensated for the small amount of time each student is required to give to the drill. The question of the change of the uniform for one less expensive and more suitable for home use is still agitated and ought to receive attention.

The School of Design would not have been recommended, great as is its practical value and importance, but for the fact that the necessary instructors and apparatus are required also by other Schools. The Teacher of free-hand Drawing, required by the Schools of Architecture and Engineering, as also by the several Schools of Natural Science and Agriculture, has always been able to give the special instruction required in the School of Design. In the development of the finer forms of industry, this branch of instruction is of great importance, as is attested by the great manufacturing peoples of Europe, where Schools of Design are counted as the indispensable conditions of success.

The School of Commerce, although it has less claim to be ranked among the Schools contemplated by the law, has done good service, affording valuable instruction to a large proportion of the students in the important art of accounts. It is true that the large number of so-called Commercial Colleges scattered through the country diminishes somewhat the necessity of such a department here, but it is certainly desirable to maintain it so long as the funds will allow without encroaching on more important and legitimate work.

In making this exposition of the work of the University, I have not stopped to notice specially the points brought to my attention by the reports of the several Professors in charge of schools or departments. I submit these reports to you in connection with my own, with the request that they shall be read and considered by you as their merit demands. I present herewith a summary of the various requests, together with other recommendations suggested by myself.

J. M. GREGORY, *Regent.*

REPORT FROM AGRICULTURAL DEPARTMENT.

Hon. J. M. Gregory, Regent:

SIR: During the term now in progress I have had two classes, one of sixteen and one of thirteen young men, whose work has been quite satisfactory, with very few exceptions. It is worthy of notice that about half the members of the larger class are taking a special course, of from two terms to perhaps two years, and that probably not more than one-third of the class will be able to complete the full four years' course.

Having received letters from nearly all the members of the Board signifying their approval, notice has been given, through a goodly number of agricultural and other papers, of the holding of an Agricultural Institute, or lecture course, at the University, the last week in January. It is recommended that this meeting commence on Tuesday afternoon and continue until Friday evening; that the Presidents of the State Agricultural, Horticultural and Dairymen's Associations or Societies, and editors of leading agricultural papers of the State, be invited to deliver addresses during the Institute; and that such time as can be spared, each day, be assigned for general discussion. The expenses of gentlemen invited to deliver addresses should be paid. It is believed such expenses would not exceed $50.

As an extension of the opportunities for giving some instruction to those who cannot take the larger course, it is recommended that authority be given to announce *free courses* of lectures on agricultural and veterinary topics, during the three weeks preceding the Institute. These lectures can be given by Dr. Prentice and myself, with the aid of other members of the Faculty of the College of Agriculture, without increased cost, or interfering with the regular class work; and it is believed they would prove useful and reasonably popular.

I have felt that my first and chief work was in the class room. This work has now become so systematized, that I shall be able to give more time to plowing and experimental work. Two things which seem to me very desirable, would involve some expenditure, and I would be glad to have an expression from the Board of Trustees as to their views:

1 The work done in sugar manufacture from sorghum, during the present year, gives much ground for encouragement. I would be glad to test some varieties here and in the autumn experiment, in the modes of manufacturing. It seems to me this is the most promising new branch of agriculture for our State.

2. An experiment in grazing and grain-feeding steers, of different breeds, would have value, and would be of general interest. I think it certain that high-grade steers of the Herford, Devon, Ayrshire, Holstein, and, of course, Shorthorn breeds, could be obtained at very reasonable rates, as breeders have expressed an interest in such a trial. The total net cost of such a test would not be large; and the presence of the steers would partly fill another want—that of representative animals of different breeds of cattle, for illustration to students and visitors. This I consider very desirable. The principal extra cost and trouble involved in keeping different breeds would be obviated, by purchasing a good female of each, making crosses, and repurchasing as necessary. Or, a bull of desirable beef breed, as the Herford, might be purchased, and crossed on the grade cows. Of the two plans, I would recommend the steer-feeding experiment, if both be not thought advisable.

Among the Agricultural students, are some who would be much interested in, and profited by, assisting in experimental work. Their labor could not be employed quite so economically as that of regular laborers, but this seems to me not the most important point.

Very respectfully,

G. E. MORROW, *Professor of Agriculture.*

REPORT FROM HEAD FARMER.

To Dr. J. M. Gregory, Regent Illinois Industrial University:

I herewith present my annual report of the operation of the farms for the year just closed:

GRIGGS FARM.

In my report of one year ago I recommended that the Griggs farm be rented to Messrs. Jaques and Hedges, on terms that we had previously agreed to. Mr. Gardner and myself were appointed a committee to rent the farm. Soon after this the bargain was closed and the farm rented. The north eighty acres to be used as a pasture, for which we were to receive $240 00, to be paid November 20, 1879. The south half was to be kept for meadow, and the hay divided in the rick, giving us one half and the other party the benefit of the fall feed. We were also to put the fences in repair, and make a new fence, dividing the farm in halves from east to west. The amount of money to be paid was paid when due, and the hay was put up in good shape, and sold on the ground for $220 00. The cost of the fence will appear hereafter. By the terms, the other party was to have the refusal of the farm for another year; and they have agreed to continue another year on same terms as the past.

STOCK AND EXPERIMENTAL FARMS.

The crops raised on the farms are as follows:

105 acres corn.
14 " wheat, including 4 acres experimental.
110 " timothy meadow.
20 " clover meadow, in orchard.
23 " oats.
210 " pasture.
3 " potatoes.
1¼ " artichokes.

The balance of the farm had Horticultural crops, and is included in the roads, yards, etc. In round numbers the profits have been as follows:

105	acres corn, at $15	$1,575 00
14	" wheat, at $25	350 00
110	" meadow, at $6	660 00
23	" oats	100 00
210	" pasture, at $3	630 00
All other, including hogs and cattle		1,185 00
Total		$4,500 00

85 acres of corn on the stock farm made an average of 70 bushels to the acre. This was all weighed, except 11 acres of shocks; a few of these were shucked and weighed, and an average from this was made.

The corn on the Hort. Farm was all cut and shocked, except 3½ acres in an experiment, and gave from 55 to 90 bushels to the acre.

There were four different fields of wheat, the best yielding 34 bushels per acre.

The oats gave 53 bushels per acre.

Timothy meadow about one ton to the acre.

Of the pasture, 80 acres was seeded last spring, oats and rye being sown with the timothy for feed before the other was grown. On account of the drouth the timothy made a poor stand and no feed till the fall rains, and then none worthy of note. 30 acres of this, as well as 20 acres sown with oats, was re-seeded in the fall, with present good promise. We have seed to sow the balance in the spring. Fifteen acres was sown to clover and made a good stand. For reasons above stated, pastures have not been as good as usual.

Potatoes were a good crop, as well as artichokes. I think we have 1,000 bushels of the latter. The pigs are now rooting them out I am unable to state the value of artichokes, but this is sure, the pigs seem to enjoy gathering them.

For an account of the sales of the year, see paper accompanying this report, and marked "A."

Of the hay sold, $640 00 was of the old crop, $220 00 from the Griggs farm, and a small amount from the farms of the present crop.

The hogs were inventoried at $320 50 at the beginning of the year; 79 head. We now have 144 at $471 00, a gain of $150 50; this added to the sales $103 47, gives $754 97 as the value of the year's crop.

Four car loads of steers were sold in Chicago. For account of purchase and sale of these cattle, see paper marked "B."

The corn sold was all of last year's crop. About 150 bushels was sold for seed at 50 cents, and the balance was sold on the market, in August, for 30 cents.

Nineteen bushels of wheat was sold early for seed at 90 cents, and the balance sold in October for $1 07. Twenty-four acres sown.

The sales of Short-horns and Jerseys are as follows:

December	1—Short-horn bull calf	$50 00
"	1—Jersey " "	44 00
January	1—Short-horn " "	50 00
February	1—Jersey " "	30 00
March	1—Short-horn " yearling	75 00
July—	1—Jersey bull for beef	21 40
November	4—Cows "	148 20
"	1—Short-horn bull calf.	60 00
"	1— " yearling heifer	40 00
Total		$518 60

The item of department credits, Horticultural Department, $415 35, is made as follows: $200 is charged (by agreement) for services of Head Farmer in this department in superintending the work, making sales, etc., and the balance is for work of men and teams. By reference to my report to Prof. Burrill, it will be seen that there is a small balance of profits to the credit of this department in the year's work.

For an account of the expenses of the year, see paper marked "C."

The item for fence-wire and posts was for the Griggs Farm, for the fence.

Aside from the items of repairs here shown, there has been 140 rods of fence made over. The cash expense comes under the head of hardware, which was for barbs, wire, staples, nails, etc. Under the head of repairs, there was a well dug at the stock farm house, costing, with pump, brick, etc., $45. The total cost of repairs in cash and labor is $158 38. We had always been troubled for water for the house on the stock farm, having previously dug two wells that had failed. In the last one dug we had 7 feet of water at the dryest time.

For balance sheet, see paper marked "D."

For cost of permanent improvements, see paper marked "E."

The paving of barn yard was done one year ago this month. I am satisfied with the outlay, and would recommend that two more car loads of stone chips be purchased, to continue this work.

The tile draining was done partly with the tile left over from last year. This accounts for the small cost. We have but little more of this to do till outlets can be obtained on the lands of others.

I discovered, early in the summer, that we were likely to be short of water on the stock farm for the stock there kept, and asked leave of Mr. Gardner to construct another syphon. His reply was: "Go ahead; I like to see the water run." I estimated the cost at $75. We went to work and put it in, the length of pipe being 1,000 feet. This would run about two days and then stop, and required about 15 minutes time to take the air out from the summit. In October we took most of the pipe up, and added 200 feet to it, and laid it around, instead of over the hill. It is now perfect and runs continuously, and I think at this time would supply 500 head of cattle. The last expense amounted to $35, and the whole to $119.28. I think it worth $500 more than a well with wind mill, and costs much less. The well from which the water is taken is practicably inexhaustable. The syphon put in last year, during a part of August and September, on account of the water failing in the well, was useless. Since the rains it is doing good service, and has not required a minute's time in six or more weeks.

For inventory of salable property see paper marked "F."

Cattle and hogs are put in about the same as last year. Timothy hay is counted worth $8—50 tons was sold for that price, to be taken from the barn at no expense to us. The balance could be sold for more. Last year corn was counted worth 25 cents, this being 10 cents below the price of May corn in Chicago. It is now 34 cents, and 13 cents below the price of May corn. Oats at 28 cents; I have been offered 31½ cents. Last year, by instruction from Mr. Pickrell, I put the blooded stock in at cost, with the cost of keep added, and whatever was received from sales, etc., was deducted. I have done the same this year. See paper "G." As far as profits go, the same feed and care given to steers would have produced a better showing. I think it will be apparent to all why this account is kept as it is.

Referring again to the balance sheet "D," the item of teams and tools is made by deducting $100 from the last year's inventory for loss on teams, and $50 for loss on tools, and adding $16 for a new plow added to tools. It is the aim to supply the place of all small tools that may fail, to keep all in good repair, and it is thought that facts can be best shown by estimating the loss on the whole rather than to undertake a new enumeration each year. With the teams the same is true. We have the same teams as one year ago—in fact nearly the same as nine years ago. Last year teams were shrunk $50; this year $100. I ask for leave to dispose of a team now about 25 years old and to purchase something to fill the place. My idea would be to get a good pair of mares that we could breed from when thought desirable. For detailed account of teams and tools see inventory book accompanying this report.

The balance, $4,507.53, shows the profits of the farm for the year.

The balance, $4,791.65, shows the accumulated balance, and is verified by comparison with the books of the Business Agent.

I herewith present (as published in the Champaign County Gazette) the result of an experiment in corn-growing:

CORN-RAISING EXPERIMENT.

The following experiment in corn-growing was conducted by E. L. Lawrence, head farmer at the Illinois Industrial University farm, and as the crop is of the greatest importance to the people of Central Illinois, we hope that the farmers at least will give the article a careful reading:

No.	Variety.	Conditions.	Number of ears.	Weight: pounds.	Bushels per acre.
1	Thomas	Fall-plowed, manure plowed in	1,290	830	85.10
2	"	Fall-plowed, manure on surface in spring	1,383	780	80.00
3	Golddrop	Same as No. 1	1,219	710	72.82
4	"	Same as No. 2	1,171	720	73.84
5	Thomas	Trench-plowed in fall, no manure	1,203	690	70.77
6	"	Common-plowed in fall, no manure	1,250	700	71.79
7	Chester County	Same as No. 5	1,255	690	70.77
8	" "	Same as No. 6	1,255	660	67.69
9	Thomas and Murdock.	Spring-plowed, manure plowed in	1,170	720	73.84
10	" "	Spring-plowed, manure on surface	973	690	70.77
11	Murdock	Same as No. 9	1,099	720	73.84
12	"	Same as No. 10	1,035	630	65.64
13	Thomas and Murdock.	Trench-plowed in spring, no manure	1,242	770	78.96
14	" "	Common-plowed in spring, no manure	1,104	600	61.54
15	Murdock	Same as No. 13	1,295	670	68.72
16	"	Same as No. 14	1,175	550	56.41
17	Thomas, small	Plowed in fall, manure on surface in spring	1,078	550	56.41
18	" large	Same	1,110	600	61.54
19	" small	Plowed in fall, manure on surface in fall	1,188	700	71.79
20	" large	Same	1,300	720	73.84
21	"	Plowed in fall, manure on surface in spring	1,250	740	75.89
22	"	Plowed in fall, no manure	1,250	720	73.84
23	"	Same as No. 21	1,143	710	72.82
24	"	Same as No. 22	1,201	660	67.69
25	"	Replowed in spring, manure on surface	1,211	800	82.00
26	"	Replowed in spring, manure plowed in	1,082	710	72.82
	Average		1,189		71.19

EXPLANATION.

Plats from one to twenty inclusive were timothy sod.

Plats twenty-one to twenty-six, wheat-stubble.

Plats seventeen to nineteen were planted with seed selected, small ears, weighing one-half pound each, on an average.

Plats eighteen and twenty were planted with seed selected, large ears. Twenty-four ears weighed twenty-two pounds.

Plats five and seven, "trench-plowed in fall," were not well trenched. The ground was dry, and the trench did but little good. The plow did not work well.

Plats thirteen and fifteen, "trench-plowed in spring"—the same plow worked well.

On all the spring-plowing of sod, from nine to sixteen, a poor stand was made, and was re-planted May 21 with Murdock corn.

Plats eleven and twelve mode a total failure of first-planting, which was "Chester County Mammoth."

Each plat contained $^{13}/_{100}$ of an acre. The rows were 3 feet 8 inches apart, and a full stand would have been 2 stalks in a hill, and hills 2 feet apart in the row. There should have been 1,456 stalks in each plat and the same number of ears, had each stalk given an ear.

The first planting was May 3. The manure used was common barnyard manure, and 2½ loads to the plat, or at the rate of 10 cords to the acre.

CONCLUSIONS.

The first conclusion arrived at is, that the corn was too thick on the ground. On an average, there were 18 per cent. less ears gathered than there would have been had there would have been, had there been a full stand and one ear to each stalk; and 10 per cent. less ears than stalks. From other experiments and this one, I am satisfied that rows 4 feet apart and 2 stalks every 2 feet, or an equivalent, will give the best results. These rows were 3 feet 8 inches apart.

Fall plowing is shown to be decidedly the best. This arose partly from the fact that a poor stand was obtained on the spring plowing,—but this also should go to the credit of fall plowing, as we are liable to the same trouble another season as the present.

Fall manuring was the best, from the fact that there was not sufficient rain in the spring and summer to place the manure in condition to be taken up by the plant, and much of it applied in the spring may now be seen in the soil.

Comparing 5 and 7 with 6 and 8, gives 1.07 bushels per acre in favor of trench plowing in the fall. As has been seen, this trenching was mostly a failure.

Comparing 13 and 15 with 14 and 16, gives 12.87 bushels per acre in favor of trench plowing in spring. I should expect best results from trench plowing in the fall, and think this result would have shown such, had the plowing been equally good.

The effect of manure is much less than has been shown in former experiments. This is supposed to result from the lack of moisture to make the manure available.

Of varieties, the "Thomas" is shown to be the best; this should be called "Thomas' Improved." It has been raised on the farm for the past nine years. After crossing it with the "Galtra," a large, late, deep-grained variety, and then with great care selecting the seed for three years, it has become, as I think, the best large or medium variety in this section.

It was found that it took 128 ears of this corn to make 75 pounds, the amount taken for a bushel. As showing that this corn was too thick and the ears too small, 75 pounds was taken from the wagon, as it run from a forty-acre field, that gave a yield of 70 bushels to the acre. This 75 pounds counted out 98 ears—30 less than the average of this experiment. The same, after being kiln-dried, was shelled, and gave 57½ pounds of dry corn and 12½ pounds of cobs.

The conclusion of the whole is, that there are many things in the simple operation of corn-raising, not yet understood, as there are results here shown, that, with most careful study, while the corn was growing, and after it was gathered, I am entirely unable to account for.

This experiment was published in the different Agricultural papers and in the Chicago Tribune, and from the number of letters, both congratulatory and inquisitory, that I have received I am lead to believe that it has been well received.

I have made some tests, one of which was to test the productiveness of the sub-soil after the soil is removed. With potatoes, where one foot was removed, about a half a crop was harvested; where two feet were removed there was practically no crop. Where two feet of soil was removed and a thin coating of course, unrotted manure was applied, a full crop was harvested. With wheat where two feet was removed the straw was 14 inches in length and about 7 or 8 bushels was the estimated yield. It was somewhat better where but one foot was taken off. This was on land where the soil had been removed to grade about the Chemical Laboratory.

For cost of experiments see paper marked "H." No account was kept of the extra labor on the corn experiment made by myself, but it is thought that the extra labor, together with the time and thought given it by myself, would amount to the sum charged.

I have commenced with an experiment with wheat on some of the poorest land we have by applying: 1st, well rotted manure; 2d, salt; 3d, super-phosphates of lime. This was done soon after the sowing. Something might be added by applications in the spring, but I consider the point of first importance in wheat growing is to secure a strong and vigorous growth in the fall. Where this has been obtained, so far as my experience goes, the percentage of failures is very small. There has been a constant inquiry, by those who have called on us, for "the experiments," and this has prompted me to do this work, notwithstanding the fact that this is not considered any part of my work.

At the March meeting, in 1878, I presented, by request of Prof. Morrow, a plan for a system of experiments to show the value of rotation of crops. I had at that time given this much thought, and can now see no place where the plan then offered can be materially changed without detracting from its value. I would again ask that this may be considered. It would also seem desirable to repeat the experiment in corn growing, heretofore presented. With this in view I have made a commencement on the stock farm.

To accomplish anything worthy of note in this important branch of our work, will require careful study and close attention, without which more harm than good will be done.

It would seem that there is a grand opening for us in the way of sugar making, But as this would require work in the Chemical Laboratory, and of those higher in authority than myself, I will refrain from further mention.

In the nine years that I have been in the service of the University the wish of the Board of Trustees as to the management of the farms has been very dimly if at all made manifest. By the terms of my first contract, I was given free choice as to management, and the arrangement of details, and was only restricted to a system of rotation that might be designated by the Board (this does not appear in the reports, but may be found in your letter book of January or February, 1871) and in preparing my plans I have reasoned something as follows: The University was established for the benefit of the "industrial classes," who want to know how to make money, rather than for the rich, who may want to know how to spend money. Farming never ends 'till the crop is marketed and the money in the bank. So good farming can't exist without making money. A baker might as well be asked to make a good loaf of bread that would not be fit to eat, as to ask a farmer to do good farming that did'nt prove remunerative. If we expect to illustrate farming, it would seem desirable to make a positive demonstration, rather than a negative—to show how to do it, rather than to show how not to do it. Further, if it is expected to encourage intelligent men to choose the occupation of farming, we can do no better than to prove to them that if they follow their vocation intelligently they will not be sold out by the sheriff. Further, though the farm might blossom "like the rose of Sharon" at the expense of the State Treasury, it would be no credit to us or benefit to any one else. A *model* is something to be followed and not a thing of ornament simply; and a model farm is the one that best fulfils the object of farming.

In the absence of definite instructions the above thoughts have prompted me to the course that has been pursued. I would refer to the adopted report of the Farm Committee, as shown in Univ. Reports 1878, p. 85, and ask for more definite instructions.

Every one who has handled cattle to any extent has learned that at this age of the world, when cattle are not required to defend themselves against wild beasts, horns are not only useless but dangerous to both man and beasts. In view of this fact, and the further fact that this as well as many other things is under the control of the breeder, and believing further that the limit of improvement in domestic animals is far from being reached, and that it is the province of the University to lead rather than to follow in this work, I ask that a systematic effort be made to breed such animals as the circumstances of the case demand. That is, to make a new breed from material now accessible. To carry this out would require the purchase of a Polled Angus bull, to be crossed on such

cows as we may have at hand, and then to breed from the product, selecting only those that have the qualities sought for. The qualities of form, color, etc., can all be arranged to order. The reason for making a new breed rather than accepting the breeds now without horns is, that it appears that these cattle, while they are able to stand our winters, do not thrive when subjected to the hot day atmosphere of our summers. It would require too much space for me to tell here *all* the reasons that might be advanced to prove that this plan would be practical; I therefore submit it for consideration.

If for any reason it is thought not desirable to undertake anything of the nature of what is above outlined, I would suggest that now is a suitable time to replace the Hereford cattle that were disposed of, for reasons then understood, in 1874.

At the time the first purchase of blooded stock was disposed of, $685 of the amount received was turned over to the University without credit to the farm. If it is thought best to keep the original investment intact, this sum should be drawn upon, but not necessarily, as we have a good surplus on hand with no prospect of its permanent decrease. There are matters connected with the Short-horn cattle that will require attention. As I think this well understood, I will refrain from further mention.

The great desideratum in farming, as I understand it, is to keep the soil rich and productive. If this be true, our farming operations have been successful.

In the memorial of the Trustees to the State Legislature of 1869, I find under the head of "*It will pay*," these words:

"If the University shall lead to the discovery of new methods, or diffuse more widely those already known, and thus teach how to raise one bushel of corn more from each acre planted than was raised per acre in 1866, it would, at 40 cents a bushel, add more than $1,000,000 to the annual harvest of the State."

In 1871 the field immediately north of the stock barn was planted to corn. All that could be plowed at that time, 28 acres, was planted. We got a good stand; it had good cultivation, and a favorable season gave 45 bushels per acre on 28 acres. This year the same lot contained 35 acres, and gave 70 bushels per acre—2,450 bushels, in place 1,260 in 1871. Seventy bushels more would have doubled the crop. Three things have wrought this change: Rotation of crops, tile draining, and improved seed. Knowing well that you have always been generous towards the farm, I leave the conclusion with yourselves.

There are 150 acres on the farms designed for corn the coming season, and all as good as the lot just mentioned. It could hardly be in better shape for a bountiful crop. In the last year 600 loads of manure have been hauled from the yards and the city. This has been applied on the thinnest land, so as to make all as good as possible. If the farm should be kept simply as an investment, I believe, with good management, it can be made to pay, on a fair valuation, 6 per cent. on the investment.

In closing this somewhat lengthened report, I wish to disclaim having any policy to enforce against the will of those who employ me. Should what I have recommended, or any other policy, be adopted, and the good of the cause seem to demand that I remain here, I shall, to the best of my ability, faithfully perform the task assigned me.

Respectfully submitted,

E. L. LAWRENCE, *Head Farmer.*

UNIVERSITY FARM, December 9, 1879.

"A."

By cash for hay	$843 37
" " straw	9 80
" " hogs	603 47
" " fat steers	4,172 13
" " fat heifer	18 25
" " corn	650 87
" " cobs	9 00
" " potatoes	110 65
" " artichokes	17 55
" " timothy seed (returned)	5 60
" " vinegar	20 40
" " pasture	38 79
" " apples	48 68
" " rent (Griggs farm)	240 00
" " other rent	4 00
" " corn premium (County Fair)	5 00
" " hides	12 50
" " wheat	430 40
" " grade Jersey cow	45 00
" " gas pipe	16 60
" " bull service	55 50
" " Short-horns and Jerseys	518 60
" " work	34 35
" " old truck (ra ls, iron, etc.)	17 65
" Department Cr., Horticultural Department	415 35
" " " hay, coal, etc., etc	265 77
Total	$8,609 28

"B."

