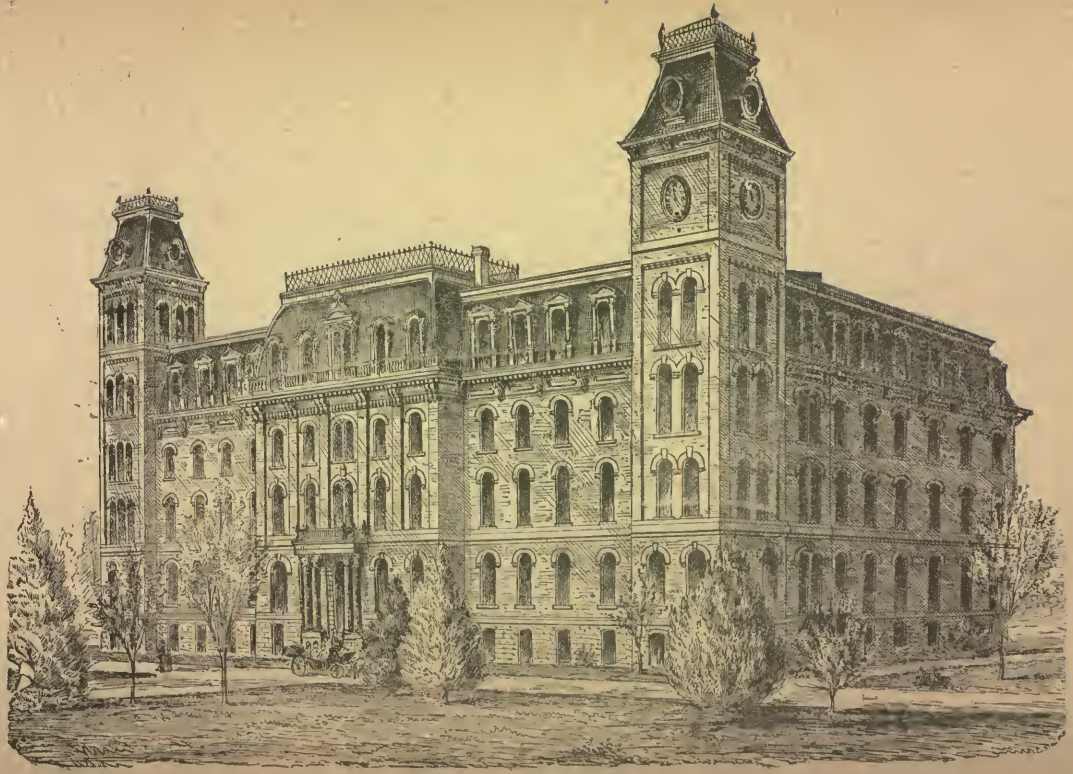

FOURTEENTH REPORT

(Seven annual, seven biennial.)

OF THE

BOARD OF TRUSTEES

OF THE

UNIVERSITY OF ILLINOIS

URBANA, CHAMPAIGN COUNTY, ILLINOIS.

FOR THE TWO YEARS ENDING SEPTEMBER 30,

1888.

SPRINGFIELD, ILL.:
SPRINGFIELD PRINTING CO., STATE PRINTERS
1889.

UNIVERSITY OF ILLINOIS,
URBANA, Nov. 1, 1888.

Honorable RICHARD J. OGLESBY, *Governor of Illinois:*

SIR: I have the honor to submit to you herewith, in compliance with the law, the fourteenth report of the Trustees of the University of Illinois, for the two years ending September 30, 1888.

I am, very respectfully, your obedient servant,

WILLIAM L. PILLSBURY,
Corresponding Secretary.

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BOARD OF TRUSTEES.

UNDER LAW OF JUNE 16, 1887.

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HON. RICHARD J. OGLESBY, *Governor of the State of Illinois.*
SAMUEL DYSART, *President State Board of Agriculture.*
HON. RICHARD EDWARDS, *Superintendent of Public Instruction.*

TERM EXPIRES 1889.

FRANCIS M. McKAY, CHICAGO.
ALEXANDER McLEAN, MACOMB.
GEORGE C. EISENMAYER, MASCOUTAH.

TERM EXPIRES 1891.

S. M. MILLARD, HIGHLAND PARK.
CHARLES BENNETT, MATTOON.
BURDEN PULLEN, CENTRALIA.

TERM EXPIRES 1893.

EMORY COBB, KANKAKEE.
GEORGE R. SHAWHAN, URBANA.
W. W. CLEMENS, MARION.

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PROF. S. W. SHATTUCK, BUSINESS AGENT.

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EMORY COBB.
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Professor of Botany and Horticulture, and Vice-President.

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

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Professor of English Language and Literature.

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

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

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Professor of Agriculture.

PETER ROOS,
Professor of Industrial Art and Designing.

IRA O. BAKER, C. E.,
Professor of Civil Engineering.

WILLIAM McMURTRIE, E. M., PH. D.,
Professor of Chemistry and Mineralogy.

STEPHEN A. FORBES, PH. D.,
Professor of Entomology and Zoölogy.

THEODORE B. COMSTOCK, SC. D.,
Professor of Mining Engineering.

JAMES H. BROWNLEE, M. A.,
Professor of Rhetoric and Oratory.

CHARLES W. ROLFE, M. S.,
Professor of Geology.

DONALD McINTOSH, D. V. S.,
Professor of Veterinary Science.

REV. NATHANIEL BUTLER, JR., M. A.,
Professor of Latin.

ARTHUR T. WOODS,
Professor of Mechanical Engineering.

*HERBERT H. SARGENT,
Second Lieutenant, Second Cavalry, U. S. A.,
Professor of Military Science and Tactics.

†CURTIS B. HOPPIN,
First Lieutenant, Second Cavalry, U. S. A.,
Professor of Military Science and Tactics.

ARTHUR N. TALBOT, C. E.,
Assistant Professor of Engineering and Mathematics.

WILLIAM H. GARMAN,
Assistant Professor of Zoölogy.

EDWIN A. KIMBALL,
Instructor in Iron-work, and Foreman.

GEORGE W. PARKER,
Instructor in Wood-work, and Foreman.

*SAMUEL W. STRATTON, B. S.,
Instructor in Mathematics.

†CHARLES E. EGGERT, PH. B.,
Instructor in Modern Languages.

EMANUEL R. BOYER,
Instructor in Mathematics.

*MAUD KIMBALL,
Teacher of Vocal and Instrumental Music.

†ANNA E. MALONEY,
Teacher of Vocal and Instrumental Music.

ARTHUR W. PALMER, SC. D.,
First Assistant in Chemical Laboratory.

*CHARLES B. GREENE, E. M.,
Second Assistant in Chemical Laboratory.

†BEDROS TATARIAN, B. S.,
Second Assistant in Chemical Laboratory.

THOMAS F. HUNT, B. S.,
Assistant in Agriculture.

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*1885-6. †1886-7.

STATE LABORATORY OF NATURAL HISTORY.

STEPHEN A. FORBES, PH. D., Director and State Entomologist.
THOMAS J. BURRILL, PH. D., Botanist.
WILLIAM H. GARMAN, First Assistant.
*CLARENCE M. WEED, M. S., Entomological Assistant.
CHARLES F. HART, Assistant.
†JOHN MARTEN, Entomological Assistant.
MARY J. SNYDER, Stenographer.
‡CORA M. MALTBY, Librarian.
MERTON B. WAITE, B. S., Botanical Assistant.

AGRICULTURAL EXPERIMENT STATION.

Board of Direction.

SELIM H. PEABODY, PH. D., President.
E. E. CHESTER, Champaign, of State Board of Agriculture.
J. T. JOHNSON, Warsaw, of State Horticultural Society.
H. B. GURLER, DeKalb, of State Dairymen's Association.
EMORY COBB, Kankakee, of Board of Trustees.
BURDEN PULLEN, Centralia, of Board of Trustees.
PROFESSOR GEORGE E. MORROW, M. A., Agriculturist.
PROFESSOR T. J. BURRILL, PH. D., Horticulturist and Botanist.
PROFESSOR WILLIAM McMURTRIE, PH. D., Chemist.

THOMAS F. HUNT, B. S., Assistant Agriculturist.
GEORGE W. McCLUER, B. S., Assistant Horticulturist.
ALBERT G. MANNS, PH. D., First Assistant Chemist.
HARRY S. GRINDLEY, B. S., Second Assistant Chemist.

WILLIAM L. PILLSBURY, Secretary.

*Till March 31, 1888. †From June 1, 1888. ‡For 1886-7.

SUMMARY OF STUDENTS.

By Classes.	1886-7.			1887-8.		
	Gentlemen...	Ladies..	Total...	Gentlemen...	Ladies..	Total...
Resident graduates	.....	.....	.....	3	2	5
Seniors	34	4	38	31	10	41
Juniors	28	8	36	31	10	41
Sophomores	52	14	66	59	11	70
Freshmen	73	15	88	77	12	89
Preparatory	83	9	91	89	14	103
Special	20	4	24	15	13	28
Total	289	54	343	305	72	377
By Courses.						
Agriculture	29	.....	29	23	.....	23
Mechanical engineering	65	.....	65	57	.....	57
Civil engineering	45	.....	45	53	.....	53
Mining engineering	4	.....	4	4	.....	4
Architecture	27	1	28	44	2	46
Chemistry	23	2	25	15	.....	15
Natural history	19	2	21	20	14	34
Art and design	1	4	5	1	13	14
English and modern languages	48	36	84	46	39	85
Ancient languages	4	2	6	6	2	8
Not specified	24	7	31	37	2	39
Total	289	54	343	305	72	377

The total number of matriculated students to June, 1888, is 2,231. The whole number of graduates is 545.

ABSTRACT OF OCCUPATIONS OF GRADUATES.

	Gentlemen.	Ladies.	Total.
Farmers	51	.....	51
Civil engineers	50	.....	50
Machinists	22	.....	22
Mining engineers	3	.....	3
Architects	14	1	15
Manufacturers	6	.....	6
Druggists and chemists	23	.....	23
Mercantile pursuits	44	1	45
Teachers	32	30	62
Clergymen	2	.....	2
Lawyers	47	.....	47
Physicians	20	1	21
Editors	8	.....	8
Miscellaneous	52	4	56
Not specified	44	.....	44
Women married	.....	48	48
Women at home	.....	25	25
Died	13	4	17
Total	431	114	545

PROCEEDINGS

OF THE

BOARD OF TRUSTEES

OF THE

UNIVERSITY OF ILLINOIS.

FOR THE YEAR ENDING AUGUST 31, 1887.

MEETING OF SEPTEMBER 14, 1886.

The Board met at the University parlor on Tuesday, September 14, at 3 o'clock P. M.

Present—Trustees Bennett, Earle, Eisenmayer, McLean, Millard and Pearman.

Absent—Governor Oglesby, Hon. John Landrigan, Trustees Cobb, Follansbee and Paden.

The minutes of last meeting were read and approved.

The Regent read his quarterly report, which was received for further consideration:

To the Trustees of the University of Illinois:

GENTLEMEN: The indications of the months that have passed since your last meeting have all been favorable for the prosperity of the University, and point to a very decided increase in its membership. Wherever I go in the State I meet fresh evidence that the work of the University is gaining favorable appreciation for its strength and quality, and that the only real foundation for substantial growth is being successfully laid.

I regret to report that Miss Kittie M. Baker, who has for some years so satisfactorily taught and illustrated music in the University, has resigned her position. I have to recommend that Miss M. Kimball, formerly one of our students, and a pupil of Miss Baker, and for some time a student at the Boston Conservatory of Music, be appointed to the vacancy.

Miss Helen M. Gregory declines the reappointment to be instructor in French. I desire to nominate for this work Mr. C. E. Eggert, B. A., a graduate of the University of Iowa. He has taught in that institution, is strongly recommended by its president, and I think will be found a useful and competent teacher.

The U. S. War Department has detailed to be instructor of military tactics at this place, Second Lieut. H. Sargent, 2d Cavalry, and he has reported for duty.

Mr. D. H. Barrett, who was appointed second assistant in the chemical laboratory, has resigned to take employment as chemist with the New York, Lake Erie and Western Railway. I ask authority to employ a proper person in his place.

I have to report on the repairs and improvements ordered to be made during the vacation, as follows:

The change of stairways at the chemical laboratory is not yet completed; the stone work is done, but the wood work is not yet in place.

The iron ventilating tubes, connecting the class rooms of each floor with the main ventilating shafts, are in place, and the plastering has been replaced in the halls. The work in the main shafts is not yet finished.