Statement of the Result of Cattle-feeding.

Date.	Number.	How Obtained.	Weight—lbs.		Cost.		Remarks.
			Total.	Av'ge.	Per 100 lbs.	Total.	
1878. Dec. 1.	15	Imported.	24,740	1,650	$3 75	$927 75	
	39	"	44,300	1,135	3 00	1,329 00	
	2	"	720	360	3 00	21 60	
1879. Mar. 5.	18	Purchas'd	15,200	844	3 75	594 00	
Mar. 29.	3	"	3,070	1,020	3 75	115 00	
Apr. 25.	1	"	900	900	3 75	33 75	
Apr. 26.	2	"	1,630	815	3 75	61 12	
Aug. 5.	6	"	6,610	1,101	3 32	219 25	
Aug. 9.	8	"	8,110	1,014	3 75	263 57	
	94		105,640			$3,575 84	

SALES.

Date.	Number.	Where.	At home.		Sold for—		Remarks.
			Total.	Av'ge.	Per 100 lbs.	Gross.	
1879. Jan. 1.	15	Chicago ..	25,120	1,675	$4 60	$1,098 86	Feed, yard'ge, etc., deducted.
May 12.	16	" ..	22,910	.....	4 80	1,056 02	Feed, yard'ge, etc., deducted.
Nov. 25.	30	" ..	44,800	1,491	4 60	1,964 25	Feed, yard'ge, etc., deducted.
Nov. 25.	1	" ..	1,400	1,400	4 00	53 00	Feed, yard'ge, etc., deducted.
Sept. 1.	1	Killed.....	1,000	1,000	.....	.....	Went blind; not fat'd; killed.
Oct. 24.	1	Died.....	1,400	1,400	.....	.....	Fat when taken sick; died.
Dec. 1.	16	Imported.	19,520	1,220	3 50	863 20	
Dec. 1.	14	"	15,870	1,123	3 00	476 10	
		Total....	130,620			$5,511 43	

RECAPITULATION.

Gain, pounds		24,980	$1,935 69
Freight	$90 00		
Other cash expenses	17 87		
			107 87
Total gain			$1,827 82

Steers were kept on the place equal to one steer for 5.80 months, and gained 24,980 lbs., or 43 lbs. for each steer for each month. Last year, the gain was 44¾ lbs. for each steer each month.

"C."

1879. Dec. 1	To paid for fence-wire and posts	$117 02
"	" " lumber	10 78
"	" " advertising	20 15
"	" " shoeing	20 05
"	" " salt	12 35
"	" " hardware	43 82
"	" " grass and other seeds	80 40
"	" " feed	8 00
"	" " threshing	38 76
"	" " Jersey bull	65 20
"	" " pump	12 20
"	" " tile	8 96
"	" " breeding two mares	20 00
"	" " harness repairs	6 80
"	" " hogs	37 00
"	" " stock cattle	1,335 19
"	" " labor	1,701 32
"	" " boarding hands	202 68
"	" " stone for paving yard	8 00
"	" " experiments	1 65
"	" " general repairs	63 50
"	" " gas- ipe	59'80
"	" " incidental expenses	18 75
"	" salary	999 96
"	" mechanical and architectural accounts	21 43
"	" Illinois Central, freight	170 25
	Total	$5,083 99

"D."

Balance Sheet.

1879. Dec. 1	By cash sales	$7,928 16	
"	" department credits	681 12	
"	" permanent improvements	339 89	
"	" inventory, salable property	10,459 24	
"	" teams and tools	2,135 00	
"	To expenses of the year		$5,083 99
"	" inventory of December 1, 1878 (salable)		9,682 89
"	" " " " tools and teams		2,269 00
"	Balance, profits of the year		4,507 53
	Total	$21,543 41	$21,543 41
	Balance in treasury December 1, 1878	$1,266 36	
	Receipts and credits of the year	8,609 28	
	Expenses of the year		$5,083 97
	Available means (present balance)		4,791 65
	Total	$9,875 64	$9,875 64

"E."

Permanent Improvements.

Paving back yard—		
Two cars stone	$8 00	
Freight	40 80	
Labor, hauling stone and ashes, etc	18 07	
		$66 87
Tile-draining (93 rods)		38 72
Fence on Griggs farm (160 rods)—		
Paid for wire	$75 32	
" " posts	23 70	
Hauling posts and making fence	16 00	
		115 02
Watering place on stock farm—		
Cost of 1,200 feet gas-pipe	$52 38	
" tank	8 20	
" well brick	3 20	
Work—hauling, grading, digging well, etc	55 50	
		119 28
Total		$339 89

"F."

Inventory Salable Property, December, 1879.

CATTLE.		
16 feeders, 19,520 pounds, average 1,220 pounds, at 3½ cents	$683 20	
14 stockers, 15,870 pounds, average 1,123 pounds, at 3 cents	476 10	
25 cows and		
21 calves, 32,330 pounds, at 3 cents	969 90	
1 yearling heifer, ¾ Jersey	35 00	
1 yearling heifer, ½ Jersey	20 00	
78 head		$2,184 20
HAY.		
110 tons timothy, at $8	$880 00	
35 tons clover, at $5	175 00	
145 tons		1,055 00
CORN.		
4,350 bushels, in crib, at 34 cents	$1,479 00	
100 bushels selected seed, at 60 cents	600 00	
868 bushels in shock (496 1¾-bushel shocks, at 60 cents)	294 00	
50 bushels in shock (50 1-bushel shocks, at 30 cents)	15 00	
5,368 bushels		1,848 00
HOGS.		
16 breeders, at $10	$160 00	
50 shoats, at $4	200 00	
33 pigs, at $2	66 00	
45 pigs, at $1	45 00	
144 hogs and pigs		471 00
COLTS.		
2 yearlings	$100 00	
2 summer colts	60 00	
4 colts		160 00
MISCELLANEOUS.		
900 bushels oats, at 28 cents		252 00
70 bushels potatoes, at 40 cents		28 00
8 bushels timothy seed, cost $2 20		17 60
30 tons straw, at $2 50		75 00
17 acres winter wheat, at $3 00		51 00
11 acres rye, at $2 50		27 50
1¼ acres artichokes, at $20		25 00
Accounts		30 00
35 head Short-horn and Jersey cattle, at cost		4,234 94
Total		$10,459 24

"G."

Blooded Stock Account.

1878.		
December 31.	To 33 head December 1, 1878, at cost	$3,638 01
	" 31 days' feed of meal, 245 pounds daily, at 60 cents	46 07
	" 200 pounds hay daily, at $4	12 40
	" labor	31 00
1879.		
February 28.	To 2 months' feed—16,520 pounds meal, at 60 cents	99 12
	17,700 pounds hay, at $5	44 25
	59 days' labor	59 00
	250 pounds oil meal	2 50
March 31	To 1 month's feed—8,370 pounds meal, at 60 cents	50 22
	8,000 pounds hay, at $5	20 00
	Labor	31 00
April 30	Same as March	101 22
May 31	To 4,000 pounds meal, at 70 cents	28 00
"	" pasture, at $1 per month	35 00
"	" hay, 1¼ tons	6 00
"	" labor	10 00
August 31	" 3 months, at $80	240 00
September 30.	" 1 month	80 00
October 31	" 1 month	80 00
November 31.	" 120 bushels corn, at 35 cents	40 00
"	" 4 tons clover	20 00
"	" pasture	20 00
"	" labor	15 00
"	" extra labor at fair	5 00
"	" 2 halters	1 25
"	" paid for Jersey bull	65 00
"	" paid freight on Jersey bull	10 00
"	" paid for advertising	19 00
	Total	$4,809 04
	By sales	$518 60
	" service of bulls	55 50
	Present inventory (cost)	4,234 94
	Total	$4,809 04

"H."

Experiments—Illinois Industrial University to Agricultural Dept., Dr.

1879.			
May 6	To plowing and harrowing	$1 25	
" 6	" clover seed	2 10	
" 17	" planting corn	2 00	
" 19	" " "	30	
June 2	" cultivating	75	
" 10	" hoeing	40	
" 11	" work	25	
" 12	" "	25	
" 24	" "	25	
" 27	" harvesting wheat	3 00	
July 1	" cultivating corn	40	
" 1	" harvesting wheat	1 50	
" 8	" hoeing corn	63	
" 18	" " "	80	
" 18	" stacking wheat	2 00	
Sept. 2	" Hauling wheat	1 00	
" 2	" threshing 82 bushels wheat	8 20	
" 3	" plowing and harrowing	1 75	
" 4	By 82 bushels wheat, at 85 cents		$69 60
Oct. 1	To cutting corn	2 50	
Nov. 1	" pig experiment	5 00	
" 1	By 45 shocks corn, at 30 cents		13 50
" 1	To corn experiment made by Head Farmer	49 47	
	Total	$83 10	$83 10

REPORT FROM HORTICULTURAL DEPARTMENT.

Dr. J. M. Gregory, Regent Illinois Industrial University:

I respectfully submit the following report for the year 1879 from the Horticultural department:

Upon the whole, the year has been a favorable one, and progress has been made, though it is well known to you that the fruit crops of the vicinity and country were comparatively light. Not more than one-half the amount produced last year in our State was gathered this year. This is the "off" year for the orchards, and the very dry weather in May severely pinched the small fruits. Concord grapes, with us, yielded a full crop, of excellent quality. A number of pear trees fruited, the first produced upon trees planted by the University.

A summary of the record of the

EXPERIMENTAL APPLE ORCHARD

is presented here, believing it to be of interest.

Fruit was gathered, and a record made of four hundred and seven (407) varieties. A few of the earliest kinds were missed, owing to the presure of other labors and the propensity of visitors, etc., to help themselves.

Taken together, the apples were smoother and better than they have been in any preceding year. Though the quantity upon each tree was usually small, the total amount was greater than heretofore in any one year. The trees, too, with one exception, to be hereafter noticed, are apparently in better condition than for several years back.

Whether any one kind not usually cultivated will prove better than those commonly grown in the vicinity cannot yet be determined; but this year's fruiting gave much more promise than heretofore of several valuable new kinds.

South of the avenue, fruit was gathered from 233 kinds. Of these, 109, or 80 per cent., bore but few apples; 19, or 14 per cent., bore what we called an average crop for the size of the tree; and 9, or 6 per cent., were as heavily laden as the trees ought ever to be. Of the above, as a whole, 38, or 25 per cent., ripened their fruit in October or before; while 114, or 75 per cent., were shown to be later varieties. In quality, 3 kinds, or 2 per cent., were accounted worthless; 49, or 36 per cent., were graded only fair (averaging equal to Ben Davis), and 84, or 62 per cent., as good as the average of the popular kinds. A few of these rank very high in flavor and richness. 23, or 10 per cent., were believed not to be true to name.

North of the avenue, records were made of the fruit from 184 varieties. In regard to the amount of fruit produced by these, 121, or 86 per cent., bore only a few apples; 15, or 10 per cent., had average crops; and 5, or 4 per cent, were very full.

In quality, 2 were worthless; 97, or 65 per cent., fair; and 51, or 34 per cent., very good. In season, 33, or 34 per cent., matured in October or earlier, and 62, or 66 per cent., at later times. The very warm weather of October caused good winter fruit to ripen prematurely, so that the test this year as to the very long keepers cannot be satisfactory. Other things have also prevented proper tests in this respect.

In this portion of the orchard, 21, or 9 per cent., are not considered true to the name they bear in the books of record.

Taking the whole orchard together, the following percentages are made from the fruiting trees, the size of the trees being considered:

Bearing only a few apples, 82 per cent.
Bearing an average crop, 12 per cent.
Bearing a large crop, 6 per cent.
Ripening in October or earlier, 29 per cent.
Ripening later than November 1, 71 per cent.

Following the winter of 1876-7, quite a number of trees died or showed signs of severe injury, and the same difficulty has shown itself to a less extent this season. In the country at large, it appears this trouble is much more prevalent than has ever heretofore been reported, and, from my investigations, proves to be the same as witnessed now and previously in the University orchard. Apple trees are subject to very many diseases, and injuries and death or unhealthiness results from many causes, requiring careful examination and accurate knowledge to determine. In this case, the injury is confined to the trunk above the surface of the ground, usually extending upward not more than one foot, but sometimes reaching and even extending over the larger branches. It is not confined to any side, but occurs more often on the Southwest. In early spring, little or no evidence is apparent of injury. The tree puts forth its leaves as usual, and the setting of fruit is not interfered with. But, by the middle of summer the whole tree looks sickly, and often dies with its leaves and fruit attached or not.

The bark of the injured portion is separated from the wood and dies. Sometimes a new bark is formed beneath, and the tree survives. If the part thus affected is not large, little damage is done, and the wound may become entirely covered by a new growth.

The cause is the freezing of the trunk when in peculiar conditions as to the abundance and fluidity of the sap. The injury is thus a mechanical one, and is attended with precisely the same phenomena as when such a wound is made by man. We have noticed that trees of the same variety are usually similarly affected. In the country at large it is the Rawles Genet this year of which there is the most complaint, yet this has usually been considered hardy. So some of the new kinds in the University orchard thus injured need not be discarded on this account.

The committee of the Trustees, to whom was referred the planting of a new orchard of well proved varieties, decided last year that it was not desirable; but there seems to me to be so much need of at least a few of such trees in some convenient location for observation and experiment that I again respectfully ask attention to the subject. There are

several questions relating to culture and management upon which no information can be gained from the present collection of varieties, nor by planting among these. I instance a few of these questions:

The influence of the stock in propagation.
The influence of deep or shallow planting.
The effects of deep or shallow tillage (cultivation).
The effect of seeding to grass.
The effects of different kinds of pruning.
The effects of top grafting in different varieties.

Such questions as these cannot be decided by experiment upon one or two trees of a kind, nor upon those that are not well known as to habit and the special influences of climate. And there are many other experiments of which illustrations would be valuable if they added nothing to the stock of information now possessed by cultivators. The planting need cost nothing beyond the labor.

Numerous seedling, ornamental and forest trees have been grown during the year for the nurseries and plantations, as well as to illustrate the methods of propagation. A shade of brush supported upon a post high enough to work under, was constructed last spring for such seeds as require their protection. Of this it is hoped to make further use the coming year.

The Greenhouse and adjoining grounds have been kept in good order during the year, and have served many practicable purposes. Experiments were made in the garden upon the fertilization of plants, and in the house upon the evaporation and absorption of water by leaves and other processes in vegetable physiology as well as in floriculture proper. The heating apparatus did excellent service last winter, with a very moderate consumption of coal. During the summer there was no trouble with the water pipes, such as occurred the previous year, but the flues of the boiler had to be replaced. This was done by the manufacturer under his guarantee. But he claims that the eating of holes in the wrought iron tubes was due to the coal used, and this seems to be the fact. Hard coal would doubtless cost a little more, but at the prices demanded during this year the additional cost would almost be balanced by the reduction in attendance. There is no question whatever as to the gain in neatness and safety. I would be much pleased, with the authority granted, to try enough hard coal this winter for experiment, one or two tons, with a view of obtaining a full supply next summer should it prove wise to do so.

The department has paid its way during the year, and has a small balance to its credit.

RECAPITULATION.

There has been given, after a general statement, a summarized account of the apple orchard, and attention is again asked to the planting of a small orchard of well proved kinds.

A statement has been made in regard to work done in the Nursery and in the Greenhouse and vicinity, and a request made to be authorized to try one or two tons of hard coal this winter, to determine its advantages over soft coal and the comparative expense.

Very respectfully submitted.

T. J. BURRILL, *Professor of Horticulture.*

MECHANICAL ENGINEERING AND PHYSICS.

Hon. J. M. Gregory, Regent Illinois Industrial University:

DEAR SIR: I have the honor to present the following report upon matters now pertaining to the Mechanical department of the University, with the request that you will communicate so much thereof as your judgment shall dictate, to the Board of Trustees:

THE NEW HEATING APPARATUS.

The situation of the boilers in the basement of the main building being such as to make the consideration of absolute safety paramount to all other questions, with the fact that two of the Root sectional boilers were already in successful use on the University premises, led to the selection of a boiler of that kind, to replace the one removed by order of the Trustees. We have now three boilers of the same kind, though of different sizes; but the pipes and most of the fittings are equally adapted to either, so that fewer extras need be kept in stock against emergencies.

It was deemed advisable to get the largest boiler which the funds at command would secure—one of 100 tubes 4 inches in diameter by 9 feet long; having a nominal power of 75 horses. This boiler is now in place, and fully answers our expectations. Our janitor reports abundance of steam for all wants as yet developed, with a consumption of fuel not greater than that required for each of the old boilers—rated at 35-horse power.

The brick setting of the old east boiler has been thoroughly repaired, and the apparatus is in order for use, but it is kept inactive, as a resort in case of emergency.

RADIATORS AND HEATING COILS.

There were in the Callisthenics and Modeling rooms and under the main corridor, not less than ten large coils, of various capacity, which different changes in the building had put out of use. These were repaired, when repairs were needed, and were used to satisfy the requirements of the new form of ventilation, and where else they could be most useful. The smaller coils which they replaced were substituted for yet smaller ones, successively, until the heating power in most of the rooms on the north front of the University was enlarged, in some degree, though not in all cases as much as could be wished. Aside from this work, much attention was given to refitting of valves and the insertion of new ones, where needed, and to a general simplification and perfection of all arrangements for warming and ventilating.

THE RETURN WATER.

In the old system the returns lead directly to the boiler, and form, essentially, part of it. Hence it follows that throughout the basement story, water constantly stands in the returns, at the same level as in the boiler itself. The greater size of the new boiler places this water level about two feet higher than in the old, and subtracts so much from the scanty fall from all heating coils placed in the basement for warming the first story. This evil is pa ticularly felt in those which warm the chapel, since that floor is depressed two feet below the other floors of the same story. The ordinary height of return water is about on a level with the outlet of these coils. Evidently, this condition of things prevents the proper circulation of steam through these coils, and exposes the return pipes to great danger of freezing, in severe weather, as occurred last winter. It is true, that we have so arranged that, if need be, this water may be allowed to escape into the ground, but at a loss of soft water which should go back to the boiler. To meet these evils, and to perfect our system, it has been thought best to gather all the return water into an adequate iron tank, to be placed in the ground, in the basement, at a level entirely below that of any of the return pipes. This tank will drain them all, will improve the circulation of steam, and will save the condensed soft water, which will be returned to the boiler by the pumps, as wanted. This tank is now daily expected, and will be in place before the beginning of another term.

THE VENTILATING DUCTS

and heating coils in the two series of tower rooms appear to be doing their work satisfactorily. So far, they warm the rooms quickly, and maintain a constant volume of sweet and pure air. If any defects exist, they must be disclosed in the severe weather which may now be at any time expected.

THE SHOP BOILER.

In November, one of the tubes of this boiler began to leak, and, upon examination, it appeared that the lower tier of six tubes should be replaced. The case was pressing, as all work at the shops had to be suspended until the repairs could be made. New tubes, with such fittings as were needed, were obtained from New York, at a cost, with freight, of $61.33. As these repairs are the necessary result of continued use, I respectfully ask that the above amount be passed to the credit of the shop, leaving only the labor and incidentals of setting to be charged to shop expenses.

The Machine Shop has had all the work it could do during the term. The new cylinder for the engine approaches completion, and we hope may be put in during the vacation. The drill-press has served as practice for the Sophomore mechanical engineers, who have shown great interest in both its design and in so much of the execution as they have had time for. We can hardly afford to wait to have it finished by class-practice, as we greatly need the tool.

It seems to me but justice to refer to the skill, energy and patience shown by the foreman, Mr. Kimball, under his multitudinous calls, and to the earnest efforts of Mr. Baker, in his endeavors to make the heating apparatus of the buildings under his charge successful.

I am, very respectfully, your obedient servant,

S. H. PEABODY, *Prof. of Mech. Eng. and Physics.*

PROFESSOR OF ARCHITECTURE.

ILLINOIS INDUSTRIAL UNIVERSITY,
December 15, 1879.

To the Regent and Board of Trustees of the Illinois Industrial University:

GENTLEMEN: I beg leave to report in behalf of the School of Architecture, as follows: The classes have been small this year, but have, I believe, done as good work as usual, and as much. My attention has been largely devoted to the class in Architectural shop practice, and I have taught the class personally, with assistance of the foreman, for one hour daily. The course of study has been revised, much extended and improved, and

now consists of 25 examples of the usual joints and constructions in Carpentry and Joining, employing throughout the Russian system, and furnishing each student full drawings for each piece. It is proposed to revise and also to extend the work of the winter and spring terms, in Cabinet Making, Turning, Metal and Stone Work, making up a more full and complete course in Architectural shop practice than is given, it is believed, elsewhere at present.

But some more facilities for lathe work are urgently needed, as we have now only an old lathe, and a foot lathe. The appropriation of $75.00 for a new lathe, made at your last meeting, has not yet been expended, as it was doubtful if a sufficient balance remained, and the lathe was not so much needed before the winter term.

I find that the old lathe can be fixed up so as to do tolerably well for several years, with new bed plates, new rest, &c., at a cost of $25 or $30. I would recommend that this be authorized, and that the balance of appropriation, with an additional amount of $15, making $90 in all, be expended for two small hand lathes, which can be purchased and fixed up for $60. These can be driven from countershaft of jig-saw, by lengthening it, and would probably furnish room enough so that we can get along this year. No tools are required, as we have enough to furnish the four lathes.

I would therefore respectfully recommend:

1. That the usual appropriation be made of $20 per month for expenses of class in Architectural shop practice.
2. That authority be given to fit up old lathe at a cost of $30.
3. That balance of appropriation of $75, and $15 additional, be used for fitting up two small hand lathes.

Very respectfully submitted.

N. CLIFFORD RICKER, *Professor of Architecture.*

An appropriation of $50 was made for the expenses of a Farmers' Institute to be held at the University in January; and a recommendation from the Regent, that a course of free lectures on Agriculture be given at the University during the three weeks preceding the institute, was also granted.

Board adjourned, to meet at the Doane House at 7:30 P. M.

EVENING SESSION.

The Board met, as per adjournment.

The Regent's report was taken up, and the following appropriations were made:

To be credited to Mechanical department, for boiler pipe and tubes	$61 33
Per month, for expenses of Architectural shop practice	20 00
Additional for fixing up lathe	15 00
For purchase of books for Library (Committee: Regent, Librarian and Business Agent)	500 00
For table and chairs for Library	150 00
For Military department ($5 00 for musket repairs, $83 00 for Gymnasium, and $23 00 for Band instruments)	111 00
For case for food collections, and glasses for same	150 00
For students examinations and lectures (Committee: Regent and Business Agent)	200 00
For frames for plans, etc., in Civil Engineering department	6 00
Case of veterinary dissecting instruments	25 00

The Business Agent then presented his report; which was read and received:

CHAMPAIGN, ILL., December 15, 1879.

Hon. Emory Cobb, President Board of Trustees Illinois Industrial University:

SIR: I hand you herewith the usual financial statement, for the three months ending December 1, 1879.

Paper "A" gives the current appropriations, expenditures and receipts under the same.

Paper "B" gives the condition of the State appropriations, of 1877 and 1879.

Paper "C" is a list of vouchers for warrants drawn in the three months, which are presented for auditing.

The expenditures of the Chemical department have been large; but some $400 to $500 of the overdraw of its appropriation will be met by the deposits in my hands at the end of this term.

The Architectural department purchased lumber to the amount of over $350, which is mostly in stock. Its account will be made good by the end of the next three months.

The overdraw in the Military department account is caused by an expenditure for the Gymnasium. which was considered necessary by the Regent and Prof. Dinwiddie.

Respectfully submitted.

S. W. SHATTUCK, *Business Agent.*

"A"

Current Appropriations and Receipts.