The veranda floor in the south court of main building has been relaid and painted, at cost of $78.19. The sum appropriated was $125. A little work on the brick foundation remains to be done.

The repairs on the room in the basement, to fit it for Prof. Burrill's use, are nearly completed, and will be finished within the appropriation of $150.

The blinds in zoölogical laboratory have been placed for the sum appropriated, $100.

The iron railing for balcony in library and stairs leading thereto, are finished. Cost $141.65; appropriation, $150.

The vacation gives the only time available for overhauling and refitting the boilers for heating the main building. They were found to be in worse condition than was expected, and repairs were made and new tubes put in place, costing $193.65, for which an appropriation is asked.

I ask an appropriation of $30 for repair of band instruments and for purchase of new music for the band.

I ask that the usual committee be authorized to purchase books and publications, using the State appropriation of $1,500 as follows:

For binding, not to exceed $200.

For periodicals, not to exceed $300.

For purchase of new books the balance of the appropriation.

I recommend the following use of the State appropriation for cabinets:

For case of drawers in Prof. Rolfe's room to contain duplicate specimens of geology, $50.

For additional work on the herbarium, $100.

And that the Regent and the Curator of the Museum have authority to expend the balance of the appropriation for such objects of natural history as may be found desirable.

I have not found opportunity to visit and inspect the University's lands in Minnesota as requested by you at your last meeting. If you still desire that service, the appropriations therefor for expenses should be renewed.

Respectfully submitted,

S. H. PEABODY.

Professor Morrow submitted his report, which was received and ordered on file:

UNIVERSITY, CHAMPAIGN, Ill., September, 1886.

Dr. S. H. Peabody, Regent:

During the last three months operations on the University farms have progressed satisfactorily, with slight exceptions. While more rain would have been desirable, the weather has been fairly favorable for the crops, and unusually so for work.

The hay crop was an average one in yield, and except a few tons was secured in good condition, amounting to about 225 tons.

The oats crop, although somewhat injured by wind storms, gave over 45 bushels per acre by "machine measure," the crop aggregating a little over 1,600 bushels.

The trial plats of wheat gave good yields.

The corn crop promises to be fully equal to that of last year, is in good condition and more than usually well matured.

The pastures have kept in good condition, notwithstanding the dry weather.

The public sale of Shorthorn cattle, in June last, was largely attended and the prices were moderately satisfactory. The aggregate of sales was a little over $2,500 (most purchasers giving notes). The pure bred cattle gave an average price of $84.28. We are now feeding thirty-six young steers and two or three cows for sale this fall.

An excellent Shorthorn bull, of the Rose of Sharon family, has been purchased. A bull calf from one of the Holstein-Friesian cows recently purchased, has been exchanged for a well-bred yearling bull of that breed.

During the present week we expect to sow about thirty acres to wheat in further trial of a considerable number of varieties. The land will also be seeded to timothy.

At the recent county fair specimens of our cattle of various breeds, and of varieties of corn, small grains and grasses were exhibited.

The trial of ditching machines in June last on the University farms, under the auspices of the State Board of Agriculture, was a gratifying success in many ways.

Of the appropriation of $1,600 made for purchase of cattle, there has been expended:

For two Hereford cows and a calf, $700; for two Holstein-Friesian cows and calf, $330; for 18 two-year-old steers, $540; a total of $1,570. The freight charges are not included in this, and will bring the total to within a few dollars of the amount specified.

The receipts from the farm during the three months have aggregated $2,061.76.

These have been divided as follows: Cattle, $1,525.05; hay, $355.57; pasture, $46.45; butter and milk, $24.33; sheep, $18.71; payment by Messrs. Clark and Chester of sale expenses, $48.00; corn, $20.35; miscellaneous, $23.60.

The expenditures for the three months have been $3,343.63.

These have been as follows: Pay roll, $752.11; cattle, $1,704.55; spring wagon and harness, $150.00; farm wagon, $50; mower, $70; lumber, $95.65; feed, $49.49; timothy, clover and millet seed, $44.83; ditching, $26.95; sale expenses and other advertising, $230.95; students' labor, freights and miscellaneous, $290.37.

Respectfully submitted,

G. E. MORROW, Professor of Agriculture.

The report of Professor Burrill was submitted and received:

UNIVERSITY OF ILLINOIS, September 14, 1886.

Dr. S. H. Peabody, Regent:

SIR—I respectfully submit the following account of work, etc., in the horticultural department for the past season. A full report of the forest tree plantation and of the experimental orchard is in preparation, and I beg leave to embody these in the report of the Board of Trustees, to be soon presented for publication.

The year has been fairly favorable for our crops and plants. In most instances good growth was made. There has been comparatively small loss from injurious climatic effects and diseases and injuries from insects, parasitic fungi, etc., have been less than the average.

SMALL FRUITS.

The strawberry crop was not large on account of the limited growth of the plants last season, but was considered fair and proportionally larger than the market prices. This fruit has never sold so low in our local markets as during the last two seasons. For a part of the time the returns barely covered the expenses of picking and marketing, and the same report came from growers throughout our own and neighboring States. Still the strawberry with us clearly keeps the lead as a profitable small fruit crop. Though the receipts are small, the final balance is upon the proper side of the account. New plantations have been made rather exceeding the old ones plowed up.

Tests were again made upon the alleged effects upon the pulp of the fruit itself of cross fertilization. It will be remembered that report was made last year that no visible difference could be detected in the size, form or color of the berry on account of the pollen used in fertilization. This was from trials upon the pistillate variety, Crescent seedling, in the open air, planted side by side of different hermaphrodite sorts and at a distance from other kinds. This season this mode of experimentation was again tried with the same results. The Crescent produced by the side of Sharpless—a very large, irregular fruit—could not be distinguished, when examined in quart boxes, from those gathered near a wild variety with very small berries totally unlike the former. But it may be justly asserted that foreign pollen carried by the air might interfere with this test. The two rows used in this experiment were 20 to 30 rods from any others and southward, hence on the side from which the prevailing winds came. The Crescent row was continuous; that containing the fertilizing plants was broken between each kind by a space of two or more rods.

But to test more carefully the matter, cross fertilizations were practiced by carefully applying pollen from special kinds by hand and then covering the trusses with manilla-paper bags. Here again Crescents were used as the pistillate plants, but care was observed to remove any rudiments of stamens which existed. The number of these crosses were not large, but apparently successful results attended the trials of three very distinct kinds. When the time for fertilization was passed, the bags were removed and the fruit matured under natural conditions. No difference could be made out in the fruit, by the closest inspection possible. The "seeds" as seen from the outside appeared all alike. Unfortunately, we did not think soon enough to remove these and more critically examine them. Afterward an examination of the "seed" of several varieties showed them to be exceedingly different in size and shape. A collection of a dozen or more kinds of these was preserved for further use. In this connection I may mention some artificial crosses made upon the wild crab apple, with pollen from cultivated kinds of apple, the practice being like that just described for the strawberry. These crab fruits preserved exactly their usual appearance. The seeds are preserved for growth next spring.

Blackberries and raspberries produced good crops. Further studies have been made upon the so-called "orange rust" affecting both these kinds of fruits. The attempt made to propagate the disease by sowing spores of the fungus suspected of being the alternate or winter-surviving form of that causing so much damage in June was not successful. Plants were grown in the greenhouse for this purpose with a view of artificially starting if possible the disease before the spores became disseminated in the outer air. It is positive that spores of some kind do germinate on the new leaves in spring time and produce the disease. The latter is not hereditary as supposed in the plant. Only the leaves and succulent stems are affected. The spores produced so abundantly in June do not live beyond a few days after maturity. There must be some alternating form not yet positively identified. But continued observations more and more confirm the idea that this alternate form is found upon the same plants late in the season and is known as *Puccinia Peckiana*—a very different

appearing fungus from that of the orange rust, but almost certainly the same in disguise. It was the spores of this Puccinia which we tried to grow on the leaves of the greenhouse plants. Evidently some essential condition was wanting. We, however, know enough of the disease to be certain that in isolated fields it can be kept down by carefully removing the affected plants before the spores are disseminated. The task would doubtless be easier if our knowledge was complete as to the life history of the parasite. This we still hope to find out.

Of a considerable number of kinds of grapes fruited this season, Moore's early deserves special mention as exceedingly vigorous and productive. The fine appearance of the fruit and the earliness of ripening make it very desirable for our markets. This year the berries were ripe the first and second weeks in August—three weeks before Concord. Champion also proves to be an excellent early variety. Perkins did well, but the vine is more subject to mildew than many others—not so much so as the similar variety, Willis. Concords were sold in our local markets at 1½ cents per pound—too low for profit even with fine crops. Those varieties that mature at a different season stand a chance of selling for better prices, hence the importance of kinds like Moore's early and Worden. The black rot attacked some of the grape berries in June but otherwise the fruit has been remarkably clean and good.

Numerous seedling strawberries and raspberries have been grown with the hope of getting something of importance in this interesting and profitable but well-worked line of experimentation.

ORNAMENTAL GROUNDS.

The appearance of the lawn has been greatly damaged this year by the white grubs, the larvæ of what is known as the May beetle. Many attribute the withered condition of the grass to the dry weather, but it is certain that without the grubs the grass would now be green and healthy. These insects are said to live three years in the larval state and do the most damage the third summer. Besides the nearly matured grubs now in the sward, we find young ones evidently from eggs of this season, but none of last year's brood. We may therefore expect to be practically free from injury next year, but not the season following, unless the young brood is by some means exterminated. Professor Forbes experimented in several ways in killing the grubs and it was found that an emulsion of kerosene oil could be graduated in strength so as to kill them without injury to the grass, but upon practical trial it proved that the expense was much too great for ordinary use. Many of them can be killed by pounding the surface, but rolling with a heavy field roller is unavailing. It is thought that some mechanical device can be arranged for killing the worm, but so far this has not been practically attained. In the meantime the birds—especially robins—are greatly aiding in the extermination of the pests. They appear to know in some way where an insect lies, and vigorously pick a hole in the sod to gain access to the coveted prize. Scores of grubs have been destroyed during the course of a half hour while the birds were watched at this work.

The report of the Business Agent will show that there has been paid for the care of the lawn, the roads and walks, etc., $148.70. To this should be added the services of Mr. McCluer, as foreman, who managed the labor and gave a considerable portion of his own time. The amount allowed at the March meeting for this entire work was $300. The flower beds have been kept in good order and now show for themselves. There has been no additional expense upon these, the labor being accounted for above and the plants furnished by the greenhouse.

The new lots upon the east have been cleaned and broken up, and the soil partially prepared for seeding. For this work twenty dollars were appropriated. Only six of this is expended so far, as the accounts of the Business Agent show, but about ten dollars more is due to the departments of agriculture and horticulture for labor not yet charged over. For the general grounds and finishing the preparation of this new land, I estimate that it will require for the next six months an expenditure of about sixty dollars.

The new fence between the University grounds and Mr. Bronson's lot was built within the amount assigned for it.

To enable the horticultural department to meet the demands of the next six months, a sum equal to that paid the foreman will be required beyond the expected income, or three hundred and thirty dollars. It is believed that the expense for fuel at the greenhouse and the cost of the necessary labor of the department can be met from receipts.

Respectfully submitted,

T. J. BURRILL.

The committee on Nebraska lands submitted the following report:

To the Trustees of the University of Illinois:

Your committee intrusted with the sale of the University lands in Nebraska, respectfully reports:

Since the last report the sales have been:

No.	Name.	Tract.	Price.	Cash.
47	Matej Hubka	S.E. 12 2 8	$2,240 00	$560 00
48	James K. Cullen	S.E. 34 3 8	2,000 00	1,040 00
49	Vensl Hnizda	S.W. 34 3 8	2,240 00	560 00
50	Bowman T. Hnizda	N.E. 26 3 8	2,000 00	500 00
51	James Sknbal and James W. Hnizda	S.E. 13 3 8	2,000 00	500 00
52	James W. Hnizda	N.E. 13 3 8	2,000 00	800 00
53	Edward R. Fogg	S.W. 13 3 8	2,000 00	500 00
	Totals		$14,480 00	$4,460 00
	Before reported		93,271 37	23,317 84
	Total sales to date		$107,751 37	$27,777 84

Seven quarter sections remain unsold.

Respectfully submitted.

S. H. PEABODY, C. W. BENNETT, } Committee.

URBANA, September 14, 1886.

The Business Agent submitted the following statements accompanied by vouchers and lists of warrants; the same were referred to the Auditing Committee:

CURRENT APPROPRIATIONS.