For what expended.	Appropri't'd	Received.	Expended.	Balance.
Board expense	$300 00		$30 10	$269 90
Salaries	16,555 00		7,537 24	9,017 76
Buildings and grounds	100 00	$40 75	43 82	96 93
Fuel and lights	3,000 00	62 78	723 32	2,339 46
Stationery and printing	200 00		158 99	41 04
Fixtures and furniture	100 00		51 86	48 14
Mechanical department	41 40	1,049 31	856 81	233 90
Architectural "	10 64	651 79	736 10	73 77
Agricultural "	1,447 74	4,202 76	839 58	4,810 92
Horticultural "	79 62	169 66	199 16	50 12
Chemical "	55 52	14 99	728 45	657 94
Military "	55 00		53 57	3 57
Library and apparatus	50 00		14 98	35 02
Incidental expense	200 00		64 80	135 20
Sundries—Physical laboratory	102 71		6 80	95 91
Preparatory department		1,143 00	700 00	443 00
Photo room	15 00		9 20	6 70
Cabinets		75 00	11 35	63 65
Engineering department	15 00		13 00	2 00
Protested dratts	400 09		400 09	
Domestic Science	30 00			30 00
Fees and room rents		2,813 50		2,813 50
State appropriations			3,799 06	
Illinois Central Railroad donation		483 85		483 85

"B"

State Appropriations.

July 1, 1877.	Appropri't'd	Received.	Expended.	Balance.
Taxes on lands	$4,306 02	$4,306 02	$4,306 02	
Buildings and grounds	5,000 00	5,000 00	5,000 00	
Chemical and physical laboratories	2,000 00	2,000 00	2,000 00	
Mechanical and architectural shops	3,000 00	3,000 00	3,000 00	
Library cases	1,000 00	1,000 00	1,000 00	
Books and publications	3,000 00	3,000 00	3,000 00	
Cabinet cases	4,500 00	4,500 00	2,700 63	$1,799 37
Cabinets	2,000 00	2,000 00	2,000 00	
Chemical laboratory	40,000 00	40,000 00	40,000 00	
Greenhouse	2,500 00	2,500 00	2,500 00	
July 1, 1879.				
Taxes on lands	$5,000 00	$2,298 52	$2,298 52	
Buildings and grounds	5,000 00	2,500 00	1,735 77	$764 23
Chemical and physical laboratories	2,000 00	1,000 00	613 47	386 53
Mechanical and architectural shops	3,000 00	1,500 00	668 86	831 14
Books and publications	3,000 00	1,500 00	241 84	1,258 16
Cabinets	1,000 00	1,000 00	168 13	831 87
Ventilation and water closets	2,500 00	2,500 00	1,789 83	710 17
Heating apparatus	3,000 00	3,000 00	2,672 07	337 93

"C"—*List of Vouchers.*

No.	To whom.	For what.	Amount.
1	S. M. Millard	Expense to meeting	$18 35
2	J. R. Scott	" "	3 00
3	R. B. Mason	" "	8 75
4	J. W. Bunn	Amount of protested drafts	400 09
5	S. W. Shattuck	Service as Business Agent	300 00
6	J. M. Gregory	Salary, September, 1879	300 00
7	T. J. Burrill	" "	150 00
8	S. W. Shattuck	" "	150 00
9	E. Snyder	" "	150 00
10	D. C. Taft	" "	150 00
11	J. C. Pickard	" "	150 00
12	N. C. Ricker	" "	125 00
13	J. D. Crawford	" "	125 00
14	H. A. Weber	" "	150 00
15	G. E. Morrow	" "	150 00
16	S. H. Peabody	" "	166 66
17	Mrs. J. M. Gregory	" "	100 00
18	F. W. Prentice	" "	100 00
19	E. L. Lawrence	" "	83 33
20	I. O. Bak r	" "	75 00
21	M. A. Scovell	" "	75 00
22	F. A. Parsons	" "	75 00
23	C. I. Hays	" "	75 00
24	Chas. Hildebrand	" "	75 00
25	C. E. Pickard	" "	60 00
26	Geo. A. Wild	" "	60 00
27	E. A. Kimball	" "	100 00
28	H. M. Beardsley	" "	35 00
29	N. S. Spencer	" "	30 00
30	A. B. Baker	" "	40 00
31	C. W. Williams	" "	20 00
32	Mosler Safe and Lock Co	Locks	8 68
33	M. Anderson	Labor	32 50
34	James Lewis	Mason work	36 56
35	Field, Leiter & Co	Window curtains	35 93
36	C. C. Harris	Harris	6 50
37	Moore & Co	"	6 86
38	Jno. Stott	Stationery	49 20
39	C. Weeks	Gravel and sand	6 50
40	Agricultural Department	Expenses Superintendent	165 05
41	Chicago Carpet Co	Mats	17 25
42	N. A. Williams	Cement and clay	9 25
43	R. S. Wilbur	Hauling	6 60
44	Inter-Ocean	Advertising	10 00
45	Fuller & Fuller	Glass	15 36
46	Fuller & Fuller	"	10 00
47	Crane, Breed & Co	1 manifold	3 20
48	W. L. E. Gurley	"	13 00
49	J. C. Pickard	Expenses in examinations	29 30
50	Jno. O'Neil	Plumbing	25 50
51	E. B. Benjamin	Chemicals	305 41
52	H. Peddicord	Lime	11 15
53	Brown & Anderson	Plastering	90 50
54	Chas. Rogers	Mason work	11 25
55	Daniel Murry	Labor	6 25
56	M. McKay	"	6 25
57	Julius Wilskie	"	7 88
58	G. Klingenspor	Planks	3 25
59	Holderness & Co	2 rubber stamps	3 00
60	Jas. Smith	Work	24 00
61	Thos. Wright	Castings	49 49
62	J. C. Lewis	Mason work	12 94
63	Enterprise Coal Co	7 cars coal	79 60
64	Eberback & Sons	Chemicals	32 55
65	J. D. Crawford	Books	2 75
66	J. C. Sedwick	Carpenter work	42 50
67	A. S. Robinson	Work in Armory	5 87
68	Publishers Illini	Printing	5 00
69	Sutton & Sheldon	8 M brick	56 00
70	J. Wilkinson	Ebony wood	7 86
71	H. Paulsen	Brushes	1 10
72	N. C. Ricker	Petty expenses	6 70
73	G. E. Morrow	Cattle pictures	2 40
74	U. S. Patent Office	Binding reports	4 80
75	W. T. Pratt	Carpenter work	38 50
76	I., B. & W. R. R.	Freights	7 76
77	Andrew Barr	Ash lumber	12 42
78	T. W. Christern	Books	1 50

"C"—*List of Vouchers*—Continued.

No.	To whom.	For what.	Amount.
79	Fred Brown	Pots	$45 95
80	Crane Bros. Manufacturing Co.	Hardware	183 53
81	Champaign Gas Co.	Bill July, August and September	88 80
82	J. W. Shuck	Ventilating apparatus	426 90
83	C. Weeks	35 yards gravel	22 75
84	Students' Pay Roll	September, 1879	405 73
85	J. M. Gregory	Salary, October, 1879	300 00
86	T. J. Burrill	" "	150 00
87	S. W. Shattuck	" "	150 00
88	E. Snyder	" "	150 00
89	D. C. Taft	" "	150 00
90	J. C. Pickard	" "	150 00
91	N. C. Ricker	" "	125 00
92	J. D. Crawford	" "	125 00
93	H. A. Weber	" "	150 00
94	G. E. Morrow	" "	150 00
95	S. H. Peabody	" "	166 66
96	Mrs. J. M. Gregory	" "	100 00
97	F. W. Prentice	" "	100 00
98	E. L. Lawrence	" "	83 33
99	I. O. Baker	" "	75 00
100	M. A. Scovell	" "	75 00
101	F. A. Parsons	" "	75 00
102	C. I. Hays	" "	75 00
103	C. Hildebrand	" "	75 00
104	C. E. Pickard	" "	60 00
105	G. A. Wild	" "	60 00
106	E. A. Kimball	" "	100 00
107	H. M. Beardsley	" "	35 00
108	N. S. Spencer	" "	30 00
109	A. B. Baker	" "	40 00
110	Leggatt Bros.	Books	46 36
111	Henry & Karcher	Brooms, etc	4 85
112	Crane Bros. Manufacturing Co	Hardware	13 08
113	Crane Bros. Manufacturing Co	Pump	262 85
114	Crane Bros. Manufacturing Co.	Pipe and fixtures	39 24
115	Agricultural Department	Farm expense, October	172 30
116	Besore Bros	Lime	8 25
117	C. & U. Gas Co.	Bill for October	93 00
118	J. E. Saxton & Co	Stationery	14 55
119	M. E. Lapham	Lumber	21 71
120	J. O'Neil	Plumbing	28 07
121	Luddington, Wells & Van Schick Co.	Lumber	349 46
122	S. Riley	Work	8 50
123	Jno. O'Neil	Work on pipes	39 49
124	Wm. Storey	Books	5 00
125	Abendroth & Root Manufacturing Co.	Tubes and gaskets	58 05
126	Nickel & Strassberger	Level	5 00
127	Publishers Illini	Blanks	6 75
128	E. B. Benjamin	Chemicals	84 06
129	Larrabee & North	Tools	61 06
130	Larrabee & North	Hardware	25 05
131	G. A. Wild	Expense for specimens	20 61
132	J. C. Lewis	Plastering	8 02
133	The Inter Ocean	Advertising	2 50
134	Chas. Berranger	Plating swords	12 80
135	Mosler Safe and Lock Co.	Locks	21 45
136	Yeomans, Shedd & Lassur	Tannate soda	3 00
137	Walter Mulliken	6 cane stools	5 10
138	J. M. Gregory	Purchase of books	28 72
139	Mosler Safe and Lock Co.	Locks	95 00
140	Students' Pay Roll	October, 1879	273 60
141	E. B. Benjamin	Apparatus	12 70
142	J. M. Gregory	Salary, November, 1879	300 00
143	T. J. Burrill	" "	150 00
144	S. W. Shattuck	" "	150 00
145	E. Snyder	" "	150 00
146	D. C. Taft	" "	150 00
147	J. C. Pickard	" "	150 00
148	N. C. Ricker	" "	125 00
149	J. D. Crawford	" "	125 00
150	H. A. Weber	" "	150 00
151	G. E. Morrow	" "	150 00
152	S. H. Peabody	" "	166 66
153	Mrs. J. M. Gregory	" "	100 00
154	F. W. Prentice	" "	100 00
155	E. L. Lawrence	" "	83 33
156	I. O. Baker	" "	75 00

"C"—*List of Vouchers*—Continued.

No.	To whom.	For what.	Amount.
157	M. A. Scovell	Salary, November, 1879	$75 00
158	F. A. Parsons	" "	75 00
159	C. I. Hays	" "	75 00
160	C. Hildebrand	" "	75 00
161	C. E. Pickard	" "	60 00
162	G. A. Wild	" "	60 00
163	E. A. Kimball	" "	100 00
164	H. M. Beardsley	" "	35 00
165	N. S. Spencer	" "	30 00
166	A. B. Baker	" "	40 00
167	Champaign Co. Gazette	Binding	153 85
168	Agricultural Department	Farm expenses, Novémber	204 37
169	A. C. Ricker	Books	5 25
170	Enterprise Coal Co	4 cars coal	44 40
171	I. B. & W. R. W. Co	Freight	8 12
172	W. T. Pratt	Repairs on roof	268 75
173	Trevett & Green	Hardware	62 00
174	" " "	"	1 60
175	E. B. Benjamin	Chemical apparatus	23 90
176	Champaign Co. Gazette	Printing	19 50
177	J. C. Lewis	Mason work	9 10
178	E. L. Lawrence	Hay	2 50
179	Geo. L. Maxwell	Crockery	6 75
180	Jno. O'Neil	Plumbing	9 60
181	H. Swannell	Chemicals	35 49
182	lliott Stott	Books	33 25
183	Jno. Wheldon	Books	32 85
184	Students' pay-roll	November, 1879	248 26
185	Robinson & Burr	Flues in boilers	16 59
186	" " "	Work on boilers	7 70
187	" " "	Work and material	11 75
188	H. J. Green	Freight and repairs	6 45
189	A. B. Baker	Pay-roll of workmen	73 75
190	The Illini	Advertising	16 66
191	C. & U. Gas Co	Bill for November	142 20
192	L. F. Allen	2 volumes herd-book	16 50
193	Besore & Co	Lime and plaster	1 95
194	Crane Bros. M'f'g Co	Hardware	46 32
195	" "	"	73 15
196	R. B. Harwell	Work and material	41 30
197	"	Painting and glazing	79 96
198	"	Painting	71 86
199	Horticultural Department	Work and trees	37 08
200	I. C. R. R. Co	Freight, August, Sept. and Oct	483 85
201	Architectural Department	Work and material	524 59
202	" "	Work for departments	40 60
203	Mechanical "	" " "	64 17
204	" "	Work and material	570 55
205	Prof. S. W. Shattuck	Petty expenses, 3 months	59 25
206	E. N. McAllister	Postage, 3 months	25 50
207	Agricultural Department	Work for Horticultural Dep'tm't	66 95
208	" "	Work for other departments	21 75
209	" "	Work and material	7 35
210	" "	" " "	8 10

A request from Prof. Burrill, Horticultural Department, for two tons of hard coal for experimental use in Green-house was granted.

The vouchers and list of warrants laid before the Board with the Business Agent's report were referred to a committee consisting of Messrs. Willard and Fountain.

J. W. Bunn, Treasurer, presented the following report of receipts and expenditures; which was read and received:

ILLINOIS INDUSTRIAL UNIVERSITY

TO JNO. W. BUNN, TREASURER.

	DR.		
1879.			
Nov. 29	To amount paid board expense	$30 10	
	" amount paid of salaries	7,537 24	
	" amount paid on account of buildings and grounds	43 82	
	" amount paid on account of fuel and lights	723 32	
	" amount paid on account of stationery and printing	158 96	
	" amount paid on account of fixtures and furniture	51 86	
	" amount paid on account of Mechanical department	856 81	
	" amount paid on account of Architectural department	736 10	
	" amount paid on account of Agricultural department	839 58	
	" amount paid on account of Horticultural department	199 16	
	" amount paid on account of Chemical department	728 45	
	" amount paid on account of Military department	53 57	
	" amount paid on account of Library and apparatus	14 98	
	" amount paid on account of incidental expense	64 80	
			$12,038 75
	" amount paid on account of Physical laboratory	$6 80	
	" amount paid on account of Preparatory department	700 00	
	" amount paid on account of Photograph room	9 20	
	" amount paid on account of cabinets	11 35	
	" amount paid on account of Engineering department	13 00	
	" amount paid on account of protested drafts	400 09	
			1,140 44
	" amount paid on account of State appropriations—		
	Chemical laboratory	$17 00	
	Cabinets	66 19	
	Mechanical shops	523 17	
	Ventilation and water closets	842 35	
	Buildings and grounds	868 76	
	Cabinet cases	39 39	
	Chemical and Physical laboratories	310 84	
	Books and publications	333 83	
	Heating apparatus	797 53	
			3,799 06
	To balance		13,507 24
			$30,485 49
	CR.		
1879.			
Sept. 10	By balance		$18,076 10
30	" amount received on account of fees and room rents	$2,280 00	
	" amount received on account of tuition in preparatory department	1,000 00	
	" amount received on account of buildings and grounds	29 50	
	" amount received on account of Chemical department	14 99	
	" amount received on account of Mechanical department	15 18	
	" amount received on account of Horticultural departm't.	2 00	
			3,341 67
October 1	" interest on Douglas county School District bonds		450 70
	" " Sangamon county bonds		1,250 00
Nov. 29	" amount received on account of Agricultural department	$4,202 76	
	" amount received on account of Mechanical department	1,034 13	
	" amount received on account of Architectural department	651 79	
	" amount received on account of Horticultural departm't	169 66	
	" amount received on account of buildings and grounds	11 25	
	" amount received on account of fuel and light	62 78	
	" amount received on account of cabinets	75 00	
	" amount received on account of fees and room rents	533 50	
	" amount received on account of tuition in Preparatory department	143 00	
	" amount received on account of Ill. C. R. R. donation	483 85	
			7,367 72
			$30,485 49
1879.			
	State appropriations	$6,909 60	
Dec. 17	Current expenses	6,597 64	
	By balance	$13,507 24	

URBANA, December 17, 1879.

JOHN W. BUNN, *Treasurer.*

The Board then adjourned, to meet at 8:30 A. M. at the University parlor.

SECOND DAY'S SESSION.

The Board assembled at the time appointed, present as yesterday.

The reports from the Agricultural Department were taken up.

Mr. Willard offered the following resolution:

Resolved, That a committee of three, with Mr. Scott as chairman, be appointed by the President, which shall be known as the Farm Committee; that the duties of the committee shall be to superintend all matters pertaining to the general and experimental farms, under the authority of the Board, and to recommend, from time to time, to the Board such improvements as they shall deem important.

The resolution was carried.

The reports of Prof. Morrow and Mr. Lawrence, on farm matters and experiments, were referred to the Farm Committee.

Prof. Burrill's recommendation for planting an additional experimental orchard, was also referred to the Farm Committee.

Mr. Millard offered the following resolution:

Resolved, That a committee of three, with Mr. Gardner as chairman, be appointed by the President, which shall be known as the Committee on Buildings and Grounds; that the duties of the committee shall be to superintend all matters pertaining to the buildings and grounds (such duties not to interfere with those of the Executive Committee), and to recommend, from time to time, to this Board such improvements as they shall deem important.

The resolution was adopted.

Mr. Jesse Burt's application for position of Head Farmer, was taken up and placed on file.

Mr. Lawrence's request for an increase of salary to $1,200, was read and received.

It was moved and carried that Mr. E. L. Lawrence be re-appointed Head Farmer for the ensuing year.

Mr. Gardner moved that Mr. Lawrence's salary be increased to $1,200.

Not seconded.

Mr. Willard moved that Mr. Lawrence be allowed $1,000, and $200 additional in produce raised on farms.

Amended by Mr. Scott, that the Head Farmer's salary be placed at $1,000, with the perquisites and privileges as heretofore.

Major Dinwiddie's request for $100, for purchase of band instruments, was laid over till next meeting.

The nomination of Miss Jennie Mahan as Instructor in Music, laid over from last meeting, was taken up.

The matter was referred to the Regent and Business Agent, with instructions that they make such arrangements as they deem necessary, and report to the next meeting of the Board.

The Regent's recommendation in regard to free-hand drawing was taken up.

It was moved and carried that Prof. Peter Roos be employed as instructor in free-hand drawing and designing, at $75 per month, with privilege of receiving additional compensation, not to exceed $25 per month, from any extra fees collected in his department; the Faculty to determine the rate of fees, etc., for extra instruction.

Mr. Millard, from committee to examine and compare vouchers and abstract of warrants from the report of the Business Agent, attested the same to be correct.

The report was received.

The Chairman then appointed the following committees, as by resolutions:

Farm Committee—Mr. Scott, Chairman; Messrs. Millard and Fountain.

Committee on Buildings and Grounds—Mr. Gardner, Chairman; Messrs. McLean and Mason.

Mr. Gardner asked for more time to settle with Mr. Percival, which was granted.

The renting of Dormitory, having been referred to Mr. Gardner and Business Agent, was passed over until next meeting.

The resolution to repeal last clause of By-laws, laid over from last meeting, was taken up.

Moved by Mr. Gardner, seconded by Mr. Millard, that the last clause of the IVth By-law be repealed.

Carried, with six affirmative votes.

Moved by Mr. Scott, that the said By-laws be changed so as to read, "one hundred thousand dollars," for Treasurer's bond, instead of "three hundred thousand dollars."

Carried, by six affirmative votes.

Mr. Millard offered the following resolution:

Resolved, That the Farm Committee be authorized to take charge of all the recommendations in the reports of the Head Farmer and the Professor of Agriculture, that they designate their respective duties in conducting experiments, and that they have the management of the two departments with full power to act in the premises.

On motion of Mr. Gardner, the Board adjourned.

EMORY COBB, *President.*

E. SNYDER, *Secretary.*

MEETING OF THE BOARD OF TRUSTEES, MARCH 9, 1880.

The Board met, at 3 o'clock P. M., in the University parlor.

Present—His Excellency, Governor S. M. Cullom; Messrs. Byrd, Cobb, Fountain, Gardner, Mason, McLean, Millard and Scott.

Absent—Mr. Conkling.

Minutes of the last meeting, and those of the meeting of the Executive Committee of January 29, 1880, were read and approved.

The Board took a recess until 7 P. M., to meet at the Doane House.

EVENING SESSION.

The Board met on time. Present as before.

On motion of Mr. Gardner, the Board proceeded to the election of officers for the ensuing year.

Governor Cullom taking the chair.

The following officers were then elected:

Hon. Emory Cobb, President of the Board.

Prof. T. J. Burrill, Corresponding Secretary.

Prof. E. Snyder, Recording Secretary.

President E. Cobb taking the chair, the following report from the Regent was submitted:

REGENT'S REPORT.

To the Trustees of the Illinois Industrial University:

GENTLEMEN—In accordance with your rules, I again report to you the condition and wants of the University.

Since your meeting in December several important changes have occurred in the Faculty, demanding new attention on your part. The 1st of February Prof. Peabody resigned his position as Professor of Mechanical Engineering to accept a more lucrative post offered him by a publishing house in New York. His eminent success and high reputation made his departure a serious loss to the Institution. His place is temporarily filled by the extra labors of Prof. Baker, who assumed the charge of the class in Physics, and Mr. Hildebrand, who assumed charge, at my request, of the class in Prime Movers. Two advanced students were employed to act as assistants in the Physical Laboratory and in Civil Engineering. It is possible that a similar arrangement may be made for the spring term, but the interests of the University will imperatively demand the filling of the vacant chair before the beginning of another year.

Mr. F. A. Parsons, who has so long and successfully managed our School of Commerce, also resigned in February. With the concurrence of the local trustees, I persuaded Mr. Parsons to remain till the close of the present term, as it was impossible to provide for his classes, allowing him a furlough of a few days to meet a necessary engagement. I recom-

mend that the Board pay his traveling expenses to Wellington, Kas., and return, as this journey was made necessary by his return here to complete the term's work. I also recommend to your attention Mr. Parsons' request for some extra compensation, which he believes to be his due, and which he expects to receive when he enters upon the work of the year.

As the question of filling Mr. Parsons' place is now before you, the question arises as to the propriety of discontinuing this department of our work till the Board shall have means to recommence it. Bookkeeping, athough desirable, if not indispensable, for every educated man and woman, does not at present constitute a part of any of the regular College courses. It is advertised as a preparatory study, and one term of instruction in it is provided in the autumn of each year. A substitute for this may be put in the course unless it should be found convenient to employ an instructor for that term. It has been suggested that the higher course in Bookkeeping might be sustained here by a proper fee, charged and collected as the fees for music and for drawing and painting. It may be advisable for the Board to authorize the Regent and Faculty to make and announce such an arrangement in the forthcoming catalogue if, on enquiry, it is found feasible.

About the 1st of March I received notice from the War Department that Lieut. Dinwiddie had been relieved from his post here and directed to join his regiment. I was also informed through Mr. Cannon, member of Congress from this district, that the Department would detail another officer, and recommending Lieut. Wood, a graduate of West Point, of the class of 1877. I immediately opened correspondence to ascertain his qualifications for the work, but before such correspondence was completed a second letter from Mr. Cannon informed me that the detail was already made, the order to take effect from the 15th of June next. The answers to my letters of enquiry lead me to believe that Lieut. Wood will prove acceptable to the Board and be able to do us good service. I have written to Mr. Cannon asking his influence to have the detail take effect from the opening of next term, or the 1st of April at latest, as the Battalion needs an instructor at once.

The break in our Military instruction, occasioned by the recent disturbance in the Military classes, seems a favorable occasion to recommend to you a change in the Military Department, which has always seemed desirable to me. The steady increase in the number of students has swelled the Battalion beyond the capacity of the Drill Hall, making it impossible, during the winter term, to secure the battalion drill, when the weather forbids the use of the parade ground. It has become obvious, also, that four years of drill in tactics is an unnecessary burden upon so large a body of students, and the attempt to hold all the classes to such frequent drills often interferes with the class work in some of the colleges. If the Junior and Senior classes shall be excused and the military drill be confined to the first to years of the College course, it will still give us as many men in the Battalion as desirable for battalion movements, will bring the work within quite manageable proportions, and will obviate some of the worst interference with the work of the College classes. I would still admit to the military drill such preparatory students as are able to matriculate by the opening of the winter term. Such studends will ordinarily complete the first two years of their course with the Freshman class which they enter.

The special class in Military Tactics may then be begun with the opening of the Sophomore year, and continue, if necessary, through the Junior year. In order to allow wider opportunity for the members of this special class to gain experience in command. I would recommend that the officers be chosen each term and serve for only one year in the same rank, the corporals and sergeants being chosen from the Sophomore class, and the commissioned officers, lieutenants and captains from the Junior. The Military organization of all the classes for the daily roll-call and chapel may be as easily maintained under this system as under the other.

I would earnestly recommend, also, the change in the uniform advised last year, from the present light gray, too expensive and too easily soiled, to a dark blue blouse, with pantaloons to match, the purchase of which would be no hardship, as it would not exceed the cost of ordinary clothing, would be equally effective as a uniform, and may be worn by the students after leaving the University. The adoption of such a uniform would save the Faculty from the perpetual stream of petitions to be excused from the purchase of uniforms.

Another point in the Military Department demands attention. The Governor was asked and consented to grant commissions to students of conspicuous merit who had attained the requisite experience as officers, and were recommended by the Faculty for their high qualities as gentlemen and scholars. It was designed that these commissions should be offered as high honors to stimulate young men to more excellent work. The recent difficulties in the Military class grew chiefly out of the desire of this class that the commissions should be given not as special honors, but rather as the College diploma is given—to all who properly complete their course. The usage of the Faculty has been to require an unanimous vote for these recommendations, and annually some students have been refused on the ground of lack of scholarship or of the requisite high character. If this usage is changed, the chief value of the commissions to the University will be lost, nor would the commissions themselves have the same value as they now have to the parties receiving them. It may be desirable to consult the Governor of the State as to his wishes in the case, and as to its bearing upon the Military interests of the State.

THE LIBRARY.

The report of the Librarian ought to receive the careful attention of the Board. He urges at length, and with sound arguments, the propriety of the early employment of a Librarian who may devote his whole time, or a large part of it, to the library work. We have now over 12,000 volumes; and to make these fully available to the students, and even to the Faculty, there is needed a man who shall be familiar with the contents of the Library, in a general way, and able to point out to the readers the authorities possessed on the various branches of knowledge. The care of so large and costly a collection of books is too important to be entrusted to inexperienced hands, and the work of preserving the old and selecting new books, has become one of the most important and onerous, imposed upon any department of the University. The knowledge of the Library and its contents already gained by Prof. Crawford, in his long service as Librarian, renders him

by far the fittest man for the service; and if his work in other directions can be sufficiently retrenched, the Library will be safer and more useful under his charge, than it can be made under any new Librarian whom you could appoint. I recommend that after this year, his chief work be that of the Library, with such limited work in instruction as he can perform without detriment to his more important duties.

This change will of course involve some other appointments, and circumstances seem to me to favor a readjustment, to some extent, of our teaching force, to make it consist both with the condition of our funds and with the relative importance of the several departments of our work.

THE PREPARATORY DEPARTMENT.

As a part of this readjustment, I am obliged to recommend that the Preparatory Department be dispensed with, after another year. The University is now coming into such relations with the High schools of the State, and so many of these schools are adjusting their courses of study to prepare candidates for the University, that we may now safely discontinue the work which needlessly occupies our strength and crowds us with a class of students who would be better off elsewhere, and who cannot be so well cared for here. The University has now an established reputation, which will be certain to draw desirable students, and such students will be sure to make whatever preparation they learn that the University demands. We might, for a brief time, show less students on our catalogue, but we should not at all diminish the amount of work done in the direction required by the law. Were it not desirable to avoid a too sudden change, I could wish the preparatory work to be discontinued at the close of the present year,

CATALOGUE AND COURSES OF STUDY.

The edition of the last Catalogue, although unusually large, was long ago exhausted, and the constant demand for information makes it important that the new Catalogue shall be issued as soon as possible. The work of preparation is already begun, and I recommend that an appropriation be made to publish five thousand copies.

Some slight changes seem desirable in some of the courses of study, and I recommend that the Faculty be authorized to make such changes, and publish the same.

The courses of study required for Degrees, in the several schools and colleges of the University, are found necessarily to restrict, to some extent, the freedom of study which we have always desired to maintain, and, in order to remedy the difficulty, the Faculty have selected and arranged the branches of learning taught here, to allow elective students to make up a course of thirty-six studies, occupying four years, which may entitle them to a certificate of graduation, without title or degree. This scheme is designed to allow the largest liberty of study consistent with the law of the State and the credit of the University. I recommend its adoption by the Trustees and its publication in the Catalogue.

RULES AND GOVERNMENT.

By the law, the government of the University is vested in the Board of Trustees. By a vote of the Board, the Faculty were authorized to make and administer such rules and regulations as are necessary for the discipline and good order of the institution. Under a permission of the Faculty, frequently, though not formally approved by the Trustees, the students were allowed to organize a voluntary association, known as the Students' Government, for the suppression of violations of good order. The legality of this government having been questioned, its constitution and laws were, by your direction, referred to the Attorney-General of the State, with a request for his opinion as to its legality. His opinion, recently received, determines that there is no conflict between the Students' Government and the State laws, on the assumption that the government is authorized by the Trustees. To remove all doubt, and to give to this useful organization proper authorization, I recommend that a distinct and explicit vote of the Board be made to cover the case. I will submit to the Board a form of rules, which seem to me to cover the case.

THE AGRICULTURAL DEPARTMENT.

The Professor of Agriculture presents a paper detailing the experiments for the year 1880. As these have already been discussed with the chairman of the Farm committee, I need not detail them to you. There is no doubt that the agricul urists of the State demand of us a vigorous prosecution of such experiments as are necessary for the improvement of Agriculture, and such as cannot so well be tried by individual farmers. The experiments recommended by Prof. Morrow seem to me well planned and important, and I commend them to your better judgment.

A paper from the Head Farmer urges again upon the Board some experiments in Dairying, as connection with the proper and economical management of Shorthorns and grade cattle. The considerations he advances are certainly important, and would doubtless be approved by the practical farmers of the State.

I ought to state that the Farmers' Institute, held during the month of January, was largely attended, and seems to have given much satisfaction to those who were present. The increasing success of these institutes will not only justify their continuance, but may again create a demand for others, to be held outside of the University.

HORTICULTURAL DEPARTMENT.

Prof. Burrill's report explains the condition of the Horticultural department. He calls attention to the boiler in the Greenhouse, which will need repair, during the summer. He recommends that Mr. Hayes be allowed leave of absence from April 1, to September 1, on account of ill health. I approve this recommendation; as also the employment of R. D. Lewis, to fill the place, in Mr. Hayes' absence.

CHEMICAL DEPARTMENT.

Prof. Weber asks for the purchase of three additional chemical balances. These have become necessary by reason of the large increase of the number of students in Advanced Chemistry. He est mates that they will cost, if purchased in Europe, about $200. Prof. Weber also asks leave of absence to visit Europe during the summer vacation, with permission to sail on Saturday before Commencement. I heartily concur in th's request, both as due Prof. Weber, and as of essential value to his department, as it will enable him to inspect and obtain specimens from metallurgical establishments of Europe.

CIVIL ENGINEERING DEPARTMENT.

I respectfully ask attention to the requests of Prof. Baker, of this department. These requests are, first: for some repairs of the platform and post on which the equatorial tele cope is mounted. He estimates the cost of repairs at $10. Second, he renews the request for the purchase of a so-called universal instrument, for which an order was given and an appropriation made several years ago. Through the failure of the manufacturers in Germany, this instrument was never obtained, and the appropriation lapsed. Prof. Baker now asks that an instrument of American manufacture be purchased, as the late improvements prove that such instruments can now be as well and cheaply made here as in Europe. Such an instrument as is required will cost, it is estimated, $850,—but its importance to the department, in all its higher work, is such as to justify this outlay. I need not repeat the statements which induced the appropriation several years ago; they have gained rather than lost in force by the lapse of time. The high praise bestowed upon our Engineering department by the chief officer of the United States Lake Survey, and the prominent positions won and now held by several of the students of this department, ought to encourage us to further efforts to maintain its excellence.

THE SIGNAL STATION.

In accordance with your vote, I recently renewed the application for the establisment of a signal station at this point. A letter from Gen. A. J. Myers, Chief of the Signal Service, informs me that the instruments for such station are already on their way here, and that a full station will be establ shed, at the close of the present session of Congress, if circumstances permit,—the contingency, I presume, being the ordinary appropriation to the Signal Service Bureau. The establishment of the station carries with it the detail of a competent observer, to take care of the apparatus and record and transmit the observations. Thanks are due Hon. J. G. Cannon, M. C., for his aid in securing this result. The establishment of this station will, it is hoped, prove valuable, both to our classes in Engineering and those in Agriculture.

SHOP-PRACTICE.

The shop-practice work of the classes in Mechanical Engineering is progressing satisfactorily under the skillful instruction of Mr. Kimball; that of the Architects, under the charge of Prof. Ricker, aided by Mr. Spencer. The work in both departments has been much improved in its plan, with a corresponding increase in interest and advancement of the students. The reports of Prof. Ricker and Mr. Kimball are commended to your attention.

SCHOOL OF DESIGN.

Prof. Peter Roos, of Boston, accepted the appointment tendered him, and entered upon service as teacher of Free-hand Drawing, Designing and Painting, at the opening of the present term. In addition to the ordinary classes in Drawing, several special students have already entered upon their studies, attracted by the well-known skill and success of Mr. Roos as an instructor. The Board having referred the question of fees to the Regent and Business Agent, it was decided by them that ten dollars a term should be charged special students in Painting, and five dollars a term for all students in Designing and Drawing, except those taking these studies in their course of instructions. It was held, also, that students not members of the University classes should also pay the incidental fees. Some modification of these terms may be desirable, at least in the case of those who will pursue, steadily and persistently, the full course in the School of Design. Mr. Roos asks that the present class in designing be permitted to continue through the Spring term, on payment of half the regular fee. As a part of his salary is to be paid from these fees, the Business Agent will report to you the amount received on this account for the current term.

THE BAND.

The University Band instruments, notwithstanding the recent purchases, have so dedeteriorated in value, that the band decline to use them. With the aid of one or two borrowed instruments, they have continued to play for the morning service: but it has become at length imperative that a new set of instruments be purchased, or the band music be dispensed with. Correspondence shows that a set of instruments may be purchased for $260. I hope it may be possible for you to appropriate the whole amount; but if this is not feasible, it is believed that half the amount may be raised by private subscriptions.

THE ACCREDITED SCHOOLS.

The scheme of selecting from the High schools of the State, examining and accredited schools, has made some progress, and thus far has proved useful, without any apparent disadvantages. Several schools have been added to the list, and applications are still pending, from other schools, asking to be examined for admission to the number. In visiting such schools, I have examined the classes in preparatory studies, to test the character of their instruction and determine their degree of preparation for admission to University classes. The more this system is extended, the less need it leaves us for the maintenance of preparatory work here; and besides, it places the University as a State institution in due and proper connection with the public schools of the State, and this gives the benefit of its influence to that entire system of instruction of which it forms part.

I will mention, in this connection, that in accordance with the wishes of the Board, I have taken the occasions of these visits and other appropriate opportunities to make addresses to the public, and thus make the University more widely known. These addresses have been largely attended, and received with many expressions of good will toward the institution which I represented. They have cost something of personal sacrifice and fatigue, but have been useful to the University, and I trust not useless to the general interests of education. I have been obliged to decline more invitations than I have accepted, as I did not desire to remit in any degree my work at home.

J. M. GREGORY, *Regent.*

The report was received, and taken up for consideration of its recommendations and suggestions.

Mr. Scott moved that the resignation of Mr. F. A. Parsons be accepted to take effect at the end of the present term, and that he be paid his necessary expenses incurred on his recent trip to Kansas.

Mr. Millard offered the following resolution, which was carried:

Resolved, That in accepting the resignation of Mr. F. A. Parsons, as Instructor in Bookkeeping and Bookkeeper, the Board recognize that he has faithfully performed his services in this department, and they regret that his business requires him to withdraw from the University.

The recommendation of the Regent in regard to the detail of a Military Instructor from the War Department, to succeed Lieut. W. A. Dinwiddie, was taken up.

Mr. McLean moved that the matter of detail of an Instructor in Military Tactics be referred to the Executive Committee with authority to investigate the qualifications of any officer recommended for the position, and with power to accept any detail that shall be satisfactory to said committee. Carried.

Upon motion of Mr. Millard, the Regent's recommendation in regard to military uniform was taken up.

Mr. Gardner moved, and was seconded by Mr. Scott, that the uniform be changed from grey to blue, the style to be agreed upon at the next June meeting. Adopted.

Mr. McLean moved that the recommendations of the Regent in regard to the Library be referred to a committee of three, with the Regent as chairman, for consideration and report at the June meeting.

Mr. McLean moved that the President appoint a committee of three to revise the catalogue, consulting with the Faculty as to any changes that may be necessary in the courses of study. The motion was carried.

The President named Messrs. Scott, Millard and Fountain such committee.

It was moved by Mr. Scott, seconded by Mr. McLean, that the students of the Freshman and Sophomore year only be required to drill; and that so much of the Regent's recommendation as regards the special classes in Military Tactics be passed over until the June meeting. Carried.

It was ordered that five thousand (5000) catalogues be printed under the direction of the Regent and Business Agent.

Adjourned to meet at 9 A. M. at the University parlor.

SECOND DAY'S SESSION.

The Board assembled as per adjournment. Present as yesterday.

The following resolution was unanimously adopted:

WHEREAS, The Governor of the State commissions as Captains in the State Militia, on their graduation from the University, such students of the class in Military Tactics as complete the course thoroughly, and obtain the necessary experience in commanding;

Resolved, That, since these commissions are designed as honors conferred for special merit and proficiency in Military Science, they will be awarded on a special examination to be made by a committee appointed by the Faculty.

On motion of Mr. Scott, the recommendation of the Regent, that the Preparatory Department of the University be dispensed with after June, 1881, was adopted.

The recommendations as to farm operations and experiments were referred to the Farm Committee, to report at this meeting.

Mr. C. I. Hayes was allowed leave of absence without pay from April 1, to September 1, 1880. The Regent's recommendations in regard to Mr. Lewis as substitute for Mr. T. Cays, was referred to the Committee on Buildings and Grounds and Prof. Burrill, with power to act.

Mr. Millard moved, seconded by Mr. Scott, that three chemical balances, be purchased at a cost not to exceed $200, from the State appropriations for Laboratories.

On motion of Col. Mason, leave of absence for the Summer vacation was granted to Prof. H. A. Weber.

The request of Prof. I. O. Baker, from the department of Civil Engineering, for $10, to repair platform of Observatory, was granted; the request for purchase of a Universal Transit instrument was referred to the Regent.

Treasurer J. W. Bunn then read his report, which was accepted and ordered on file:

ILLINOIS INDUSTRIAL UNIVERSITY,

In account with JOHN W. BUNN, *Treasurer.*

	DR.		
1880.			
Febu'ry 28.	To amount paid for Board expense	$50 21	
" " "	Salaries	7,440 17	
" " "	Building and grounds	15 04	
" " "	Fuel and lights	963 35	
" " "	Stationery and printing	106 24	
" " "	Fixtures and furniture	16 02	
" " "	Mechanical Department	548 07	
" " "	Architectural "	263 41	
" " "	Agricultural "	1,357 82	
" " "	Horticultural "	136 37	
" " "	Chemical "	133 68	
" " "	Military "	71 54	
" " "	Library and apparatus	15 78	
" " "	Incidentals	90 81	
			$11,208 51

Treasurer's Report—Continued.

1880.			
Febu'ry 28.	To amount paid for Physical Laboratory	$20 79	
	" " " Cabinets	25	
	" " " Veterinary instruments	25 00	
	" " " Agricultural Institute	24 50	
	" " " Preparatory Department	572 60	
			643 14
	" " " Chemical and Physical Laboratory	$29 47	
	" " " Buildings and grounds	148 90	
	" " " Mechanical and Architectural shops	437 77	
	" " " Books and publications	641 68	
	" " " Cabinets	100 16	
	" " " Cabinet cases	213 92	
	" " " Ventilation and water closets	18 21	
	" " " Heating apparatus	325 38	
			1,915 49
	Balance (State appropriation, $4,993 91; current account, $7,506 60)		12,500 51
			$26,267 65
1879.	CR.		
Dec. 16	By balance		$13,507 24
1880.			
Jan. 1	" interest on Champaign county bonds	$4,600 00	
	" " Illinois 6 per cent. bonds	810 00	
	" " Chicago 7 per cent. bonds	875 00	
			6,285 00
Feb. 12	" " Pike county 10 per cent. bonds		308 40
Feb. 28	By amount rec'd on account of Mechanical Department	$542 04	
	" " " " Architectural "	504 68	
	" " " " Agricultural "	1,152 74	
	" " " " Horticultural "	71 68	
	" " " " Chemical "	462 77	
	" " " " Civil Engineering	1 00	
	" " " " Fees and room rent	1,954 25	
	" " " " Tuition in Prepar'y depart.	1,017 00	
	" " " " Printing and stationery	100 00	
	" " " " Fuel and lights	67 30	
	" " " " Buildings and grounds	40 20	
	" " " " Ill. Cent. R. R. donation	253 35	
			6,167 01
			$26,267 65

URBANA, March 9, 1880. JOHN W. BUNN, *Treasurer.*

The following report of the Business Agent was read and received:

CHAMPAIGN, ILLS., March 9th, 1880.

Hon. Emory Cobb, President Board of Trustees, Illinois Industrial University:

SIR: I have the honor to present herewith the usual Financial Statement of the University for the six months ending March 1st, 1880.

Paper A, gives the current appropriations, receipts and expenditures for that time, which have passed through the business office.

Paper B, is a statement of the State appropriations to March 1st.

Paper C, is a list of vouchers and bills for the past three months presented for auditing.

Respectfully submitted.

S. W. SHATTUCK, Business Agent.

"A"

Current Appropriations and Receipts, February 28, 1880.

For what paid.	Appropri't'd	Received.	Expended.	Balance.
Board expense	$300 00		$80 31	$219 69
Salaries	16,555 00		14,977 41	1,577 59
Buildings and grounds	100 00	$80 95	58 86	122 09
Fuel and lights	3,000 00	130 08	1,686 67	1,443 41
Stationery and printing	200 00	100 00	265 20	34 80
Fixtures and furniture	100 00		67 88	32 12
Mechanical department	102 73	1,591 36	1,404 88	289 20
Architectural "	10 64	1,156 47	999 51	166 60
Agricultural "	1,447 74	5,355 50	2,197 40	4,605 84
Horticultural "	79 62	241 34	335 53	—14 57
Chemical "	55 52	477 76	862 13	—328 85
Military "	50 00		125 11	35 89
Library and apparatus	50 00		30 76	19 24
Incidental expenses	200 00		155 61	44 39
Sundries—				
Physical laboratory	102 71		27 59	75 12
Preparatory department		2,160 00	1,272 60	887 40
Photograph rooms	15 00		9 20	5 80
Cabinets		75 00	11 60	63 40
Engineering department	21 00	1 00	13 00	9 00
Protested drafts	400 09		400 09	
Domestic Science	30 00			30 00
Fees and room rents		4,767 75		
Veterinary instruments	25 00		25 00	
Agricultural Institute	50 00		24 50	25 50
Students' examinations	200 00			200 00
State appropriations			5,714 55	
Illinois Central R. R. donation		737 20		

"B"

State Appropriations, February 28, 1880.

For what paid.	Appropri't'd	Received.	Expended.	Balance.
Taxes on lands	$4,306 02	$4,306 02	$4,306 02	
Buildings and grounds	5,000 00	5,000 00	5,000 00	
Chemical and Physical laboratories	2,000 00	2,000 00	2,000 00	
Mechanical and Architectural shops	3,000 00	3,000 00	3,000 00	
Library cases	1,000 00	1,000 00	1,000 00	
Books and publications	3,000 00	3,000 00	3,000 00	
Cabinet cases	4,500 00	4,500 00	2,914 55	$1,585 45
Cabinets	2,000 00	2,000 00	2,000 00	
Chemical laboratory	40,000 00	40,000 00	40,000 00	
Greenhouse	2,500 00	2,500 00	2,500 00	
July 1, 1879—*Appropriations.*				
Taxes on lands	5,000 00	2,298 52	2,298 52	
Buildings and grounds	5,000 00	2,500 00	1,884 67	615 33
Chemical and Physical laboratories	2,000 00	1,000 00	642 94	357 06
Mechanical and Architectural shops	3,000 00	1,500 00	1,106 63	393 37
Books and publications	3,000 00	1,500 00	883 52	616 48
Cabinets	1,000 00	1,000 00	268 29	731 71
Ventilation and water closets	2,500 00	2,500 00	1,808 04	691 96
Heating apparatus	3,000 00	3,000 00	2,997 45	2 55
	$24,500 00	$15,298 52	$11,840 05	$3,408 46

"C."

List of Warrants Drawn.

No.	To whom.	For what.	Amt.
211	J. M. Gregory	Salary, December, 1879	$300 00
212	T. J. Burrill	" "	150 00
213	S. W. Shattuck	" "	150 00
214	E. Snyder	" "	150 00
215	D. C. Taft	" "	150 00
216	J. C. Pickard	" "	150 00
217	N. C. Ricker	" "	125 00
218	J. D. Crawford	" "	125 00
219	H. A. Weber	" "	150 00
220	G. E. Morrow	" "	150 00
221	S. H. Peabody	" "	166 66
222	L. A. Gregory	" "	100 00
223	F. W. Prentice	" "	100 00
224	E. L. Lawrence	" "	83 33
225	I. O. Baker	" "	75 00
226	M. A. Scovell	" "	75 00
227	F. A. Parsons	" "	75 00
228	C. I. Hays	" "	75 00
229	C. Hildebrand	" "	75 00
230	C. E. Pickard	" "	60 00
231	G. A. Wild	" "	60 00
232	E. A. Kimball	" "	100 00
233	H. M. Beardsley	" "	35 00
234	N. S. Spencer	" "	30 00
235	A. B. Baker	" "	40 00
236	Emory Cobb	Expense to meeting	7 25
237	R. B. Mason	" "	3 50
238	S. M. Millard	" "	20 96
239	T. T. Fountain	" "	18 50
240	C. S. Kingsbury	Leading choir, fall term	12 50
241	Students' pay roll	December, 1879	230 01
242	Agricultural department	Farm expense, December	109 25
243	Estes and Lauriat	Books	46 65
244	Harper Bro's	"	8 53
245	D. Appleton & Co	"	65 88
246	Jansen, McClurg & Co	"	157 51
247	J. M. Gregory	Salary, January, 1880	300 00
248	T. J. Burrill	" "	150 00
249	S. W. Shattuck	" "	150 00
250	E. Snyder	" "	150 00
251	D. C. Taft	" "	150 00
252	J. C. Pickard	" "	150 00
253	N. C. Ricker	" "	125 00
254	J. D. Crawford	" "	125 00
255	H. A. Weber	" "	150 00
256	G. E. Morrow	" "	150 00
257	S. H. Peabody	" "	166 66
258	L. A. Gregory	" "	100 00
259	Dr. F. W. Prentice	" "	100 00
260	E. L. Lawrence	" "	83 33
261	I. O. Baker	" "	75 00
262	M. A. Scovell	" "	75 00
263	F. A. Parsons	" "	75 00
264	C. I. Hays	" "	75 00
265	C. Hildebrand	" "	75 00
266	C. E. Pickard	" "	60 00
267	G. A. Wild	" "	60 00
268	E. A. Kimball	" "	100 00
269	H. M. Beardsley	" "	35 00
270	N. S. Spencer	" "	30 00
271	A. B. Baker	" "	40 00
272	Peter Roos	" "	75 00
273	F. W. Prentice	Case of veterinary instruments	25 00
274	F. W. Button	Iron tank	115 00
275	B. C. Beach	Coal	69 77
276	N. A. Williams	Cement and lime	5 40
277	Abendroth and Root Manufacturing Co	Hardware	39 06
278	Frank Jewell	Repairs on piano	14 00
279	D. C. Taft	1 moose skin	35 00
280	John C. Lewis	Work on boilers	15 75
281	Wm. Skinner	Work	5 00
282	Jennie C. Mahan	Services as organist	12 50
283	L. H. Walden	Work	12 00
284	D. L. Buckworth	1 B f. cornet	15 00
285	H. O. Smith	1 B f. "	18 00

Warrants Drawn—Continued.