March 1, 1886—August 31, 1886.	Appropriated	Receipts also appropriated	Expended.	Balance.
Board expense	$300 00		$266 28	$33 72
Salaries for instruction { Current / State... }	18,385 00		15,379 80 / 2,354 93	650 27
Salaries for services	1,215 00		1,215 00	
Buildings and grounds	300 00	$86 00	263 80	123 20
Fuel and lights	1,000 00	34 78	1,014 28	20 50
Stationery and printing	1,300 00	145 00	1,279 24	65 76
Nebraska lands	256 33	175 60	231 83	209 10
Mechanical department	300 00	484 50	465 82	318 68
Architectural department	300 00	1,098 98	1,165 54	233 44
Agricultural department	2,200 00	2,678 06	4,531 31	346 75
Horticultural department	300 00	595 81	895 81	
Military department	68 00	50	64 64	3 36
Laboratories	300 00	475 95	303 70	472 25
Library and apparatus	50 00		48 10	1 90
Incidental expense	308 55	7 00	270 29	45 26
SUNDRIES.				
Gymnasium	15 00			15 00
Cases, etc., zoölogical laboratory	274 51		216 99	57 52
Farmers' institutes	50 00		32 44	17 56
New Orleans Exposition	250 00		250 00	
Architectural drawings	74 50		45 23	29 27
Furniture and fixtures	50 00		10 58	39 42
Griggs farm		125 00	10 00	115 00
Taxes of lots east of University	25 00		18 47	6 53
Publications of bulletin, etc	150 25		35 00	115 25
Commencement expenses	110 00		110 00	
Drawing-room shutters	63 05		63 05	
Architectural cabinet case	50 00		13 62	36 38
Music fees		115 50	115 50	
Preparatory year fees		465 46	490 00	
University students' fees		2,180 00		2,180 00
Illinois Central freight		566 85		

STATE APPROPRIATIONS.

Of July 1, 1885.	Appropriated.	Received.	Expended.	Balance.
Taxes on land (½ per annum)	$4,000 00	$3,433 15	$3,433 15	.....
Buildings and grounds (½ per annum)	6,000 00	6,000 00	4,037 82	$1,962 18
Laboratories (½ per annum)	3,000 00	3,000 00	893 88	2,106 12
Mechanical and archit'ral shops (½ per annum)	3,000 00	3,000 00	1,650 00	1,350 00
Books and publications (½ per annum)	3,000 00	3,000 00	1,500 00	1,500 00
Cabinets (½ per annum)	2,000 00	2,000 00	1,123 26	876 74
Current expense of instruction (½ per annum)	24,000 00	24,000 00	14,354 93	9,645 07
Machines and tools (½ per annum)	4,000 00	4,000 00	2,000 00	2,000 00
Fire walls and ventilation	4,500 00	4,500 00	2,980 82	1,519 18
Laboratory of Natural History	18,000 00	8,260 65	6,986 34	1,274 31
	$71,500 00	$61,193 80	$38,960 20	$22,233 60

A communication from the Champaign and Urbana Water Supply Co. was received and read; it was referred to the Executive Committee and the Regent, with authority to negotiate with said company.

A communication from S. Goodrich was, on motion, referred to the Committee on Buildings and Grounds, for report at the next meeting.

The appointment of Miss Maud Kimball as teacher of music, vice Miss Kittie Baker, resigned, was approved.

The appointment of C. E. Eggert as assistant in modern languages, vice Miss Gregory resigned, was approved.

The Regent was authorized to make an appointment as second assistant in chemical laboratory, vice D. H. Barrett resigned.

The following special appropriations were made:

$30.00 for repair of instruments and for band music.
$200.00 for binding of books and periodicals.
$300.00 for periodicals.
$1,000.00 for purchase of books.
$50.00 for case for geological specimens.
$100.00 for herbarium.
$726.24 for purchase of specimens for cabinets.
$60.00 for seeding and care of grounds.
$100.00 for apparatus for botanical laboratory.
$15.00 for meteorological instruments.
$150.00 for expenses of inspecting and recording lands in Minnesota.

The following report from the Auditing Committee was received and approved:

CHAMPAIGN, ILL., September 14, 1886.

To the Board of Trustees:

Your Auditing Committee would respectfully report that they have found the reports of the Business Agent in proper form and correct, and the vouchers from No. 751 to 1,000, both inclusive, properly receipted, and recommend that the same be approved.

We would recommend, that the list of appropriations submitted by the Business Agent for the next six months be adopted.

We would also recommend, that the following bills be audited and allowed:

Abendroth & Root Mfg. Co., boiler tubes	$193 65
Burnham, Trevett & Mattis, advertising Nebraska lands and commissions	73 50
R. S. Wilbur, hauling benches and seats	18 75
Architectural department, expenses for commencement	37 08

Respectfully submitted,

GEO. C. EISENMAYER.
C. W. BENNETT.

Treasurer J. W. Bunn then read his report, which was received and ordered filed:

JOHN W. BUNN, TREASURER, IN ACCOUNT WITH THE UNIVERSITY OF ILLINOIS.—*Dr.*

1886.				
June	8	To balance		$293 98
	15	" interest on Morgan county bonds		1,750 00
July	1	" " " Champaign county bonds	$5,400 00	
		" " " Pike county bonds	2,100 00	
		" " " Sangamon county bonds	880 00	
		" " " Macoupin county bonds	660 00	
		" " " Chicago water bonds	875 00	
		" " " Kankakee school bonds	240 00	
		" " " Christian county school bonds	250 00	
		" " " Sangamon county school bonds	118 00	
		" " " Litchfield school bonds	275 00	
		" " " Kankakee county bonds	1,500 00	
				12,298 00
		To interest on Kankakee county bonds		900 00
		" " " Pittsfield school bonds		600 00
July	9	Rec'd from State for taxes on lands in Neb. and Minn	1,666 87	
		" " " " for buildings and grounds	3,000 00	
		" " " " laboratories	1,500 00	
		" " " " books and publications	1,500 00	
		" " " " educational work in machine shops	1,500 00	
		" " " " specimens for cabinet	1,000 00	
		" " " " expenses of instruction	12,000 00	
		" " " " tools and machines	2,000 00	
				24,166 87
August	30	Rec'd from State for State Laboratory of Natural History		1,050 00
		" on account building and grounds	25 00	
		" " fuel and light	34 78	
		" " stationery and printing	145 00	
		" " Nebraska lands	175 60	
		" " mechanical department	424 50	
		" " architectural department	1,022 67	
		" " agricultural department	2,061 76	
		" " horticultural department	367 31	
		" " military department	50	
		" " laboratories	325 95	
		" " incidentals	7 00	
		" " music fees	18 50	
		" " preparatory year	10 00	
		" " University fees	80 00	
		" " Illinois Central freight donation	566 85	
				5,265 42
		Total		$46,324 27

Cr.