No.	To whom,	For what.	Am't.
286	J. C. Segwick	Carpenter work	$6 80
287	Brown and Holdoway	Books	6 50
288	Sutton and Sheldon	2,500 brick	17 50
289	Larrabee & North	Hardware	4 76
290	A. S. Barnes & Co	Periodicals	5 00
291	G. W. Bunster	Load of sand	1 50
292	Eichberg Bro's	Cord	1 00
293	A. H. Andrews	2 chairs	5 00
294	John S. Stott	Stationery	3 65
295	D. VanNostrand	Books	1 25
296	R. and W. Economy Company	"	26 25
297	Thos. Wright	Castings	71 76
298	I., B. and W. Railroad Co	Freight	12 54
299	C. W. Palmer	Appropriation for gymnasium	7 75
300	C. and U. Gas Light Co	Lights, Dec., 1879, and Jan. 1880	155 10
301	Jos. W. Queen & Co	App. for Chem. and Phys. Lab	16 20
302	David Weeks	2 yards sand	2 50
303	J. M. Clark	Carpenter work	15 51
304	R. B. Harmel	Painting	3 00
305	R. B. Harmel	Painting	5 30
306	Agricultural Department	Farm expenses	338 07
307	Crane, Breed & Co	Boiler fixings	1 60
308	H. Swannell	Glass	3 10
309	J. E. Saxton & Co	Paper and twine	5 35
310	Fuller and Fuller	Glassware, etc	32 61
311	Crane Bros. Manufacturing Co	Pipe and fixings	4 90
312	Jansen, McClurg & Co	Books	130 46
313	Champaign Union	Printing	10 00
314	Peterson and Lloyde	Stationery	10 80
315	John B. Weeks	Hauling	11 75
316	B. C. Beach & Co	Coal	69 92
317	Larrabee & North	Hardware	14 00
318	Abendroth & Root Manufacturing Comp'y	Gaskets	14 25
319	J. M. Gregory	Salary for February, 1880	300 00
320	T. J. Burrill	" "	150 00
321	S. W. Shattuck	" "	150 00
322	E. Snyder	" "	150 00
323	D. C. Taft	" "	150 00
324	J. C. Pickard	" "	150 00
325	N. C. Ricker	" "	125 00
326	J. D. Crawford	" "	125 00
327	H. A. Weber	" "	150 00
328	G. E. Morrow	" "	150 00
329	F. W. Prentice	" "	100 00
330	L. A. Gregory	" "	100 00
331	E. L. Lawrence	" "	83 33
332	I. O. Baker	" "	75 00
333	M. A. Scovell	" "	75 00
334	F. A. Parsons	" "	75 00
335	C. I. Hays	" "	75 00
336	C. Hildebrand	" "	75 00
337	Peter Roos	" "	75 00
338	C. E. Pickard	" "	60 00
339	G. A. Wild	" "	60 00
340	E. A. Kimball	" "	100 00
341	H. M. Beardsley	" "	35 00
342	N. S. Spencer	" "	30 00
343	A. B. Baker	" "	40 00
344	Illinois Central Railroad, donation	Freights, three months	253 35
345	Agricultural department	Work for other departments	204 95
346	Agricultural Department	Work and hauling	14 40
347	Crane Bros. Manufacturing Company	Hardware	141 25
348	A. Barr	625 feet lumber	32 93
349	Enterprise Coal Co	16 cars coal	239 70
350	Moore & Co	Tinners work	8 95
351	Moore & Co	Pump	3 35
352	G. E. Morrow	Petty expense at Agricult'l Inst	14 50
353	A. B. Baker	" "	6 05
354	I. O. Baker	Sundry expense	3 25
355	Brown & Holdoway	Book	5 50
356	John Wilkinson	Brass rod	70
357	Carl Schoenhof	Books	10 95
358	U. S. Patent office	Binding	15 60
359	Beach & Co	Coal	37 20
360	E. B. Benjamin	Crucibles	15 50
361	Agricultural Department	Expense on farm, February, 1881	595 69
362	W. S. McWilliams	1 yard sand	75
363	Champaign County Gazette	Printing	36 25

Warrants Drawn—Continued.

No.	To whom.	For what.	Am't.
364	Agricultural Department	Work and hauling	$6 25
365	J. C. Vaughan	Bulbs and seeds	3 05
366	Moore & Co	Stove and fixing	15 10
367	J. M. Clark	Carpenter work	37 90
368	Fuller & Fuller	Tubing	6 00
369	Fuller & Fuller	Glass	17 80
370	J. W. Rooney	Advertising	5 00
371	Star Coal Mine Company	5 cars coal	78 30
372	E. S. Ritchie	Pump packings	2 15
373	Trevett & Green	Hardware	18 06
374	H. W. Mahan	Sundries	1 25
375	Jansen, McClurg & Co	Books	44 10
376	Mrs. M. Hayes	Painting specimens	4 95
377	Students' labor pay-roll	January, 1880	260 70
378	A. B. Seymour	Work in herbarium	17 45
379	G. Deuerlich	Books and periodicals	117 50
380	Students' labor pay-roll	February, 1880	252 71
381	E. W. McAllister	Postage, 3 months	40 62
382	S. W. Shattuck	Petty expense, 3 months	54 33
383	Architectural Department	Work for departments	42 28
384	Architectural Department	Work and material for State	383 79
385	Mechanical Department	Work for departments	100 65
386	Mechanical Department	Work and material for State	305 36

Messrs. Mason, Byrd and Scott were appointed a committee to examine the vouchers, and made the following report:

To the Board of Trustees:

Your committee have duly examined the vouchers and warrants for the current year, from number 211 to 386, both inclusive, and report the same correct.

J. BYRD,
R. B. MASON,
J. R. SCOTT.

The following resolutions were passed:

Resolved, That the Board of Trustees approve the preamble and resolutions of the Faculty, authorizing the organization of the Students' Government, except the clause "and may impose and collect reasonable fines therefor."

Resolved, That the subject of rules and regulations for the government of the University be referred to a special committee, appointed by the President, to report thereon at the June meeting.

The Regent was requested to express the thanks of the Board to Hon. J. C. Cannon for his action in securing a signal station.

An appropriation of $10 was made for chemicals and materials to make negatives of drawings for the Architectural department.

It was resolved that the students in Architecture, Free-hand Drawing and Engineering shall be required to leave for the University specimens of drawings in last term, as may be decided by the Faculty.

Prof. Rickers' request for advertising was referred to Business Agent.

The recommendations of the Regent, in regard to the School of Design, were referred to the Regent and Business Agent.

It was resolved to bestow on Mr. P. Roos the title of Professor of Industrial Art and Designing.

The Board took a recess until 2 P. M.

AFTERNOON SESSION.

The Board met at the hour appointed.

The Executive Committee was authorized to expend not to exceed $125 toward purchase of a complete set of band instruments.

The following appropriations were made:

APPROPRIATIONS FROM CURRENT FUNDS, FROM MARCH 1 TO SEPTEMBER 1, 1880.

Board expense	$300 00
Salaries	14,000 00
Fuel and lights	1,000 00
Stationery and printing	600 00
Buildings and grounds	100 00
Incidental expense	200 00
Furniture and fixtures	100 00
Library and apparatus	100 00
Military department	100 00
Agricultural department	4,605 84
Horticultural "	
Mechanical "	289 21
Architectural "	166 60
Chemical "	
Physical Laboratory	75 12
Cabinets	63 40
Domestic Science	30 00
Students' examinations	200 00
Total	$21,930 17

The following certificates were granted to students recommended by the Faculty:

William Barnes; H. S. Llewellyn; Mary McElroy; John A. Peck; R. R. Conklin; C. F. Foster; F. W. Hawkinson, for partial certificates; to Walter P. Ward, Degree of B. L.

It was moved by Mr. Scott, that the clause in the catalogue, referring to Dormitories, be struck from the same, and that the matter of Dormitory Buildings be referred to the Committee on Buildings and Grounds, with power to rent the same.

It was resolved that Prof. S. W. Shattuck be appointed Business Agent for the coming year, and that his compensation be fixed at $200 per annum.

It was moved by Mr. Scott, and seconded by Mr. Millard, that all special students shall pay the incidental fee each term.

It was moved by Mr. Mason, and seconded by Mr. Scott, that the Incidental Fee for the next academic year be fixed at $7.50 per term.

Carried.

It was resolved that the Regent be requested to secure from the various departments such information and samples of work as may be of use in describing and characterizing the work of departments of the University, to be ready for the Winter Term, 1881.

On motion of Mr. Mason, it was voted that a committee of three be appointed by the chair to codify and revise the By-laws and amendments, and report the same to the June meeting.

The following report from the Committee on Buildings and Grounds was read:

To the Hon. Board of Trustees:

Your committee beg leave to report that, after examining the report submitted to us by the Professor of Horticulture, and the condition of fences, walks and outbuildings in general, they find that the wants are so numerous that they would involve the expenditure of much more money than we can reasonably ask, or you can appropriate at this time.

Yet, certain things must be done to keep up our grounds and protect them from depredations of cows, that are permitted to roam at large here, and have the past season been a source of great annoyance anv much damage to the grounds, and the trees and shrubbery thereon.

We submit the report of Prof. Burrill, and approve his recommendations of improvements and repairs of the grounds, buildings, drives, walks and fences.

We would recommend that a suitable man be employed to do the labor and repairs on buildings and grounds, and be subject to and under the control of the Professor of Horticulture.

Your committee would ask for an appropriation of five hundred dollars for improvements and repairs most needed, the same to be expended under their direction. The committee have authorized the purchase of 43 hardy trees for the main grounds; eighteen varieties, which could not be obtained here, will be set out this spring.

The deed conveying to us the ground for continuing the street from Main Building to the Drill Ground is not yet delivered, but the arrangements are all complete, and we hope to obtain it in a few days.

The improvements and repairs in time past have been made when and where it seemed best and most needed, considering the funds at our disposal, and your committee propose to pursue that course in the future, unless especially instructed by you.

All of which is respectfully submitted.

D. GARDNER,
R. B. MASON,
A. McLEAN.

The report was approved, and the recommendations were concurred in.

The Farm committee then submitted the following report:

To the Hon. Board of Trustees of the Illinois Industrial University:

Your committee beg leave to submit the following recommendations from the Professor of Agriculture, in regard to experiments for the coming season, with their approval:

AGRICULTURAL EXPERIMENTS FOR 1880.

Most, if not all, the plans named below have been discussed with the chairman of the Farm Committee of the Board; several of them having been presented at the last meeting. They are re-named for convenience in reference:

First—The purchase of two or three high grade or pure bred steers, of the Devon, Hereford, Holstein and Ayrshire breeds of cattle, with which to try an experiment showing their comparative merits in fattening. From some correspondence, it is believed fairly satisfactory animals can be obtained.

Second—The feeding of grade Short-horn steers of different ages and for different lengths of time; re-trying experiments showing comparative profits.

Third—Growing upon the farm, and securing the growing on different classes of lands in vicinity, different varieties of sorghum, preparatory to chemical and other work in manufacture of syrup and sugar. To carry this out would involve an expenditure of possibly $250. It is believed the promise of success in sugar making from some varieties of sorghum is such as to make it very desirable to make these experiments.

Fourth—Cultivation of different varieties of sugar beets, more with reference to chemical analysis than actual work in sugar making. In both these, the active coöperation of the Chemical department is assured.

Fifth—The formal commencement of what is designed to be a long continued experiment to show the effect of rotation of crops, contrasted with continuous corn growing – with and without manuring, and also the effect of clover and grass in a rotation. A commencement was made last year, and we are fortunate in having a piece of land more than usually well adapted for such a test.

Sixth—Experiments with several varieties of grain; with manures; with sweet corn, as a variety for cattle feeding; with pumpkins, etc., are proposed, but need no special action.

Seventh—It is very desirable to have a few plats of different varieties of grass and clover for illustration. I find many farmers' sons do not know so common a grass as "orchard grass." It is desirable to have such plats comparatively near the building. The southern part of the ground just north of the Nurseries is suggested.

Eighth—On the score of appearance, convenience in cleaning and feeding, and especially for convenience in trying experiments, a small new piggery is very desirable. The total cost of a convenient and not unsightly building could be brought within $100.

Ninth—Attention is again called to the desirability of a few sheep on the farm.

Respectfully submitted.

G. E. MORROW, *Professor of Agriculture.*

The report was approved, and its recommendations concurred in.

The report of Head Farmer E. A. Lawrence was referred to the Farm committee, with power to act.

The President appointed the following committees:

On Rules and Regulations of Students' Government—Messrs. Millard, Mason and McLean.

On Revision of By-Laws—Messrs. Mason, Millard and McLean.

The Farm committee made the following report:

To the Honorable Board of Trustees:

Your committee recommend the planting of an experimental orchard of 100 trees, as requested by the Professor of Horticulture.

J. R. SCOTT,
S. M. MILLARD.

The report was approved and the request granted.

It was resolved that the Faculty be directed to reorganize the Military department and its drills for the next term, the Executive Committee to render such assistance as they may deem necessary.

Adjourned.

MEETING OF THE BOARD OF TRUSTEES JUNE, 1880.

The Board met at the University Parlor Tuesday, June 8, 1880, at 3 o'clock P. M.

Present—Messrs. Cobb, Gardner, Millard and Scott.

Absent—Governor Cullom, Messrs. Byrd, Mason, Fountain and McLean.

No quorum being present, the Board adjourned to meet at 9 o'clock A. M.

SECOND DAY'S SESSION.

Board met on time.

Present—Messrs. Cobb, Gardner, McLean Millard and Scott.

Absent—Governor Cullom, Messrs. Byrd, Fountain and Mason.

The following recommendations from the Faculty for degrees and certificates were approved:

For Master's Degree.

George F. Kenower	Class	1875	Literature.
Clarence H. Blackall	"	1877	Architecture.
Henry M. Beardsley	"	1879	Literature.
Lorado Z. Taft	"	1879	Literature.

For Bachelor's Degree.

Byard S. Briles	Agriculture.
W. L. Parker	Mechanical Engineering.
Arthur F. Robinson	Mechanical Engineering.
Jerome Sondericker	Civil Engineering.
Frank White	Civil Engineering.
Albert F. Robinson	Mining Engineering.
Charles F. Cook	Chemistry.
Cecil S. Stanton	Chemistry.
Eddie J. Baker	Natural History.
Ella M. Watson	Domestic Science.
Charles S. Kingsbury	Literature.
Charles G. Neely	"
George M. Savage	"
Alice Lee Coddington	"
Catharine I. Bacon	"
Minnie A. Parker	"
Ida Pearman	"
Frank W. Hatch	"

Certificates in Elective Courses.

JOHN C. BLEY,	EDGAR E. HARDEN,	AUGUSTA BATCHELDER,
ROLAND R. CONKLIN,	BENJAMIN HIDENHEIMER,	WILLIAM W. TRAVIS,
CHARLES W. GROVES,	RICHARD D. JONES,	CORDA LUCAS.
CHRISTIAN F. HAFNER.		

The Board then adjourned to the call of the chair.

AFTERNOON SESSION.

The Board met at the call of the chairman at 2:30 P. M.

The minutes of the last meeting, also those of the Executive Committee of January 18, 1880, were read and approved.

The Regent presented the following report, which was received:

REPORT OF THE REGENT.

To the Board of Trustees of the Illinois Industrial University:

GENTLEMEN:—The close of the term and your quarterly meeting requires me to bring before you again the condition and wants of the University. Happily I am enabled to report it as in condition of restored peace and prosperity. The disturbances in the Military class prevailing at the time of your last meeting were at length quietly adjusted, and the students who were expelled were, on their own petition and promise of good behavior, restored to their places. The work of the term in the several departments of instruction, as also in the principal departments of the University, has been prosecuted with ordinary diligence and success. The Military department, under its new commander, Lieut. Wood, is doing good work, and your action in diminishing the time of drill to two years meets with general approval, and will doubtless relieve the work of the several Colleges of some of the conflicts with which they have before been troubled. The catalogue just published shows a total attendance for the year of 434 students, a larger attendance than ever before attained. The out-going Senior class numbers but 26, but the class which succeeds them numbers 70, and will furnish the largest Senior class the University has ever known. The Freshman class numbers 104 students, and many of the preparatory students will probably return to swell the Freshman class of next year.

The reports from the several departments will show you in detail their condition and wants. The School of Agriculture asks—

1. $25 for additional tools and materials for shop practice.
2. The usual appropriations for the expenses of said classes.
3. That Mr. N. S. Spencer be employed during the vacation to perform such repairing and carpenter word as shall be needed.
4. That he be engaged as foreman for the next College year.

I recommend that all these requests be granted as proper and important.

Prof. Weber, of the Chemical Laboratory, asks for the appropriation of $709 to replace chemical apparatus and materials. You will recognize this as the current demand of this department.

The College of Engineers asks an appropriation of $30, for additional fittings for their printing and copying work; also for the purchase of a polar planimeter, which will not cost over $30. These requests are reasonable, and I recommend the appropriations for them.

REAPPOINTMENTS.

As my own resignation will be communicated with this report, I deem it improper that I shall nominate candidates to fill the vacancies in the corps of instructors, but I may, without impropriety, recommend the reappointment of assistants already employed, and whose work has proved satisfactory to their principals. I cordially recommended the reappointment of Chas. E. Pickard as Assistant Teacher of Languages; and of Henry M. Beardsley as Assistant in Chemistry. I hand you a communication from Mr. Pickard, asking for an increase of his salary to the amount usually paid to assistants of his standing. According to usage, Mr. Beardsley would also be entitled to some increase of compensation. I would also recommend the reappointment of Mr. Wild, as Curator of Museum, if he desires to remain. His services in connection with the Museum have been exceedingly valuable, and we owe much of the completeness and beauty of the collections in Natural History to his skill and energy. He has also done good service in teaching in the Preparatory class. I concur also with the members of the Faculty of the College of Engineering in recommending the appointment of Mr. Sondericker, a member of the present Senior class, as an assistant in that College. Mr. Sondericker has already been employed in instructing several classes, and has proved himself thoroughly competent and successful.

The communication of Miss Jennie Mahan, Teacher of Instrumental Music, will give you the information desired by you in regard to that department. While it is not the province of the University to furnish instruction in instrumental music, the wants of a large number of female students require that facilities for such instruction shall be furnished, and I recommend that Miss Mahan be reappointed, with the provision that her compensation shall be the fees paid by music students, except the incidental fee required from those not otherwise students of the University.

The success of Prof. Roos, as Instructor in Industrial Art and Designing, has fully met our expectation, and I earnestly recommend his continued employment, and that his compensation be made a fixed amount instead of being dependent in part upon the fees received.

I desire to pass into the hands of the Board the testimonials of several candidates for the vacant chairs of the University. I will confer with the Board, if desired, as to the merits of these candidates, and the selection of the fittest for the places to be filled.

BUILDINGS AND REPAIRS.

Two cyclones, or tornadoes, which visited us in the early spring, partly unroofed the main building and drill hall, and demolished a part of the westerm wing of the main dormitory building. The roofs were immediately repaired, under the direction of the Business Agent; but as it was a serious question as to the repair of the dormitory building, it was temporarily protected from the weather and remains as left by the storm, awaiting your decision. One of the most difficult of the questions you have to settle is as to the disposition of this building. Its further use as a dormitory is full of objection. The rooms are unfit for occupation, and the best interests of the University, and the good order of the students are constantly imperiled by the gathering of a large number of young men in a building unwatched and uncared for by any proper and sufficient guardianship. I can only repeat the convictions formerly expressed to you, that this building should be thoroughly remodeled and devoted to the use of female students as a proper home and an adjunct of the School of Domestic Science. For any other purpose it is worse that useless.

MILITARY DEPARTMENT.

The Board will remember that the changes in the Military department, adopted at your last meeting, constituted only a part of those recommended at that time. After the experience of the Spring term, I repeat the recommendation that the officers of the battalion be hereafter selected as follows: Sergeants and other non-commissioned officers from the Sophomore Military class; Captains and Lieutenants from the Junior class. I recommend, further, that the requisite experience in command demanded for a commission be not less than one term's service as Sergeant, one term as Lieutenant, and one term as Captain; and that, in order to give opportunity to gain such experience, no Captain shall retain his post more than one term, except in case of deficiency of officers for the battalion.

In accordance with your vote for a change in the uniform, correspondence with several clothing houses has been had by Prof. Wood, and there will be submitted to you samples of goods and patterns for a uniform to be adopted.

The appropriation made by you for instruments for the band was supplemented by a large voluntary contribution from the faculty and students, and a set of new instruments purchased, which have added much to the excellence and value of this department.

SALARIES.

I beg to be allowed to recall the attention of the Board to my former recommendations in regard to the increase of salaries of several of the Professors. Knowing the embarrassments under which you are placed, I urge this question with some hesitation; but there is an evident justice in the claims of these men to be placed on equal terms in payment with those men whom they equal in work. In some cases, like that of the Professor of Civil Engineering, the compensation is absolutely insufficient for the comfortable support of the Professor and his family. Knowing your readiness to meet generously all such claims, I call your attention to it with less hesitation.

COURSES OF STUDY.

With the concurrence of the committee appointed at your last meeting, several changes were made in the courses of study, and especially in combining the two schools of Agriculture and Horticulture, and in uniting the School of Mining Engineering with that of Civil Engineering. This last change has already provoked some unfavorable comment among the students of Mining Engineering, and I believe it will be found best to restore this School to its independent position whenever a separate instructor can be afforded for it.

It is said that an opinion has been expressed in certain high quarters that the University is undertaking to do more than it ought, and this coalescence of schools was partly, at least, dictated by the desire to give a less extended appearance to our plan of organization. It is doubtless true that the plan of the University, though not larger than that indicated in the first report on organization, and certainly not more extensive than the needs of the State and the fulfilment of the law of Congress is too large to be carried out by our present faculty; but it is not true that the University has ever shown anything in its catalogue which was not present in its actual instruction. The work promised has been done, though it has been done by the overwork of zealous and faithful instructors. Comparing our force with that of the Michigan University, they would seem twice, if not thrice, as strong in number, but the actual work done is nearly the same. In the Department of Mathematics they catalogue three instructors, but the time of instruction aggregates only four and four-fifths hours daily. One Professor here has worked four hours a day and covered nearly the ground of the three men there. So, in the other leading departments of Languages, ancient and modern, and English Language and Literature, our Professors have worked four and five hours a day, while the average time given by those of Michigan varies from two to three and three-fifths hours a day. In general, each instructor here does twice the work of a Professor in the Michigan University, and does it, I may add, for much less salary. Such a condition of things is often necessary, and may therefore be tolerated in the early history of such an institution; but it is evident that the best interests of the University will demand that this excessive drain upon the forces of the Professors shall not always continue. In some departments four hours a day are not excessive, but in all departments where scientific investigation and study are required, two hours a day of class instruction will represent as much toil as four hours in the other case; and there are departments, like those of Physics and Chemistry, where a single hour in a day in the class-room is as much as can be properly asked.

If your efforts to secure additional funds shall fail, it may then become a serious question whether the University can be maintained in its present extended form, since it will involve not only the continued over-work of men growing gray in the service, but also the perpetuation of low salaries, exposing you to a constant drain of your best men to more liberally paying institutions.

ECLECTIC COURSE.