August	11	By amount paid on account board expense	$112 77	
		" " " salaries	6,186 26	
		" " " building and grounds	166 60	
		" " " fuel and lights	771 88	
		" " " stationery and printing	1,158 34	
		" " " preparatory year	130 00	
		" " " Nebraska lands	29 00	
		" " " mechanical department	222 27	
		" " " architectural department	960 56	
		" " " agricultural department	3,343 63	
		" " " horticultural department	556 22	
		" " " military department	13 22	
		" " " laboratories	171 92	
		" " " library and apparatus	40 25	
		" " " incidental expense	190 54	
				14,053 46

Treasurer's Report—*Continued.*

1886.		*Cr.*		
August	30	By amount paid on account commencement expenses	$110 00	
		" " " drawing-room shutters	63 05	
		" " " furniture and fixtures	10 58	
		" " " New Orleans Exposition	16 35	
		" " " bulletins	35 00	
		" " " music fees	18 50	
		" " " zoölogical laboratory cases	216 49	
		" " " architectural drawings	45 23	
		" " " architectural cabinet case	13 62	
				$528 82
		By amount paid on account taxes on lands in Neb. and Minn.	1,666 87	
		" " " buildings and grounds	1,037 82	
		" " " mechanical & architectural shops	442 00	
		" " " books and publications	297 25	
		" " " laboratories	97 33	
		" " " cabinets	481 37	
		" " " machinist tools	7 70	
		" " " expenses of instruction	2,354 93	
		" " " fire walls and ventilators	851 12	
		" " " Laboratory of Natural History	1,624 18	
				8,860 57
		Total		$23,442 85
		Balance		22,881 42
				$46 324 27

JOHN W. BUNN, Treasurer.

URBANA, September 14, 1886.

The following appropriations were made from current funds for the six months ending February 28, 1887:

Salaries for instruction	$19,914 00	
" " services	1,650 00	
Board expenses	300 00	
Fuel and lights	2,000 00	
Stationery and printing	350 00	
Library apparatus	50 00	
Incidentals	200 00	
Military department	50 00	
		$24,514 00
Laboratories	$200 00	
Mechanical department	200 00	
Architectural "	200 00	
Agricultural "	400 00	
Horticultural "	400 00	
		1,400 00
Sundries—		
Furniture and fixtures	$25 00	
Architectural drawings, balance	29 27	
Architectural cabinet case, balance	36 38	
		90 65
Total		$26,004 65

The following motion by Trustee McLean was carried:

Resolved, That the President and Secretary be directed to draw their requisition upon the State Auditor for the several sums of money appropriated by the General Assembly for the use of the State Laboratory of Natural History and the State Entomologist's office for the quarter ending December 31, 1886.

For the field work and incidental expense of the Laboratory the sum of one hundred and fifty dollars.

For the traveling, office, and the incidental expenses of the Entomologist the sum of one hundred and fifty dollars.

For improvement of the library the sum of two hundred and fifty dollars.

For the pay of the entomological assistant the sum of two hundred and fifty dollars.

For the pay of the botanical assistant the sum of two hundred and fifty dollars.

For miscellaneous assistance the sum of five hundred dollars.

For the publication of bulletins the sum of one hundred and fifty dollars.

For the preparation and publication of the second volume of the report upon the zoölogy of the State the sum of fifteen hundred dollars.

The Board then took a recess until 8 o'clock p. m.

EVENING SESSION.

The Board assembled at the hour appointed.

The account of Treasurer Bunn of money paid for premiums on bonds and for taxes, amounting to $173.50, was audited and allowed, and a warrant ordered to be drawn.

The renting of the Griggs farm was referred to the Farm Committee with power to act.

The following resolution introduced by Trustee Bennett was adopted:

Resolved, That the Regent of the University is hereby authorized to accept on behalf of the University such donations as will be useful to the University either for instruction or experiment,—and that he make proper acknowledgement of the same.

On motion the Board adjourned, to meet at Chicago in the office of the President, No. 115 Dearborn street, Tuesday, the 9th of November, 1886, at 10 o'clock a. m.

E. SNYDER,
Secretary.

S. M. MILLARD,
President.

ADJOURNED MEETING, CHICAGO, NOVEMBER 9, 1886.

The Board met pursuant to adjournment at the office of S. M. Millard, Esq., 115 Dearborn street, Chicago, November 9th, at 10 a. m.

Present—Trustees Bennett, Cobb, Earle, Eisenmayer, McLean, Millard, Pearman, and Paden.

Absent—Governor Oglesby and Mr. Landrigan.

The Secretary being absent, Mr. McLean was appointed Secretary *pro tempore*.

The minutes of last meeting were read and approved.

Mr. Francis M. McKay of Chicago presented his commission from the Governor, appointing him a member of this Board, *vice* Trustee Follansbee, resigned, was duly sworn and took his seat.

The Hon. Samuel Dysart, acting President of the State Board of Agriculture, was present and invited the Trustees to attend the opening meeting of the Exhibition given by the Board of Agriculture in the evening; the invitation was duly accepted.

The regular order of business, being the discussion of the appropriations to be asked of the coming legislature for the years 1887 and 1888, was taken up and considered at length. On motion of Mr. Eisenmayer, a committee of three was appointed to present an estimate of appropriations to be asked for the ensuing two years, to report at the next regular meeting. The President of the Board, Mr. Millard, Regent Peabody, and Mr. Bennett were appointed as this committee.

On motion of Mr. Earle a committee consisting of the Regent and Messrs. Cobb, Bennett, Millard, and Earle were appointed to report at the next regular meeting plans and estimates for constructing and operating a Ladies' Hall and Boarding House, to accommodate not less than one hundred students; also plans and estimates for constructing a Men's Dormitory, to accommodate not less than one hundred students.

Adjourned to half past two in the afternoon.

Afternoon Session.

Present—Messrs. Bennett, Cobb, Eisenmayer, McLean, McKay Pearman and Paden. Mr. Bennett in the chair.

The Regent presented the following report upon his examination of the lands in Minnesota owned by the University.

REPORT ON MINNESOTA LANDS.