I communicate herewith a full course of optional studies, showing certain required studies, and a list of permissive or optional studies, out of which students, not candidates for a degree, may select an elective course which will entitle them to the honors of graduates without sacrificing their freedom of study. This course was adopted after careful deliberation by the Faculty, and is recommended by them to be adopted as a part of the plan of the University. It adds no new feature or new work, but guards the elective course of studies from abuse by idle or incompetent students. That freedom of studies which we inscribed on the banners of the University at the very outset ought never to be sacrificed, but it must necessarily be restricted by the powers of your teaching force. Every enlargement of this force will allow a corresponding enlargement in the liberty of choice of studies. While the great leading institutions of our country are steadily throwing down the old barrier of restricted and obligatory courses of study, the State of Illinois will certainly not endure that its chief seat of learning shall go back to the antiquated narrowness of old-time Colleges, on any such plea as the need to guard idle and worthless students from the consequences of their indolence. Such students may be the better for being held under the reins of a strict prescription, but learning itself must suffer by making such prescription the rule for all.

The close of the Preparatory department will release to some extent, the instructors, and increase the teaching force in the proper College work. There is an increasing demand for this in the number of post-graduate students, who seek to obtain higher instuction and for whom some provision ought to be made. I mention in this connection the application of the Professor of Mathematics for additional assistance in the Freshman instruction to enable him to meet the demands for advanced work. Thus far these demands, in his own as well as in other departments, have been met by the volunteer efforts of the several Professors. During the past year several post-graduates have been carried through advanced courses of study required for their second degree.

Respectfully submittted.

J. M. GREGORY, *Regent.*

Mr. Cobb, chairman of the Board, presented the resignation of Dr. Gregory, Regent.

Mr. McLean moved, and was seconded by Mr. Scott, that the resignation of Dr. Gregory as Regent be accepted, to take effect on the 1st of September, 1880.

The motion was carried.

Mr. Gardner moved that a committee of three be appointed by the Chair, with Mr. Millard as Chairman, to draw up appropriate resolutions.

The motion was carried and the Chair appointed Messrs. Millard, Gardner and McLean.

After a short recess, the committee reported the following preamble and resolutions:

WHEREAS, Dr. John M. Gregory, our esteemed and beloved Regent, who has been at the head of the Illinois Industrial University from its birth, and to whom the people of the State of Illinois owe a debt which can never be repaid by mere words, has presented to the Board of Trustees his resignation of the trust so long and faithfully held by him; therefore,

Resolved, That while this Board accepts the resignation of Dr. Gregory, it does so with feelings of regret, and while compelled to lose his valuable services in the future management of the University, the Board takes this occasion to express and extend to Dr. Gregory its appreciation of his past services in behalf of the University, the harmony and good feeling which exists between himselt and this Board, and the valuable services and affectionate devotion on his part to the welfare of this Institution and all connected with it.

Resolved, That the Illinois Industrial University is and ever will be a monument to the name, fame and genius of Dr. Gregory. That in him this Institution has had, for over thirteen years a constant, faithful and devoted friend to the cause of higher education as applied to the practical and useful arts, as well as to a full and complete University system, which he has crystalized and incorporated in the system of education adopted by the University.

Resolved, That this Board, in its own behalf as well as in behalf of the people of the State of Illinois, desires to, and does hereby, express its thanks to Dr. John M. Gregory for his long and faithful services in behalf of the University, and while we are compelled to part with him, we shall ever remember and appreciate the services he has performed for

the Institution and the State, and hall ever follow his future career with feelings of affection and personal regard, fully believing that his future work will ever be, as it has been in the past, devoted to the moral and intellectual elevation of his fellow-beings.

Resolved, That the Secretary be and is hereby directed to engross these resolutions, and forward a copy of the same to Dr. Gregory and to the press.

The resolutions were adopted.

Board adjourned until 9 P. M.

EVENING SESSION.

The Board assembled as by adjournment.

The following appropriations were granted, upon requests from the different departments:

For tools and materials for shop practice	$25 00
" Replenishing the stock of chemicals and chemical apparatus	700 00
" Continuing the collections of Botanical and Entomological specimens for University Museum	50 00
" Copying and printing plans and drawings for Architectural Department	30 00
" Polar Planimeter	30 00
" Frames for Art Gallery	25 00
" Shelving and storage, etc., of University Reports	25 00
" Bill of James Forsyth for work on Mammals and Birds for Museum	63 50
" Removal of Veterinary Building	150 00

The following appointments were made:

Dr. Frederick W. Prentice was assigned the chair of Physiology, in addition to his duties as Professor of Veterinary Science, and his salary was increased to $1,200 per annum.

The salary of Prof. Peter Roos was increased to $1,200 per annum—the fees from special students in Drawing and Painting to be paid to the University.

Assistant Professor I. O. Baker was granted the title of "Professor of Engineering," and his salary was made $1,200 per annum.

The salary of Assistant Professor M. A. Scovell was made $1,000 per annum.

Mr. Chas. E. Pickard's salary was fixed at $90 per month for 10 months.

Mr. H. M. Beardsley was re-employed at $45 per month.

Mr. Nelson S. Spencer was reappointed Foreman of Carpenter Shop, with salary as before. His employment during the present vacation was referred to the Business Agent and Prof. Ricker, with power to act.

Mr. Jerome Sondericker was employed as Assistant in Engineering and Instructor in Drawing, at a salary of $40 for 10 months.

Miss Jennie C. Mahan was reappointed Teacher of Instrumental Music—the incidental fees to be charged to students in her classes instructed at the University.

A leave of absence for one year was granted to Mr. George A. Wild, on his request, to study Zoölogy and Biology, under Prof. Huxley, in England.

Dr. Gregory was authorized to express the thanks of this Board to the French government for the contributions of "Plans and Reports of Public Buildings and Bridges."

Adjourned till 8:30 A. M.

SECOND DAY'S SESSION.

The Board assembled at 8:30 A. M.

The Executive Committee and the Regent were authorized to fill the chair of Mechanical Engineering.

The recommendations of the Regent in regard to buildings and repairs of same, were referred to the Building Committee.

Profs. Roos and Crawford were granted leave of absence during vacation.

On motion of Mr. Scott, a petition of Prof. Burrill, relating to the loaning of certain articles belonging to the University, to a party of students of Natural History, was granted, with the exception, however, of the request for money.

Prof. Taft was authorized to have the case for Archæological specimens completed under the direction of the Business Agent.

On Prof. Crawford's request, an appropriation for binding necessary in Library, was allowed.

The resignation of Prof. Louisa A. Gregory was read, and, on motion, accepted. Whereupon the Board unanimously passed the following resolutions:

WHEREAS, Professor Louisa Allen Gregory, Preceptress, and Professor of Domestic Science, has presented her resignation to this Board; and, whereas, the long and faithful services of Mrs. Prof. Gregory in her department has demonstrated the utility of a practical education for the women of the century; therefore,

Resolved, That this Board does hereby recognize the value of the services and ability of Mrs. Prof. Gregory, in establishing the woman's course of studies in this Institution, and in bringing it to its present high perfection. We regret that she has determined to sever her connection with the University, and hereby extend to her our congratulations upon the success and reputation she has acquired in her department. And this Board expressly extends its thanks to Mrs. Gregory for the work she has done for the woman's department of this Institution, and the reputation she has established for the University.

Resolved, That the Secretary be directed to engross these resolutions, and send a copy of the same to Mrs. Prof. Gregory, and also to the press.

It was resolved that the action of this Board at the last March meeting, providing for a change in the military uniform, be reconsidered, and that the question of uniform be referred to the Executive Committee, with power to act.

The following resolution was presented and adopted:

Resolved, That Mr. S. Cecil Stanton, of the class of 1879, be recommended to the Governor for a commission as Captain in the State Militia.

Mr. Gardner made a report on the subject of exchange of certain lots, upon which the following resolution was passed:

Resolved, That the proper officers of the Board be authorized to execute a quit-claim deed to Morton E. Chase for the lot now owned by the University, for the lot taken in exchange for the extension of avenue adjoining the horse railroad track, as set forth in report.

The following report from the Committee on Buildings and Grounds was read, and, on motion, adopted and the recommendations concurred in:

To the Hon. Board of Trustees, Illinois Industrial University:

Your Committee on Buildings and Grounds beg leave to report that the grounds have been kept in good order, and, as far as possible, the plans made in the spring have been executed. The cows have been kept out, not by rebuilding fences, but by patching and constant watching.

The trees ordered were received and planted, and, with two exceptions, are now growing. The trade of lots with Mrs. Chase has been made, and the avenue opened. Further work upon the avenue, as upon other new roads and walks, has been postponed until the farm teams have leisure to do it. Those laid out but not completed around the Chemical Laboratory will be finished during the summer.

Trees have been planted back of the University in distant groups, extending southward to the nursery grounds.

Attention is called to the position and condition of the Veterinary stable. It is too near the roadway, and the wood foundation is badly rotten It should be moved westward, and placed on brick piers.

The west gable of the Dormitory building was blown in, taking also a portion of the roof. This renders that portion of it untenable. Temporary protection has been made, which partially shelters it, We desire the especial attention and direction of the Board concerning the building and its future.

Mr. Lewis has satisfactorily done the work in the greenhouse and on the grounds, and will continue during the summer. As the greater part of his labor is upon the grounds, and no credit is gived the Horticultural department for the plants placed in the beds, we request that his salary, $25 per month, be charged to Buildings and Grounds.

All of which is respectfully submitted.

D. GARDNER,
ALEX. McLEAN,
Committee.

The following report of the Business Agent was received, and the accounts for audit referred to Mr. Scott:

CHAMPAIGN, ILL., June 8, 1880.

Hon. Emory Cobb, President Board of Trustees, Illinois Industrial University:

SIR—I have the honor to present herewith the financial statement for the three months ending May 31.

Paper A gives the current appropriatlons, with expenditures under the same; also, collections passing through my hands.

Paper B shows the condition of the State appropriations at date.

Paper C is a list of warrants drawn, with vouchers.

Paper D is a list of bills on which I desire the action of the Board of Trustees.

Respectfully submitted.

S. W. SHATTUCK,
Business Agent.

"A"

Current Appropriations, May 31, 1880.

For what paid.	Appropri't'd	Received.	Expended.	Balance.
Board expense	$300 00		$118 15	$181 85
Salaries	14,000 00		7,135 65	6,864 35
Buildings and grounds	100 00	$40 60	155 09	—14 49
Fuel and lights	1,000 00	90 93	717 43	373 50
Stationery and printing	600 00	20 00	423 42	196 58
Fixtures and furniture	100 00	6 00	30 31	75 69
Mechanical department	289 21	499 83	564 86	224 18
Architectural "	166 60	930 72	631 41	475 91
Agricultural "	4,605 84	2,264 65	1,874 95	4,995 54
Horticultural "		386 35	584 08	—197 73
Chemical "		600 00	395 13	204 87
Military "	100 00	32 40	44 27	88 13
Library and apparatus	100 00		19 48	80 52
Incidental expense	200 00	1 00	53 63	147 37
Sundries—Physical laboratory	75 12		6 80	68 32
Cabinets	63 40	3 35	12 15	54 60
Domestic Science	30 00		33 56	—3 56
Students' examination	200 00			200 00
Civil Engineering department	10 00		2 19	7 81
Band instruments	125 00		125 00	
Fees and room rents		1,552 63		1,552 63
Tuition Preparatary year		665 00	384 20	280 80
Illinois Central Railroad, freight		499 90		499 90
Mr. Parsons' traveling expenses	61 60		61 69	
State appropriations			2,962 29	

"B"

State Appropriations, May 31, 1880.

For what paid.	Appropri't'd	Received.	Expended.	Balance.
Taxes on lands	$4,306 02	$4,306 02	$4,306 02	.....
Buildings and grounds	5,000 00	5,000 00	5,000 00	.....
Chemical and Physical laboratories	2,000 00	2,000 00	2,000 00	.....
Mechanical and Architectural shops	3,000 00	3,000 00	3,000 00	.....
Library cases	1,000 00	1,000 00	1,000 00	.....
Books and publications	3,000 00	3,000 00	3,000 00	.....
Cabinet cases	4,500 00	4,500 00	3,915 01	$584 99
Cabinets	2,000 00	2,000 00	2,000 00	.....
Chemical laboratory	40,000 00	40,000 00	40,000 00	.....
Greenhouse	2,500 00	2,500 00	2,500 00	.....
July 1, 1879—Appropriations.				
Taxes on lands	$5,000 00	$2,298 52	$2,298 52	.....
Buildings and grounds	5,000 00	2,500 00	2,491 92	$8 08
Chemical and Physical laboratories	2,000 00	1,000 00	668 69	331 31
Mechanical and Architectural shops	3,000 00	1,500 00	1,616 14	116 14
Books and publications	3,000 00	1,500 00	1,449 69	50 31
Cabinets	1,000 00	1,000 00	308 10	691 90
Ventilation and water closets	2,500 00	2,500 00	1,919 55	580 45
Heating apparatus	3,000 00	3,000 00	2,997 45	2 55

"C"

"C"—*List of Warrants and Vouchers drawn for three months—March 1 to June 1, 1880.*

No.	To whom.	For what.	Amount.
	1880—March 15.		
387	John J. Byrd	Expense to meeting	$22 20
388	S. M. Millard	" "	22 00
389	R. B. Mason	" "	8 15
390	T. T. Fountain	" "	20 60
391	Alex. McLean	" "	18 20
392	E. B. Benjamin	Chemical apparatus	169 31
393	C. and U. Gas Light Co.	Gas, February, 1880	103 80
	March 31.		
394	J. M. Gregory	Salary, March, 1879.	300 00
395	T. J. Burrill	" "	150 00
396	S. W. Shattuck	" "	150 00
397	E. Snyder	" "	150 00
398	D. C. Taft	" "	150 00
399	J. C. Pickard	" "	150 00
400	N. C. Ricker	" "	125 00
401	J. D. Crawford	" "	125 00
402	H. A. Weber	" "	150 00
403	G. E. Morrow	" "	150 00
404	L. A. Gregory	" "	100 00
405	F. W. Prentice	" "	100 00
406	E. L. Lawrence	" "	83 33
407	I. O. Baker	" "	75 00
408	M. A. Scovell	" "	75 00
409	F. A. Parsons	" "	75 00
410	C. I. Hays	" "	75 00
411	Chas. Hildebrand	" "	75 00
412	P. Roos	" "	75 00
413	Geo. A. Wild	" "	60 00
414	C. E. Pickard	" "	60 00
415	E. A. Kimball	" "	100 00

"C"—*List of Vouchers*—Continued.

No.	To whom.	For what.	Amount.
	1880—March 31—*Continued.*		
416	H. M. Beardsley	Salary, March, 1879	$35 00
417	N. S. Spencer	" "	30 00
418	A. B. Baker	" "	40 00
	April 15.		
419	John Conklin	Work on roof	6 00
420	Joseph Johnson	" "	6 00
421	Louis Preston	" "	6 00
422	Clark Rush	" "	7 00
423	Wm. A. Dinwiddie	Sundry expenses, Military	25 71
424	Hovey & Co	Seeds	10 30
425	William Skinner	Work	5 00
426	E. B. Benjamin	Glassware and apparatus	28 05
427	J. Sondericker	Printing, drawing	3 32
428	Houghton, Osgood and Co	Periodicals	6 00
429	A. H. Roffe and Co	"	145 42
430	F. Leypoldt	Advertising	1 40
431	Champaign Gas Co	Lights for March, 1880	125 40
432	J. A. Patterson	Cattle, 2 head	49 60
433	N. S. Spencer	Work on Drill hall roof	8 75
434	L. F. Ross	3 Devon cattle	60 00
435	J. M. Clark	Work in shops	50 75
436	Wm. Harvey	Work on roof	6 00
437	H. W. Mahan	Brooms, etc	1 88
438	Agricultural Department	Expenses, March, 1880	245 81
439	D. C. Taft	Expenses for cabinets	10 21
440	Enterprise Coal Co	3 cars coal	45 90
441	J. F. Wollensack	Locks	11 25
442	R. B. Harmel	Glazing	10 20
443	Larabee & North	Hardware	58 42
444	F. A. Parsons	Traveling expenses	61 60
445	Larrabee & North	Hardware	12 64
446	Brown & Holdoway	Books	20 00
447	Thos. Wright	Castings	64 75
448	Lyon & Healy	Band instruments	125 00
449	Fuller & Fuller	Chemicals	21 25
450	Am. M. U. Express	Expressage	4 95
451	Jansen, McClurg & Co	Books	51 15
452	H. Swannell	Chemicals	90 58
453	Publishers Illini	Printing	20 26
	April 30.		
454	J. M. Gregory	Salary, April, 1880	300 00
455	T. J. Burrill	" "	150 00
456	S. W. Shattuck	" "	150 00
457	E. Snyder	" "	150 00
458	D. C. Taft	" "	150 00
459	J. C. Pickard	" "	150 00
460	N. C. Ricker	" "	125 00
461	J. D. Crawford	" "	125 00
462	H. A. Weber	" "	150 00
463	G. E. Morrow	" "	150 00
464	L. A. Gregory	" "	100 00
465	F. W. Prentice	" "	100 00
466	E. L. Lawrence	" "	83 33
467	I. O. Baker	" "	75 00
468	M. A. Scovell	" "	75 00
469	C. Hildebrand	" "	75 00
470	P. Ross	" "	75 00
471	C. F. Pickard	" "	60 00
472	G. A. Wild	" "	60 00
473	E. A. Kimball	" "	100 00
474	H. M. Beardsley	" "	35 00
475	N. S. Spencer	" "	30 00
476	A. B. Baker	" "	40 00
477	Students' Laboratory Pay Roll	March	284 05
	May 15.		
478	Jno. Y. Reid	1 Short Horn bull	350 00
479	Jas. R. Willett	Services as consult. arch.	100 00

"C"—*List of Vouchers*—Continued.

No.	To whom.	For what.	Amount.
	May 31.		
480	Students' Pay Roll	April, 1880	$304 80
481	Agricultural Department	Farm expenses, April, 1880	377 84
482	C. Rush	Carpenter work	40 25
483	I. I. McAllister	Hauling coal	14 40
484	Johns Hopkins University	Periodicals	4 00
485	C. J Sabin	Sawing and turning	17 70
486	E. B. Benjamin	Apparatus and chemicals	25 45
487	J. M. Clark	Carpenter work	43 70
488	D. Appleton & Co	Books	15 00
489	I. B. & W. Railway	Freights	8 47
490	M. E. Chase	Exchange of lots	15 00
491	T. T. Fountain	Expenses to Com. meeting	27 00
492	W. Cummins	Work on Dormitory	5 00
493	Magazine American History	Subscription, 1880	5 00
494	R. B. Harmel	Painting gallery	40 00
495	Busey & Hardy	Pruning shears	2 50
496	Jno. S. Stott	Stationery, etc	11 20
497	A. Hance & Son	Trees	9 53
498	R. B. Harmel	Painting and glazing	15 30
499	H. K. Vickroy	Plants	18 00
500	J. Bacon	Coal	11 12
501	Walker & Mulliken	Mats and furniture	99 41
502	Sprague, Warner & Co	Specimens of foods	8 78
503	Burnham & Sons	2 Hereford steers	60 00
504	E. O. Chester	1 Short Horn steer	30 00
505	Henry & Kariher	Brooms, etc	4 30
506	Champaign Gas Co	Lights, April, 1880	78 90
507	Fuller & Fuller	Glass	27 49
508	Fuller & Fuller	Chemicals	7 70
509	B. C. Beach & Co	Coal (Blossburg)	7 50
510	E. O. Chester	1 Short Horn steer	26 60
511	J. Alford	Work on Dormitory	2 00
512	J. M. Gregory	Salary, May, 1880	300 00
513	T. J. Burrill	" "	150 00
514	S. W. Shattuck	" "	150 00
515	E. Snyder	" "	150 00
516	D. C. Taft	" "	150 00
517	J. C. Pickard	" "	150 00
518	N. C. Ricker	" "	125 00
519	J. D. Crawford	" "	125 00
520	H. A. Weber	" "	150 00
521	G. E. Morrow	" "	150 00
522	Mrs. J. M. Gregory	" "	100 00
523	F. W. Prentice	" "	100 00
524	E. L. Lawrence	" "	83 33
525	I. O. Baker	" "	75 00
526	M. A. Scovell	" "	75 00
527	C. Hildebrand	" "	75 00
528	P. Ross	" "	75 00
529	C. E. Pickard	" "	60 00
530	G. A. Wild	" "	60 00
531	E. A. Kimball	" "	100 00
532	H M. Beardsley	" "	35 00
533	N. S. Spencer	" "	30 00
534	A. B. Baker	" "	40 00
535	Enterprise Coal Co	6 cars coal	73 80
536	W. T. Pratt	Roof repairs	43 40
537	D. F. Root	Repair of gates	1 50
538	Moses King	Book	1 00
539	Jno. B. Weeks	Hauling	30 30
540	Jansen, McClurg & Co	Books	196 27
541	Champaign County Gazette	Catalogues, 1880	322 50
542	C. B. Richard	Charges on imp. books	6 55
543	Champaign Gazette	Binding	81 00
544	Ill. C. R. R.	Freights, Feb., Mar., Apr., 1880	499 96
545	"Illini."	Advertising	16 67
546	Ill. C. R. R.	Advanced freight	3 56
547	R. Blum	Six pans	75
548	Wm. Gray	Sundries, specimens of food	24 78
549	Bloomington Nurseries	Plants	25 55
550	" "	Trees	14 68
551	Peterson & Lloyde	Ink and stationery	6 05
552	C. Rush	Carpenter work	51 75
553	Larrabee & North	Hardware	3 64
554	C. S. Kingsbury	Leading in choir	20 00
555	Fuller & Fuller	Glass	185 49

"C"—*List of Vouchers*—Continued.

No.	To whom.	For what.	Amount.
	1880. May 31—*Continued*		
556	J. E. Saxton & Co	Paper	$4 20
557	Champaign Gas Co	Lights, May, 1880	76 20
558	Thos. Wright	Castings	32 85
559	J. Burkett Webb	Books	39 45
560	W. Witt	Carpenter work	45 16
561	J. M. Clark	" "	60 82
562	Agricultural department	Work	27 40
563	Jas. Hollingsworth	Work on grounds	4 10
564	Agricultural department	Work	175 75
565	R. B. Harmel	Finishing mus. cases	150 00
566	Hubbard & Son	Rooffing	262 11
567	E. N. McAllister	Postage	40 24
568	Agricultural department	Farm expenses	361 86
569	Trevett & Green	Hardware	27 32
570	Crane Brothers' Manufacturing Co	Hardware	33 94
571	M. L. Lapham	Lumber	35 60
572	American Journal of Philology	Subscription, 1880	3 00
573	Baird & Tuttle	Apple stocks	3 25
574	Horticultural Department	Evergreens	11 00
575	H. Swannell	Chemicals, etc	21 10
576	Mechanical department	Work and material	142 84
577	" "	" "	256 57
578	S. W. Shattuck	Petty exp's, Mar., Apr., May, 1880	67 75
579	J. C. Lewis	Mason work	10 25
580	Architectural department	Work for departments	50 58
581	" "	Work and material	795 76
582	Students' pay-roll	Labor, May, 1880	283 31
583	Horticultural department	Work on grounds	60 26

A petition from students asking for the use of the Chemical Laboratory during vacation, was referred to the Regent and Business Agent, with power to act.

The request from Janitor A. B. Baker for leave of absence was referred to Mr. Gardner and Business Agent, with power to act.

The committee appointed to codify and revise the By-laws submitted the following report:

To the Honorable President and Board of Trustees of the Illinois Industrial University:

Your Committee on By-laws respectfully report that they have codified the By-laws of the Board with such amendments as they deem important, which is respectfully submitted.

J. M. MILLARD,
ALEX. McLEAN.

BY-LAWS.

I. MEETING OF THE BOARD.

Sec. 1. All meetings of the Board of Trustees shall be held at the University building, in Champaign county, unless otherwise ordered, and five members of the Board shall constitute a quorum.

Sec. 2. The Board shall hold an annual meeting the second Tuesday of March, and other meetings as often as once in three months, at such times as the Board may designate.

Sec. 3. Special meetings may be called whenever necessary, by the President or any two members of the Board, by mailing to each member of the Board, at least five (5) days before the meeting, a notice of the call: *Provided*, in such notice the business to be attended to at such meeting shall be specified.

II. ORDER OF BUSINESS.

Sec. 1. The business of each meeting shall be conducted in the following order.

1. Calling the roll of members.
2. Reading, corrections and approval of minutes of last meeting.
3. Election of officers.
4. Report of Regent and other officers.
5. Report of committees.
6. Communications, petitions and memorials.
7. Unfinished business.
8. New business.

III. RULES OF DEBATE.

Sec. 1. In the discussion and the disposal of business, the Board shall be governed by the parliamentary rules and usages usually governing deliberative bodies.

Sec. 2. Every resolution offered shall be reduced to writing before it shall be finally acted upon.

IV. OFFICERS AND APPOINTEES,

Sec. 1. The officers of the Board shall consist of a President, Treasurer, Corresponding Secretary and Recording Secretary, and the Board may, from time to time, appoint such Professors, Tutors or Instructors, and such subordinate officers and employés as they may deem necessary to carry on the Institution.

V. TERM OF OFFICE.

Sec. 1. The Regent and Treasurer shall be elected at each biennial meeting, and shall hold their office for two years and until their successors are duly elected and qualified.

Sec. 2. The Corresponding and Recording Secretary shall be elected at each annual meeting, and hold their offices for one year and until their successors are duly elected and qualified.

Sec. 3. Professors and other officers and employés shall be appointed at such time, in such manner, and for such term as the Board shall by resolution in each case direct, and be subject to removal at the pleasure of the Board.

Sec. 4. The Regent, Professors and assistant Professors of the University are engaged for the whole year, and are to consider themselves on duty except leave of absence be granted; *provided* that the Regent in his discretion may, when he believes the interest of the University will be promoted thereby, visit other parts of the State or country in pursuance of that object.

VI. TREASURER.

Sec. 1. The Treasurer shall give bonds of such amount and with such security as the Board of Trustees shall deem amply sufficient to guard the University from danger of loss or diminution of the funds intrusted to his care; *provided*, such bond shall at no time be less than $100,000.00. He shall be custodian of all the moneys and securities belonging to the University, except the land script, which is by law placed in the custody of the State until the same shall be sold or located. He shall invest the funds of the University as directed by the Board, and he shall pay no money out of the Treasury except upon a warrant of the President of the Board, countersigned by the Recording Secretary. He shall also annually, and oftener when required, make a detailed report to the Board of all the receipts and disbursements, since making his last report.

VII. CORRESPONDING SECRETARY.

Sec. 1. The Corresponding Secretary shall perform the duties indicated and required by the act creating his office, and shall hold his office in the University building.

VIII. RECORDING SECRETARY.

Sec. 1. The Recording Secretary shall perform the duties required of him by law and usually appertaining to his office. He shall keep the books and papers belonging to his office at the University building, at Urbana, and the same shall be open to inspection by any member of the Board, or officer of the University. He shall be Clerk of the Executive Committee and reside at or near the University.

Sec. 2. He shall countersign all warrants on the Treasurer and note on each the appropriation of the Board or Executive Committee authorizing the issue of the same.

PRESIDENT, REGENT AND PROFESSORS.

Sec. 1. It shall be the duty of the President to preside at all meetings of the Board, and of the Executive Committee, sign warrants for all accounts properly audited and allowed, and to communicate to the Regent all votes, orders, or resolutions of the Board, in reference to the management and control of the University.

Sec. 2. The Regent shall be charged with the supervision of the educational facilities and interests of the University, and to that end shall recommend, from to time, to the consideration of the Board such measures as he shall deem necessary or expedient. He shall have, under the direction of the Board or its Executive Committee, general supervision of all the departments of the University and the officers therein, and shall, at the request of the Board, recommend all Professors, instructors and assistants of the Institution that may from time to time be found needful. He shall report in full, in writing, to each regular meeting of the Board of Trustees what has been done in the several departments of the University since its last regular meeting, together with any recommendations as to the future requirements of the University in such departments as to him may seem needful.

Sec. 3. The Business Agent shall report to the Regent at least one day before the regular meetings of the Board, and at such other times as he may require, the financial condition of the University.

Sec. 4. All Professors and instructors shall report in writing to the Regent, or, in his absence, to the President of the Faculty, at least five days before the regular meeting of the Board, and at such other times as may be required, the number of classes taught, the number of students in each class, and the number of hours spent in actual teaching by

each Professor or instructor, respectively, and also state, in writing, what is actually needed to make their respective departments more effective in the way of instruction.

Sec. 5. The Professors of Agriculture and Horticulture and the Mechanic Arts shall have charge of the employés in such departments, and said employés shall report their doings to said Professors, who shall embody said reports with their own to the Regent.

X. BUSINESS AGENT.

Sec. 1. The Business Agent shall keep all business books of the University and do its business correspondence. He shall keep, or cause to be kept, the books of accounts of the several departments. He shall make all purchases for the Unfversity, but no purchases shall be made except upon requisition from the heads of departments, or such as may be ordered by the Trustees, provided, also, that all purchases must first be authorized by by the Trustees.

Sec. 2. In case of necessity for immediate purchases, the Business Agent will make them, but within the limit of $50 for any one month, the same to be reported to the Trustees at their next meeting. Purchases of material for commercial work of the machine shops may be made if immediate returns are to be received, the same also to be reported at the next meeting of the Trustees.

Sec. 3. He shall aid the heads of departments in effecting such sales as may be authorized by the Trustees. He shall aid the Treasurer, when required by said Treasurer, in making collections of all fees, rents and other dues or debts due the University, and do such other business as may from time to time be entrusted to him.

Sec. 4. He shall keep the President of the Board. the Trustees and the Regent informed as to the state of finances and business affairs of the University, presenting at the meetings of the Board, or when called for, a statement of all collections and expenditures in the several departments.

XI. SALARIES.

Sec. 1. The salary of each officer, Professor, instructor or other employé of the University shall be fixed by resolution at the time the appointment is made, subject to alteration in the discretion of the Board, and a warrant shall be drawn for the same according to law on the Treasurer as the same shall fall due; provided, there are funds in the treasury to pay the same. Salaries shall be payable monthly.

XII. DUTIES OF EXECUTIVE COMMITTEE.

Sec. 1. The Executive Committee shall meet whenever they find it necessary for the transaction of any business necessary to be done during the vacation of the Board.

Sec. 2. The Executive Committee shall, for the purposes for which they were appointed, possess all powers of the Board; provided, that they shall not revise or change the acts of the Board, nor act upon matters referred to any committee of the Board that may be entrusted with any special business, shall not purchase or sell real estate, nor the land scrip, nor bonds belonging to the University, without the consent in writing of a majority of all the members of the Board, and shall be strictly confined to such business as cannot be left till the quarterly meetings of the Board.

Sec. 3. The committee shall hold office till the annual meeting next after their appointment, and they shall submit the minutes of their proceedings, or make a report through their chairman to every meeting of the Board, of all their transactions since the last meeting of the Board.

Sec. 4. These By-laws may be repealed or amended at any meeting of the Board, by a vote of a majority of all the members of the Board.

Sec. 5. All prior By-laws are hereby repealed.

Mr. Scott submitted the following report from the Committee on Catalogues, which was adopted:

To the Honorable Board of Trustees:

The committee to whom were referred changes in the catalogue and courses of study, met April 9, at the Grand Pacific Hotel. Present, J. R. Scott, S. M. Millard and T. T. Fountain. The Regent was also present and was appointed Secretary. The several changes proposed by the Faculty were approved, including the uniting of the Schools of Agriculture and Horticulture, the Schools of Civil and Mining Engineering, and the discontinuing of the School of Commerce. It was also voted that the permission heretofore allowed to make up the Preparatory Latin necessary for entering the School of English and Modern Languages after entering the University, should be continued, and notice of the same be entered in the catalogue.

A large number of verbal amendments to the catalogue were also considered and voted.

J. M. GREGORY, SEC'Y.
J. R. SCOTT,
S. M. MILLARD,
T. T. FOUNTAIN.

On motion, it was resolved that in the opinion of the Board the old Dormitory Building, having been so damaged by the elements, is unsafe for occupancy, and that, therefore, the Committee on Buildings and Grounds be and are hereby instructed to take such steps as may be necessary to prevent further destruction until such time as the Board can take further action.

The Committee on Students' Government asked and were granted further time to report.

ILLINOIS INDUSTRIAL UNIVERSITY

IN ACCOUNT WITH JNO. W. BUNN, TREASURER.

	CR.		
1880.			
March 1....	By balance		$12,500 51
March 31....	" collections	$1,226 06	
	Fees and room rents $866 00		
	Tuition in Preparatory department 327 50		
	Mechanical department 17 16		
	Architectural department 1 80		
	Buildings and grounds 12 60		
	Incidentals 1 00		
April 1.....	" interest on Sangamon county bonds	1,250 00	
April 12.....	" interest on Douglas county bonds (school)	400 00	
May 31.....	" amount received on account of buildings and grounds	28 00	
	" amount received on account of fuel and lights	90 93	
	" amount received on account of stationery and printing	20 00	
	" amount received on account of furniture and fixtures	6 00	
	" amount received on account of Mechanical department	482 67	
	" amount received on account of Architectural departm't	928 92	
	" amount received on account of Agricultural departm'nt	2,264 65	
	" amount received on account of Horticultural departm't	386 35	
	" amount received on account of Military department	32 40	
	" amount received on account of Chemical department	600 00	
	" amount received on account of cabinets	3 35	
	" amount received on account of fees and room rent	686 63	
	" amount received on account of tuition in Preparatory department	337 50	
	" amount received on account of Ill. C. R. R. donation	499 90	
			9,243 36
			$21,743 87
	DR.		
May 31.....	To amount paid for Board expense	$118 15	
	" amount paid for salaries	7,135 65	
	" amount paid for buildings and grounds	155 09	
	" amount paid for fuel and lights	717 43	
	" amount paid for stationery and printing	423 42	
	" amount paid for fixtures and furniture	30 31	
	" amount paid for Mechanical department	564 86	
	" amount paid for Architectural department	631 41	
	" amount paid for Horticultural department	584 08	
	" amount paid for Agricultural department	1,874 95	
	" amount paid for Chemical department	395 13	
	" amount paid for Military department	44 27	
	" amount paid for Library and apparatus	19 48	
	" amount paid for incidental expense	53 63	
			$12,747 86
	" amount paid for Physical laboratory	$6 80	
	" amount paid for cabinets	12 15	
	" amount paid for domestic science	33 56	
	" amount paid for Civil Engineering department	2 19	
	" amount paid for band instruments	125 00	
	" amount paid for tuition in Preparatory year	384 20	
	" amount paid for Mr. Parsons' traveling expenses	61 60	
			625 50
	" amount paid for buildings and grounds	$607 25	
	" amount paid for Chemical and Physical laboratories	25 75	
	" amount paid for Mechanical and Architectural shops	509 51	
	" amount paid for books and publications	566 29	
	" amount paid for ventilation and water closets	111 57	
	" amount paid for cabinets	39 81	
	" amount paid for cabinet cases	1,002 11	
			2,862 29
	To balance		5,508 22
			$21,743 87

URBANA, June 9, 1880.

JOHN W. BUNN, *Treasurer.*

Adjourned.

CALLED MEETING OF THE BOARD OF TRUSTEES, JULY, 1880.

The Board met in response to the call of the Chairman, at the University parlors, Tuesday, the 27th of July, 1880, at 3 o'clock P. M.

Present—Messrs. Cobb, Gardner, Fountain, Millard, Scott and McLean.

The Chairman laid before the Board the following applications for the Regency:

Rev. John Wheeler, of Iowa.

D. Adams, of Wesleyan University, of Bloomington.

Dr. Wm. Sheldon, President Irving College.

C. H. Woodward, of St. Louis.

On motion of Mr. McLean, the above applications were placed on file for future consideration, and the President of the Board requested to so notify the applicants.

Moved by Mr. Fountain that President E. Cobb be authorized to take such steps as he may deem necessary, to ascertain the name or names of a proper person for the office of Regent, and that he report to the regular quarterly meeting in September next for the action of this Board. Carried.

It was moved and adopted that the Regent *pro tem.*, Profs. Shattuck and Burrill, and Dr. Gregory, be and are hereby appointed a committee to arrange for and employ, if necessary, an additional instructor to supply any place found necessary during the coming year, at a sum not to exceed $1,000.

A bill of advertising, presented by Educational Weekly, of $35.00, was allowed.

Recess taken, to meet at the Doane House 7:30 P. M.

EVENING SESSION.

The Board met on time. Attendance as before.

On motion of Mr. McLean, it was resolved that Prof. S. H. Peabody be re-appointed to the chair of Mechanical Engineering, at a salary of $2,000 per annum, the year commencing August 15, 1880.

On motion of Mr. Gardner, it was resolved that Prof. Peabody be appointed Regent *pro tempore*.

Moved that a committee, consisting of Messrs. McLean and Gardner from the Board, and Prof. Shattuck and Dr. Gregory of the Faculty, be and are hereby appointed to nominate to the Board, at the next September meeting, an instructor of Domestic Science. Carried.

Moved and carried that a committee be appointed by the President of this Board, to examine the College lands in Nebraska and Minnesota, and report their condition, surroundings, etc., to the Board at the next December meeting.

The President appointed Messrs. Gardner and McLean for Nebraska, and Messrs. Millard and Fountain for Minnesota.

It was ordered that the bill of Hubbard & Son, for new roof on Mechanics Hall, be paid by the Business Agent, provided they guarantee in writing to keep it from leaking for a period not less than three years.

The Business Agent was authorized to have 3,000 of the usual circulars printed.

The Recording Secretary was directed to have 200 copies of the present By-laws printed.

The Business Agent was authorized to advertise the opening of University in the Chicago papers at an expense not to exceed $100.

The application of Edgar L. Hill, for the position of Head Farmer, was received and placed on file.

A communication from Dr. Prentice, in regard to salary, was read, and the request laid over to the regular September meeting.

Adjourned.

MEETING OF THE BOARD OF TRUSTEES, SEPTEMBER, 1880.

The Board met at the University parlor at 3:30 P. M. on Sep- 14th, 1880.

Present—Messrs Cobb, Gardner, McLean, Millard and Fountain.

Absent—Governor Cullom, Messrs Byrd, Mason and Scott.

The minutes of the June and July meetings were read and approved.

The Regent *pro tem.* then submitted the following report; which was read and received:

REGENT'S REPORT.

To the Trustees of the Illinois Industrial University:

GENTLEMEN:—Before I proceed to consider the topics which are to be laid before your honorable body in this my first official report, I have to express my profound acknowledgments for the compliment you have paid in entrusting to me the Regency of this University, until you shall have chosen to place its responsibilities in other and abler hands. But for every expression of confidence and encouragement which I have received from yourselves, from my colleagues of the Faculty, and from the students, I should shrink from assuming the duties of this position even temporarily. Until the time, which should not be remote, when you will make a more suitable and a permanent choice, I shall earnestly endeavor so to discharge this trust, that the interests of the University may not suffer.

THE CORPS OF INSTRUCTION

needs no encomium from me. It includes learned, accomplished, and tried Professors and tutors, deficient only in numerical strength to meet the demands made upon them by growing numbers of students, and a variety of courses of study. The corps is too small for the duty and the deficit is made up by the painstaking and self-denying overwork of those who feel that their reputations and their lives are at stake. The process of depletion is so gradual that possibly the fact has been overlooked. At the end of the year, in June, 1878, eight persons were employed, who have since vacated their positions: viz. Dr. Gregory, Professors Webb, Robinson and Allen, and Instructors Baker, Clark, Wild and Taft. In these places are found now only Baker *vice* Webb, Peabody *vice* Robinson and Sondericker *vice* Clark. The other five are vacant, and their duties have been distributed to others of the Faculty, or not provided for. It is true that the names of certain courses of study have been suppressed, but the courses still remain, and their work is done as before. As no one could have said that the force two years since was unnecessarily large, it must appear that the University is notably short-handed now. The closing of the classes of the Preparatory year at the end of the current Academic year will relieve this difficulty in a measure, but for this year these students are with us, and while they are here they are entitled to the competent instruction we promise in our circulars to the public.

It is hardly in my province to suggest to you a solution of this whole problem, since so much of it depends upon the disposition you will make of the Regency, and of the line of instruction hitherto connected with it. For the present, it has been arranged that the Historical part of that work shall be undertaken by Prof. Crawford, and the Philosophical part by myself. I have not found that any authority has been given to the Regent, or to any other officer, to provide for the work of the preparatory class in the term now beginning. To provide for the emergency, I have made the following arrangements, subject to your approval: That the class in Bookkeeping shall be taught by Mr. James G. Allison, a member of the Senior class; the classes in Physiology by Mr. Chas. I. Hayes; and the classes in Algebra by Lieut. William T. Wood. If this arrangement meets your approval, it will be necessary that you provide for the suitable compensation of these gentlemen.

Provision will thus be made for the current term, but I see at present no satisfactory way of providing for the classes in this department, or of furnishing competent and needful assistance to myself during the two terms to follow.

is left without a Professor, and the University without a Preceptress, by the resignation of Mrs. Gregory. While I would avoid any interference with the duties of the Committee which you have appointed to consider this matter, I ask leave to suggest a single thought upon the principle involved. I believe that both Dr. and Mrs. Gregory had very clear and positive ideas as to the scope of the work in this School, the ends to be attained by it, and its value to its graduates, the University, and the public. The means by which those ends were to be secured, and the details of instruction,were doubtless subjects of experiments, subject to modification, improvement, or rejection, as the experiment should progress. If it is your wish that these ends should still be sought, and these experiments should be continued, it will be necessary that they should be entrusted to some lady whose ideas of the work are high and comprehensive, whose capacity for it is assured, and, above all, whose convictions as to its value, and of her duty in regard to it, are settled and imperative. A woman who has the necessary character, ability and zeal, may have to undertake the work on a plane lower than that which Mrs. Gregory had reached, but she would mount the ascent more quickly, because the road has already been surveyed and partly graded.

If, on the other hand, you assume that the course in this School has no valuable aim, or one unknown, or even one that cannot be formulated, and that the whole is an experiment into darkness; if you should appoint a person, otherwise of the most desirable qualities, who is, I will not say inimical, but not positively friendly to this course, it will speedily become a dead issue, and one very soon to be removed from our present programme of work.

STATE APPROPRIATIONS.

I have received a communication from Hon. Jas. P. Slade, the Superintendent of Public Instruction of this State, asking for a report of the progress of this University during the last two years, and I am informed that the Trustees are required by law to make a similar report to the Governor of the State by the end of the present month. In each of these reports a statement will be expected as to the grants which will be asked of the Legislature during the next session. I respectfully suggest that this subject, already receiving your earnest attention, may be considered so early that the results of your deliberations may be brought to the notice of these officers in time for their consideration, and, as may be hoped, for their approval and earnest advocacy.

I am informed that it is your wish that the University should place in the State House in Springfield an exhibition which may fully illustrate our scientific and practical work in the several colleges and schools, and that this work should be done before the Legislature convenes. I earnestly approve this design, and shall work zealously in its execution. An appropriation will be needed to refit cases for a suitable display of the exhibit, and to pay for freight, labor and contingent expenses.

I lately received a request for an exhibit of our elementary work from the Machine and Carpenter shops, to be placed in the Exposition Building at Chicago. The occasion appeared to be one which it were unwise to neglect, and a selection of shop-work, models and drawings was forwarded. I ask that you will authorize the payment of the expenses of this display, which I think should not exceed $25.

APPROPRIATIONS.

I ask that you will make the usual appropriations for the ensuing six months, as per schedule of the Business Agent, and I recommend the following special appropriations, asked by the several Professors, whose communications are herewith transmitted:

For cases in the room of the Professor of Agriculture	$200 00
For expenses of shop practice, Machine shop, per month	20 00
For expenses in the Architectural shop, per month	20 00
For frames in Printing Laboratory, College of Engineers	10 00
For apparatus and repairs in Physical Laboratory	360 00
For cases in the Museum, cabinet case fund	300 00
For models for School of Civil Engineering, to be made at shops	25 00
For books and periodicals	1,000 00
For music and leader of the choir, Fall term	25 00

I invite attention to Prof. Ricker s request that the salary of Mr. Spencer, Foreman of the Agricultural shop, be made $40 per month from September 1 to July 1. The wages seem to be well earned by Mr. Spencer.

I also ask your attention to the request of Prof. Morrow, that a house be provided for a farm laborer.

I present herewith the quarterly report of the Head Farmer, Mr. E. L. Lawrence. Mr. Lawrence desires attention called to the fact that his year, as now arranged for convenience of accounts, ends with the first of December, while his service, contracted for by the year, began on the first of March, and he wishes that that may be taken into account in his final settlement.

I recommend that authority be given to the Faculty to employ instructors in Vocal Music and in Elocution, to be paid by the fees accruing from their several classes.

Mr. A. B. Baker, the efficient and ubiquitous Janitor of the main building, asks that his compensation be raised to $50 per month. From a familiar knowledge of the nature and quality of his labors and cares, I am led to think his request reasonable.

Respectfully submitted.

S. H. PEABODY, *Regent, pro tem.*

The Board then proceeded to the consideration of recommendations contained in the report of the Regent.

Mr. Chas. I. Hayes was reappointed for the year, salary and position to remain as before.

The recommendation in regard to the teaching of preparatory classes was approved.

The arrangements made for the exhibit at the Chicago Exposition were concurred in, and $25 appropriated for expenses.

The salary of Mr. Nelson S. Spencer, foreman of Carpenter shop, was increased to $40 per month for 10 months.

The request of Prof. Morrow, in regard to house for farm hands, was referred to the Farm Committee and the President of the Board, with instructions to report.

The Faculty was given authority to appoint instructors in Oratory and Vocal Music, such instructors to be paid by the fees collected from their pupils.

It was resolved that all fees for special instruction at the University be paid to the Business Agent, and that he report the amount of same to this Board at its regular meeting.

The salary of Mr. A. P. Baker, the Janitor, was increased to $50 per month.

Recess taken at 8:30 P. M.

EVENING SESSION.

The Board assembled on time.

Present, as before.

Mr. J. W. Bunn, the Treasurer, read his report, which was received:

ILLINOIS INDUSTRIAL UNIVERSITY,
IN ACCOUNT WITH JOHN W. BUNN, TREASURER.

1880.	CR.		
June 9	By balance		$5,508 22
June 10	" interest on Menard county bonds		700 00
June 15	" interest on Morgan county bonds		2,000 00
July 1	" interest on Pike county bonds		2,100 00
	" interest on Sangamon county bonds		880 00
	" interest on Champaign county bonds		4,600 00
	" interest on Chicago water bonds		875 00
July 3	" amount received from State to pay taxes on lands in Nebraska and Minnesota	$2,195 50	
	" amount received from State for buildings and grounds	2,500 00	
	" amount received from State for Chemical and Physical laboratories	1,000 00	
	" amount received from State for Mechanical shops	1,500 00	
	" amount received from State for Library and Museum	1,500 00	
			8,695 50
July 15	By interest on Kankakee district school bonds		200 00
August 31	" amount received on account Mechanical department	$157 17	
	" amount received on account Architectural department	369 88	
	" amount received on account Horticultural department	319 31	
	" amount received on account Agricultural department	545 76	
	" amount received on account Chemical department	182 49	
	" amount received on account buildings and grounds	28 00	
	" amount received on account fuel and light	14 63	
	" amount received on account stationery and printing	80 00	
	" amount received on account fees and room rents	46 83	
	" amount received on account tuition in Preparatory department	15 00	
	" amount received on account Illinois Central R. R. donation	99 90	1,858 97
			$27,417 69

	Dr.		
1880.			
August 31...	To amount paid Board expense	$130 40	
	" amount paid for salaries	6,662 83	
	" amount paid for buildings and grounds	75	
	" amount paid for fuel and lights	125 56	
	" amount paid for stationery and printing	216 87	
	" amount paid for Mechanical department	201 67	
	" amount paid for Architectural department	425 92	
	" amount paid for Agricultural department	1,224 09	
	" amount paid for Horticultural department	354 77	
	" amount paid for Chemical department	370 79	
	" amount paid for Military department	11 08	
	" amount paid for library and apparatus	2 15	
	" amount paid for incidental expenses	89 77	
	" amount paid for furniture and fixtures	108 22	
			$9,924 87
	To amount paid for Preparatory department	$160 00	
	" amount paid for Physical laboratory	1 25	
	" amount paid for cabinets	25 35	
			186 60
	To amount paid on account of State appropriations—		
	For taxes on lands in Nebraska and Minnesota	$2,195 50	
	For ventilation and water-closets	92 26	
	For cabinet cases	55 29	
	For Chemical and Physical laboratories	27 00	
	For books and publications	399 68	
	For cabinets	343 10	
	For Mechanical and Architectural shops	246 89	
	For buildings and grounds	1,234 02	
			4,593 74
	To balance		12,712 48
			$27,417 69

URBANA, September 14, 1880.