To the Trustees of the University of Illinois:

Gentlemen—Pursuant to your instructions, since the last meeting I have visited the lands held by the University in the counties of Pope, Renville, and Kandiyohi, in Minnesota. I personally identified and examined all but twelve of the one hundred quarter sections. These twelve lay somewhat remote from the others, and I did not think the visit to them required at this time.

The lands are all prairie, generally smooth, and with perhaps half a dozen exceptions, the selections are as good as that section of the country will afford. The soil is a light, friable loam, not usually very deep, but easy to cultivate, and quick to come forward in the spring. The cultivated farms in the vicinity show excellent crops of small grain harvested during the present season, the common yield having been 20 bushels of wheat, and 35 to 40 of oats to the acre. Little corn is seen, and that little is not specially valuable.

The lands may be described in two groups. The first group lies in the township of Bangor and Lake Johanna, in Pope county, from 9 to 18 miles distant from Glenwood, the county seat. A new railway, the Minneapolis and Pacific, has been graded and ironed, and is now about ready for traffic, running through Pope county, from Minneapolis, about 140 miles westward. It forms part of the "Washburn System" of roads, and will be extended far west into Dakota. Its eastern connections are under counstruction, via Northern Wisconsin and the Sault Ste. Marie, to join the Canadian system of railways. Its construction and equipment appears to be first-class, and it will evidently be an important factor in the Minnesota railway system.

This road passes through Bangor township, cuts two of our quarter sections diagonally, and brings all our tracts in that township within one to four miles of its stations. The tracts in the next township are only a little farther away, but none are more than six miles from a station. The Little Falls branch of the Northern Pacific Railway passes about twelve miles from the nearest of our lands, on the north. The next nearest railway is one of the Manitoba lines, about 30 miles away to the south.

A road is projected, and may be built, which will come very near to, if it does not touch, some of the western pieces of this group of our lands. This road, if built, will be part of a system running southwestwardly from Duluth.

The north part of Bangor township is well settled, and shows a good many fine farms. Much railroad land is yet for sale in this vicinity at prices ranging from $5 to $9 per acre. Some choice pieces would probably bring $10, but the most of our lands would not now bring more than $6 per acre. The building of the new road has already added to the value of the lands, and its effect will be more marked when the road comes to be actively operated.

I am of the opinion that the present is not a favorable time to attempt to sell these Pope county lands; but I think the time will come in the near future, after the roads have brought the people to view this country, and especially if the price of wheat should materially advance, when the property

may be offered for sale, and be disposed of at good prices. From being the least desirable of the Minnesota lands, these lands have now become the most promising. I believe the present policy is to wait for developments.

The other group of lands, about 9,000 acres, is about equally distributed on either side of the line which separates Renville and Kandiyohi counties. These lands may be reached from Bird Island, the principal town in Renville county, on the line of the Chicago, Milwaukee and St. Paul Railway, or from Willmar, the county seat of Kandiyohi county, on the southern line of the Manitoba railway. The lands lie about midway between these two lines of road, and are from 10 to 15 miles distant from the nearest stations. There is much talk about projected lines of cross roads which would come nearer to these lands, but none that I could believe worthy of much confidence.

These counties contain a large amount of railroad lands yet unsold. Until this fall there has also been considerable land for sale belonging to the State, but this has within a few weeks been all sold at low prices and on easy terms. Through an agency in Chicago, the railroad companies are sending in actual settlers in considerable numbers. I found a good many new dwellings and new breakings, together with a goodly number of farms of longer standing, along the lines of my travel. The railroad prices are from $4 to $9 per acre; one-third cash, and the balance on long time at 7 per cent. The State had lately sold land at $3 to $5 per acre, most of the price to lie 15 years at 6 per cent.

I think we may have to hold these lands from 5 to 7 years, unless some peculiar change which we can not now foresee should occur. I believe it will pay the University and the State to hold these lands; and that the processes which will give them value are now going forward as rapidly and surely as we can expect.

I found that a second entry had been made upon the S. E. ¼ Sec. 18, 124, 36, and that the land had been transferred under that entry several times. The tract has not been improved. On my return to the University I wrote to the Commissioner of the General Land Office, and have received answer stating that this conflict has already been decided in favor of the University.

You have also heard of a conflict as to the S. E. ¼ Sec. 24, 124, 36. I found that this tract has been transferred under the patent issued to another party in pursuance of an entry subsequent to ours, and that the land is now under improvement. I also found that the S. W. ¼ of the same section has not been entered upon or improved; it is in every respect as good as the S. E. ¼, so that in fact it would be hard to say that one tract is better in any respect than the other. If the Land Office should continue to take the view of the case which was expressed to me by its officers in conversation last spring, the simplest solution would be for the University to accept the S. W. ¼ in lieu of the S. E. ¼, and I would recommend that authority be given to the President of the Board to take such steps as may be necessary to make this transfer, if the Land Office should agree thereto. Otherwise it will remain to be seen whether the Land Office can put the University in possession of the land without resort to legal process in the courts.

I found four cases in which parties were wrongfully occupying or using our land:

1. Peter Olson, a Swede, is on the S. E. ¼ of Sec. 25, 124, 36, in Pope county. He moved his log house upon the land last spring. Has done no breaking. Is old and poor, and will probably not stay if directed to leave.

2. There is breaking on N. W. ¼ 13, 124, 37, by a man living near whom I could not find.

3. August Anderson has built a house and done large amount of breaking on the N. W. ¼ of Sec. 10, 117, 35. I saw him, but could not converse with him very much. He knows that the land is University land, and says that he will buy when it is offered for sale. I have since had a letter of inquiry on his behalf from a person in Willmar. The man has chosen the best 80 acres of the section; went on last spring; has not raised any crop.

4. Peter Hagstrum, a Swede, has broken a considerable part of the S. W. ¼ of the same section. I could not find him. Inquiry among the settlers of the vicinity shows that both Anderson and Hagstrum know very well where they are, but that they have an idea that in equity, if not in law, they will establish a sort of claim to the land, or to a pre-emptive right of purchase, by making actual settlement upon it.

On the day before I left my work in Minnesota I learned a fact concerning some decisions of the Supreme Court of the State which may be cause of a little uneasiness. It is well known that the University, through its treasurer, has paid taxes on all these lands, year by year, and that he or the State Auditor holds receipts for the taxes so paid. I suppose that all parties have rested in the opinion that in these respects the interests of the University were secure. It now appears that the Supreme Court of Minnesota has decided that if for any cause—accident, neglect, collusion or otherwise—the county officers shall have included any of these lands in those offered for sale for delinquent taxes, and the land have been so sold, etc., etc., that the tax title thus acquired is good even against the owner who has paid his taxes regularly, and holds the evidence that he has done so.