JOHN W. BUNN *Treasurer.*

The report of Prof. S. W. Shattuck, Business Agent, was read and accepted:

ILLINOIS INDUSTRIAL UNIVERSITY,
BUSINESS OFFICE,
CHAMPAIGN, ILL., Sept. 14, 1880.

Hon. Emory Cobb, President Board of Trustees Illinois Industrial University:

SIR: I have the honor to herewith make my report, as Business Agent, for the three months ending August 31, 1880.

Paper "A" is a statement of the current appropriations and receipts passing through my hands for the six months from February 29 to August 31.

Paper "B" is a statement of the State appropriations August 31, showing an expenditure of $7,456 03 in the last six months and a present balance of $6,223 36.

The State Auditor has accepted our filed vouchers for all expenditures under the appropriations to June 1, 1880.

Paper "C" is a list of the warrants drawn, with vouchers, since the June meeting of the Board.

The circular authorized at your July meeting has not been printed, but is ready to be put into the printer's hands; and I recommend that an edition of 6,000 or 10,000 be printed. I enclose bids for those numbers, as well as for the 3,000—paper "D."

Respectfully submitted.

S. W. SHATTUCK, *Business Agent.*

"A."

Current Appropriations and Receipts, August 31, 1880.

For what paid.	Appropriated.	Received.	Expended	Balance.
Board expense	$300 00	.....	$248 55	$51 41
Salaries	14,000 00	.....	13,798 48	201 52
Buildings and grounds	100 00	$68 60	155 84	12 72
Fuel and lights	1,000 00	105 56	842 99	162 57
Stationery and printing	600 00	100 00	640 29	59 71
Fixtures and furniture	100 00	6 00	138 53	47 47
Mechanical Department	289 21	657 00	766 53	179 68
Architectural Department	166 60	1,300 00	1,057 33	419 27
Agricultural Department	4,605 84	2,810 41	3,099 04	4,315 21
Horticultural Department	.....	705 66	938 85	—233 19
Chemical Department	.....	782 49	765 92	16 57
Military Department	100 00	32 40	55 35	77 05
Library and apparatus	100 00	.....	21 63	78 37
Incidental expenses	200 00	1 00	143 40	57 60
Sundries—Physical Laboratory	75 12	.....	8 05	67 07
Cabinets	63 40	3 35	37 50	29 25
Domestic Science	30 00	.....	33 56	—3 56
Students' examinations	200 00	.....	.....	200 00
Civil Engineering Department	10 00	.....	2 19	7 81
Band instruments	125 00	.....	125 00	.....
Fees and room rents	.....	1,599 46	.....	.....
Tuition Preparatory Department	.....	680 00	544 20	135 80
I. C. R'y freight	.....	599 80	.....	.....
Mr. Parsons' trav. expenses	61 60	.....	61 60	.....

"B."

State Appropriations, August 31, 1880.

For what paid.	Appropriated.	Received.	Expended	Balance.
Taxes on lands	$4,306 02	$4,306 02	$4,306 02	.....
Buildings and grounds	5,000 00	5,000 00	5,000 00	.....
Chemical and Physical Laboratories	2,000 00	2,000 00	2,000 00	.....
Mechanical and Architectural shops	3,000 00	3,000 00	3,000 00	.....
Library cases	1,000 00	1,000 00	1,000 00	.....
Books and publications	3,000 00	3,000 00	3,000 00	.....
Cabinet cases	4,500 00	4,500 00	3,970 30	$529 70
Cabinets	2,000 00	2,000 00	2,000 00	.....
Chemical Laboratory	40,000 00	40,000 00	40,000 00	.....
Green-house	2,500 00	2,500 00	2,500 00	.....
July 1, 1879—Appropriations.				
Taxes on lands	5,000 00	4,493 02	4,493 02	.....
Buildings and grounds	5,000 00	5,000 00	3,725 94	1,274 06
Chemical and Physical Laboratories	2,000 00	2,000 00	693 69	1,304 31
Mechanical and Architectural shops	3,000 00	3,000 00	1,863 03	1,136 97
Books and publications	3,000 00	3,000 00	1,849 37	1,150 63
Cabinets	1,000 00	1,000 00	651 20	348 80
Ventilation and water closets	2,500 00	2,500 00	2,011 81	488 19
Heating apparatus and boiler	3,000 00	3,000 00	2,997 45	2 55
Balance unexpended	.....	.....	.....	6,223 36
Expenditures in six months	.....	.....	7,456 03	6,235 21

"C."

List of Vouchers for three months—May 31 to August 31, 1880.

No.	To whom.	For what.	Amount.
584	Jas. R. Scott	Expense to meetings	$33 00
585	S. M. Millard	" "	25 00
586	Alex. McLean	" "	23 40
587	Stedman & Brown	Atlas	16 00
588	Jennie C. Mahan	Services as Organist, 2 terms	22 25
589	Jas. Forsyth	Mammals and Birds	43 50
590	J. M. Gregory	Salary, June, 1880	300 00
591	T. J. Burrill	" "	150 00
592	S. W. Shattuck	" "	150 00
593	E. Snyder	" "	150 00
594	D. C. Taft	" "	150 00
595	J. C. Pickard	" "	150 00
596	N. C. Ricker	" "	125 00
597	J. D. Crawford	" "	125 00
598	H. A. Weber	" "	150 00
599	G. E. Morrow	" "	150 00
600	L. A. Gregory	" "	100 00
601	F. W. Prentice	" "	100 00
602	E. L. Lawrence	" "	83 33
603	I. O. Baker	" "	75 00
604	M. A. Scovell	" "	75 00
605	C. Hildebrand	" "	75 00
606	P. Roos	" "	75 00
607	C. E. Pickard	" "	60 00
608	E. A. Kimball	" "	100 00
609	G. A. Wild	" "	60 00
610	H. M. Beardsley	" "	35 00
611	N. S. Spencer	" "	30 00
612	A. B. Baker	" "	40 00
613	M. E. Lapham	Lumber	100 00
614	Jansen, McClurg & Co	Books	60 25
615	Chas. A. Hume	Work on grounds	13 60
616	United States Patent Office	Binding reports	13 00
617	J. F. Harvey	Services as night watchman	5 00
618	Henry Keller	" "	5 00
619	J. Sondericker	Lettering diplomas	13 50
620	M. E. Lapham	Lumber	30 50
621	Moore & Co	Plumbing	23 87
622	Students' labor pay-roll	June, 1880	178 25
623	Agricultural department	Farm expense, June, 1880	429 17
624	Larrabee & North	Hardware	31 87
625	W. T. Pratt	Roof repairs	15 00
626	G. E. Morrow	Seeds and expressage	7 25
627	Jno. S. Stott	Stationery	16 44
628	Ludington, W. & V. S. Co	Lumber	133 25
629	J. M. Wollensack	Locks and handles	4 82
630	Champaign Gas Co	Lights, June, 1880	12 90
631	Thos. Franks	Plants	2 85
632	N. C. Ricker	Nos. American Architect	10 00
633	Jansen, McClurg & Co	Books	28 35
634	A. B. Baker	For extra services	10 00
635	Keuffel & Esser	Polar Planimeter	27 00
636	Chas. E. Aiken	Specimens of birds	77 02
637	J. E. Saxton & Co	Manilla and twine	2 12
638	Peterson & Lloyde	Picture frames	21 60
639	J. M. Gregory	Salary for July, 1880	300 00
640	T. J. Burrill	" "	150 00
641	S. M. Shattuck	" "	150 00
642	E. Snyder	" "	150 00
643	D. C. Taft	" "	150 00
644	N. C. Ricker	" "	125 00
645	J. D. Crawford	" "	125 00
646	H. A. Weber	" "	150 00
647	J. C. Pickard	" "	150 00
648	G. E. Morrow	" "	1 0 00
649	L. A. Gregory	" "	100 00
650	E. L. Lawrence	" "	83 33
651	I. O. Baker	" "	75 00
652	M. A. Scovell	" "	75 00
653	P. Roos	" "	75 00
654	E. A. Kimball	" "	100 00
655	A. B. Baker	" "	40 00
656	C. Hildebrand	" "	75 00
657	Hubbard & Sons	Roofing	280 00
658	Eudcational Weekly	Advertising	35 02

List of Vouchers—Continued.

No.	To whom.	For what.	Amount.
659	S. M. Millard	Expense to meeting	$18 50
660	T. T. Fountain	" "	17 00
661	Alex. McLean	" "	20 50
662	F. W. Christern	Books and periodicals	96 48
663	Jansen, McClurg & Co	" "	100 00
664	Pubs. "Illini"	Advertising	5 00
665	Chicago "Times"	"	12 60
666	N. S. Spencer	Salary, July, 1880	50 00
667	J. E. Saxton and Co	Stationery	14 50
668	Chicago Tribune Co	Advertising	13 44
669	N. A. Williams	Lime and stucco	4 90
670	J. C. Lewis	Mason work	6 45
671	E. S. Lawrence	Farm expense, July, 1880	339 67
672	Students' Labor Pay Roll	July, 1880	67 80
673	J. M. Gregory	Salary, August, 1880	300 00
674	T. J. Burrill	" "	150 00
675	S. W. Shattuck	" "	150 00
676	E. Snyder,	" "	150 00
677	D. C. Taft	" "	150 00
678	J. C. Pickaad	" "	150 00
679	N. C. Ricker	" "	125 00
680	J. D. Crawford	" "	125 00
681	H. A. Weber	" "	150 00
682	G. E. Morrow	" "	150 00
683	L. A. Gregory	" "	100 00
684	E. S. Lawrence	" "	83 33
685	J. O. Baker	" "	75 00
686	M. A. Scovell	" "	75 00
687	P. Roos	" "	75 00
688	E. A. Kimball	" "	100 00
689	A. B. Baker	" "	40 00
690	C Hildebrand	" "	75 00
691	S. H. Peabody	Salary, August 15th, 1880	83 33
692	R. B. Harmel	Finishing shelves, etc	5 75
693	R. B. Harmel	Finishing specimen case	8 00
694	R. B. Harmel	Finishing pedestals	6 50
695	R. B. Harmel	Finishing models	8 00
696	Agricultural department	Work for other departments	149 55
697	Agricultural department	Work	40 05
698	M. E. Lapham	Lumber	105 53
699	Jno. W. Bunn	Taxes on University lands	2,195 50
700	Trevett & Green	Hardware	4 10
701	Wm. A. Dinwiddie	Expense for band	2 78
702	Illinois Central R. R. Co	Freight advanced	2 80
703	N. S. Spencer	Salary, August, 1880	50 00
704	E. L. Lawrence	Pay of berry pickers	8 78
705	A. T. Hall	Boxes and crates	11 07
706	C. Rush	Work in shops	49 50
707	J. Harvey	Moving Veterinary building	20 00
708	Champaign Gazette	Stationery and printing	34 00
709	F. W. Christern	Books and periodicals	3 60
710	Agricultural department	Farm expenses August, 1880	166 01
711	Moore & Co	Hardware	1 15
712	J. M. Gregory	Letter-press and balance	15 00
713	Inter-Ocean Publishing Co	Advertising	42 50
714	August & Sturm	Veneers	22 22
715	Horticultural department	Trees for grounds	82 80
716	J. C. Lewis	Mason work	18 92
717	Star Coal Mine Co	Five car loads coal	64 40
718	N. A. Williams	Cement and lime	18 75
719	Crane Bros. Manufacturing Co	Cutting gears and castings	35 32
720	Crane Bros. Manufacturing Co	Hardware and pipes	33 26
721	Miller & Hunt	Plants	6 15
722	R. D. Lewis	Sundry expenses in Hort. dept	25 56
723	W. Witt	Work in shops	43 50
724	H. Swannell	Chemicals	345 12
725	Miss G. E. Butts	Work on botanical cabinets	4 32
726	F. A. Taft	Work in cabinets	3 06
727	A. B. Seymour	Work in cabinets	26 20
728	Champaign Gazette	Binding	72 00
729	Trevett & Green	Hardware, etc	3 85
730	A. B. Baker	Pay on help in cleaning buildings	164 45
731	A. B. Baker	Sund. expense clean. buildings	2 90
732	Henry & Kauhn	Soap, brushes, etc	8 95
733	R. B. Harmell	Painting	59 64
734	E. N. McAllister	Postage, June, July and August	33 12
735	Mosher Safe and Lock Co	Document case	26 00
736	J. E. Armstrong	Work in taxidermy, etc	45 97

List of Vouchers—Continued.

No.	To whom.	For what.	Amount.
737	Geo. A. Wild	Specimens for cabinets	$67 06
738	R. Hanna	Moose and caribou skins	50 00
739	S. W. Shattuck	Sal. as B. Agt., Sep. 1, '79, to Sep. 1, '80	200 00
740	S. W. Shattuck	Students' pay-roll, August, 1880	49 17
741	G. A. Wild	Tools for taxidermy	15 00
742	Architectural department	Work for other departments	265 01
743	Architectural department	" " " "	48 37
744	Horticultural department	" " " "	94 63
745	S. W. Shattuck	Petty expense, June, July, Aug., '80	76 57
746	Mechanical department	Work for other departments	21 44
747	Mechanical department	" " " "	85 40
748	Illinois Central Railroad	Freights, three months	99 40

The vouchers were referred for audit to a committee consisting of Messrs. McLean and Fountain.

The following assignments from State appropriations were made:

From State appropriation for cabinet cases, for the completion of the cases in the Museum, and a case for Agricultural Lecture Room, to be expended under the direction of the Regent and Business Agent $518 05

For the Mechanical and Architectural shops, for expenses of practical instruction, each per month 20 00

From State appropriation for Physical and Chemical Laboratories, for repairs and purchases for Physical Laboratory 360 00

" State appropriation for books, and publications for books, periodicals and binding for Library, to be expended under direction of the Regent, Business Agent and Librarian 1,000 00

" State appropriation for cabinets, for the continuation of collection of botanical and entomological specimens 25 00

Upon request of Prof. Ricker, an amount of $15 from credits of Architectural Department was assigned for whitewashing, etc., of carpenter shop.

The following appropriations from current funds were made for the six months ending February 28, 1881:

Board expense		$300 00
Salaries:		15,230 00
Buildings and grounds	$100 00	
Fuel and lights	2,500 00	
Stationery and printing	300 00	
Fixtures and furniture	100 00	
Library and apparatus	50 00	
Military department	50 00	
Incidental expense	200 00	
		3,300 00
Agricultural Department, credit	$4,315 21	
Chemical " "	16 27	
Mechanical " "	176 68	
Architectural " "	419 27	
		4,927 73
Physical Laboratory, balance	$67 07	
Cabinets, balance	29 27	
Printing plans College of Engineering	10 00	
Models for School of Civil Engineering	25 00	
Expense Chicago Exposition	25 00	
		156 32
		$23,914 05

The chairman of the committee on appointment of Regent asked and was granted further time.

Prof. Shattuck, from committee on employment of foreman for carpenter shop during vacation, reported that Mr. N. S. Spencer had been employed as such, at $50 per month.

The President reported that the quit-claim deed to Morton Chase had been executed, as directed by the Board at the June meeting.

The Regent *pro tem.*, from committee on employment of additional teaching force, reported the following recommendations: That Lieut. W. T. Wood be employed to teach classes in Preparatory Mathematics, with compensation of fifteen dollars per month per class; and Mr. J. G. Allison to teach the class in Preparatory Bookkeeping, at twenty dollars per month.

The report was approved and adopted.

Adjourned to 9 o'clock A. M.

SECOND DAY'S SESSION.

The Board met at 9 o'clock A. M.

Present as before, with Mr. Scott added.

Mr. Millard offered the following resolution, which was carried:

Resolved, That the Regent be and is hereby authorized to prepare and place on exhibition in the State capitol at Springfield, during the coming winter, such exhibits relating to the University as he may deem advisable; and that he prepare a brief report, for general use, showing the experiments and work that has been and is now being carried on in the several departments of the University, and anything he may deem advisable for the purpose of giving general information to the people of this State, of the work and scope of this University.

Resolved, That the Regent be authorized to expend in the above matter not to exceed $300; and said amount is hereby appropriated out of the general fund of the University.

Mr. Gardner presented the following report from committee on Buildings and Grounds:

To the Honorable Board of Trustees:

Your committee on Buildings and Grounds submit the following report:

Many improvements were desired and intended to be made the past season; sufficient funds were at our disposal to complete them at the commencement of the season. But the injuries to our buildings by storms, amounting to about seven hundred dollars, so reduced our funds that we had to confine ourselves to mere necessities. As far as the grounds are concerned, we think they are in a very creditable condition, showing that they have received proper care from those directly in charge.

The want of soft water for steam and other purposes has been supplied by the putting in of a cistern of 300 barrels capacity, which we think will fully supply the wants. The Veterinary Building has been moved back, as instructed by your Board. Owing to the absence of Dr. Prentice the details are not yet completed, but will be as soon as he returns.

The dwelling near the Veterinary Building, formerly occupied by farm hands, did not seem to your committee suitable or much needed for that purpose. It is now in course of repairs, as also is the house near the street railway, and both will be rented to students.

The old Dormitory Building is now occupied by four students. It has been much and seriously debated what is to be done with that building. Your committee do not feel very proud of its present appearance and condition; we have previously asked your honorable Board for instructions concerning it; have no definite answer in view of all the facts, and would ask from the Board further instructions as to its final disposal. In its present condition we consider it unsafe for occupancy and unsightly to the grounds.

The trees and plants set out last spring have generally lived and made a good growth.

All of which is respectfully submitted.

D. GARDNER,
ALEXANDER McLEAN,
Committee.

Mr. Scott made the following report from committee on Uniforms:

To the Honorable Board of Trustees:

Your committee would report that after having received bids and propositions from various firms, they have decided to accept the bid of Sweitzer and Woody, and recommend that the students make their purchases of suits of said firm.

E. COBB,
J. R. SCOTT,
D. GARDNER,
Committee.

The following report, from a special committee on Department of Domestic Science, was received and adopted:

To the Honorable Board of Trustees:

The undersigned, a special committee appointed at your last meeting, relative to the School of Domestic Science, would respectfully report:

That we are not sufficiently advised as to details necessary in this department to justify us in recommending any particular course of action.

We would, therefore, recommend that the matter be referred to the Regent and Faculty, to fully ascertain the wants of this department and to recommend such plan as they may deem advisable to the Executive Committee, in a reasonable time, and that this committee, after such report is made to them, are hereby authorized to take such action as they think proper, with a view to advance the interests of the Institution, and make such recommendations as they may see proper to the next meeting of this Board.

ALEXANDER McLEAN.
D. GARDNER,
S. W. SHATTUCK,
Committee.

Mr. McLean offered the following resolution, which was adopted:

Resolved, That the communication to this Board from Dr. F. W. Prentice be placed on file, and that this Board hereby express their high appreciation of his services in this valuable department of science, but under the present condition of the finances of his University it would be difficult to provide for an advance in salary at present, but recommend that at the earliest practicable moment the salary of Prof. Prentice be increased in accordance with the importance of his department.

The Auditing Committee submitted the following report:

To the Honorable Board of Trustees:

The undersigned, a special committee to audit accounts and vouchers as reported by Business Agent, for the quarter ending August 31, 1880, would respectfully report that we have examined the same from voucher No. 584 to No. 748 both inclusive, making an aggregate of $14,705 21, and find the same correct, each voucher being accompanied by receipted bills, for which warrants were issued.

Respectfully submitted.

T. T. FOUNTAIN,
ALEXANDER McLEAN,
Committee.

The following resolution was offered and carried:

Resolved, That the Regent and Executive Committee be and are hereby authorized to prepare a report to the Governor of the State and such other persons as they may deem advisable—in which report the necessary appropriations for the years 1881 and 1882 be fixed, and that in said appropriations to be asked for the committee are requested to name the sum of $10,000 per annum for current expenses of the University; and that the committee also report the to Governor and Legislature the condition of the old Dormitory building, and ask that the building be disposed of, or converted into such new building as may be most needed.

Mr. McLean made the following motion:

Resolved, That the salary of Head Farmer Lawrence be continued until the first day of March, 1881, at the present rate; and further, that the said Lawrence shall give up possession of the house he now occupies, on the first day of January, 1881, the Farm Committee giving him (Lawrence) at least ten days' notice to that effect.

The motion was carried.

The following preamble and resolutions were offered by Mr. Millard, and adopted:

WHEREAS, Horace H. Morgan, Principal of the High School of St. Louis, Mo,, has generously donated to the University library fifty volumes of British poets; therefore,

Resolved, That the Board of Trustees of the Illinois Industrial University hereby tender to Prof. Morgan its thanks for his generous gift and kind remembrance of the University.

Resolved, That the Secretary is hereby instructed to forward to Prof. Morgan a copy of these resolutions.

Assistant Professor M. A. Scovell was given the title of Professor of Agricultural Chemistry.

A communication from Mr. E. L. Hill was referred to Prof. Morrow for report.

Adjourned.

EMORY COBB, *President.*

E. SNYDER, *Secretary.*

MEETING OF EXECUTIVE COMMITTEE, JUNE 17, 1879.

The Executive Committee (with Mr. McLean added) met at the University parlor on the 17th of June, 1879, at 9:30 A. M.

Present—Messrs. Cobb, Gardner, Scott and McLean.

The following appropriations were made:

For bill of Mr. Mulliken, for instruction of University band	$10
" preparation of specimens for cabinets	12
" increase of water supply for greenhouse	45
" changes in Physical Laboratory and Lecture Room	350
" additional forges for shop practice classes	75
" inspirator for boiler at the shops	30
" repairs of engine at mechanical shops	125
" additional desks, and specimen case in Chemical Laboratory	450
" building, as per plans of Prof. Ricker, Architect	1,000
" new boiler and repairs of pipes, coils, etc	2,000
" changes in ventilation, as planned and approved by Architects Willet and Ricker	2,000
" purchase of new pumps for heating apparatus	150
" additional room for foundry	150

The question of employment of janitors was referred to a committee consisting of Messrs. Gardner, Scott and Business Agent; the matter of continuing the use of old Dormitory was also referred to them.

It was voted that the machinery and the heating apparatus of the University be placed under the charge and control of the Mechanical Department.

The employment of laborers for the shops was referred to the Business Agent, and Professors Ricker and Peabody, as a committee.

It was resolved that the Executive Committee approve the suggestions made by Prof. Peabody in his report to the Regent, concerning a plan to systematize and improve the course in elementary Shop Practice, and they desire that more fully detailed plans for such purpose be presented to the Board of Trustees.

It was resolved that the thanks of the Board be tendered to the Knowles Steam Pump Co., of Warren, Mass., for their donation of the steam pumps now in use in the Mechanical shops of the University.

Adjourned.

E. SNYDER,
Secretary.

E. COBB,
Chairman.

MEETING OF THE EXECUTIVE COMMITTEE, JANUARY 29, 1880.

The Executive Committee met at the University parlor at 3 o'clock P. M.

Present—Messrs. Cobb, Gardner and Scott.

It was moved and carried that the resignation of Professor Selim H. Peabody be accepted.

It was resolved that the Regent and Business Agent be authorized to employ such students assistants as may be necessary to provide for instruction in Engineering and Physical Laboratory during the remainder of this term.

Adjourned.

E. SNYDER,
Secretary.

E. COBB,
Chairman.

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