Immediately after my arrival at home I wrote to the several registers of deeds, in the three counties, asking them to inform me if any claims of any sort, including tax titles, are now against any of the University lands. I have not yet received any answer, but expect to have full knowledge of the facts to lay before you when you shall next meet.

All which is respectfully submitted,

S. H. PEABODY.

On motion of Mr. Cobb, all matters concerning lands in Minnesota belonging to the University, especially touching the perfection of title to any which may be in question, the leasing, and the general supervision of said lands, were referred to the Regent and Mr. Bennett, now serving as committee on Nebraska lands, with full power to act for the University and to protect its interests in said Minnesota lands.

On motion of Mr. McLean, the committee on Nebraska lands before named, was authorized to make such arrangements as it may deem proper concerning extensions of time of payment of principal sums due from buyers on contracts made by the University for sale of its lands in Nebraska.

The Regent presented the following requests from the Director of the State Laboratory of Natural History, to-wit: That authoriity be given to pay to Professor T. J. Burrill, for services in connection with the Natural History Survey of the State, $100 per quarter for current fiscal year. To pay to Mr. Clarence M. Weed, $55 per month, and to Miss Mary J. Snyder, $50 per month, both for the current quarter. On motion, the request was allowed, and the payments were authorized.

On motion of Mr. Cobb, the subject of asking legislative aid for the State Laboratory of Natural History, was referred to the committee already appointed to report upon appropriations to be asked for the University.

On motion, the Board adjourned until the next regular meeting.

ALEX. MCLEAN, *Secretary Pro Tempore.*

S. M. MILLARD, *President.*

MEETING OF DECEMBER 14, 1886.

The Board met at the University Parlor at 3:30 p. m.

Present—Trustees Bennett, Eisenmayer, McKay, Millard, McLean, and Pearman.

Absent—Governor Oglesby, Trustees Landrigan, Cobb, Earle and Paden.

The minutes of last meeting were read and approved.

The Regent submitted the following report, which was received:

To the Trustees of the University of Illinois,

GENTLEMEN: The term of University work now drawing to a close has been marked with the usual and characteristic good order which has been maintained now for several years. The number of students in attendance is slightly above the average of the last few years. I shall not enter any general discussion of scholastic matters, reserving that until the annual report which is to be made at the next meeting.

The work laid out at the June meeting, in the way of repairs and improvements, has mostly been completed.

The improvements in ventilation have been made as contemplated. Each class-room on the first, second, and third floors of the main building has now its separate ventiduct leading to the open air at the top of the building. The effect thus far has been quite satisfactory. It is probable that some of the rooms should have the ventilation farther improved by opening inlets through which fresh air should be brought at once to the steam heaters. If this is done nothing further can be desired. The coming cold season will aid us to ascertain exactly where this work is needed.

The amount of the State appropriation available for this purpose in June was	$2,370 30
Of this has been used in the placing of ventiducts	1,607 35
Leaving unexpended	$ 762 95

The improvement ordered at the chemical building has been finished as was designed. The stone steps at the south end of the house have been removed; the wall faced up where they stood, and a balcony rail set where there was formerly a landing. The steps have been reset, at the west side, making the main entrance at the first floor, with a basement entrance beneath. A portico has been added, uniform with the portico at the north end of the building. The improvement to the building, both in convenience, and in architectural propriety, is greater even than was anticipated.

The earth has been removed from the base of the building down to the footing stones, and the stone wall thoroughly covered with asphalt, put on hot. The trench was connected with the line of drain tile which surrounds the building, was then filled nearly to the top with coal cinders, and was finally covered with soil. It is believed that this will stop the injury which was caused by the dampness which permeated the foundation walls.

The expense of these improvements has been greater than was estimated.

The cost has been	
For removing and replacing steps, building portico, etc	$568 97
For repairs on foundation	43 08
	$612 05
Against which was appropriated	500 00
Leaving unprovided for	$112 05

for which an appropriation is asked.

The repairs on the gardener's house in the arboretem have been made at a cost of $61 35. This is within the appropriation, which was $100.

The woodwork of the chemical building, outside, has not been repainted since the house was erected, now more than eight years since. The new portico brings this fact into unpleasant relief, and I suggest that authority be given to paint the outside woodwork at an expense not to exceed $175.00. Account, Buildings and grounds.

Also, that authority be given to extend the front fence of the college park on Green street, before the lots bought last year, to cost not more than $200.00. Much of this work can be done at the shop during the winter, so that the fence can be set when the ground opens in the spring.

Much work has been done in arranging articles, cases, &c., in the engineering museum. I ask that $50.00 be allowed for carrying on that work.

Also that $100 be allowed from the fund for natural history collections, to be used for clerical work on the herbarium.

There is need for a suitable house for the storage of the field pieces loaned the University by the U. S. War Department, and for the storage of the ammunition supplied from the same source. While I believe that this may be secured from the present funds, it will hardly be practicable to enter upon such constructions until the next season opens. The matter is one that should not be neglected too long.

I present the report of Professor Morrow upon the financial affairs of the farm for the year ending December 1st. While the credit balance is not so large as has been shown in some former years, it must not be forgotten that all agricultural matters are now in a state of almost unprecedented depression, farm produce and stock being sold, if sold at all, at ruinously low prices, and inventories being of necessity low in proportion.

If the four items of Shorthorn and Jersey cattle, corn, and hay now on hand could be valued at the prices of five years ago, the total profits of the year would be increased by more than $2,500.

REPORT OF THE AGRICULTURAL DEPARTMENT.

UNIVERSITY OF ILLINOIS, December 14, 1886.

Dr. S. H. Peabody, Regent:

SIR: I respectfully present the following report of the receipts and expenditures of the University farms for the year ending December 1st, 1886, with the inventory of personal property on the farms of that date:

Credits: Inventory, December 1, 1886				
Cattle—Shorthorns, 55	$5,500 00			
Jerseys, 9	650 00			
Herefords and Holsteins, 8	1,400 00			
Grades, 13	475 00			
		$8,025 00		
Colts		775 00		
Hogs, 75		620 00		
			$9,420 00	
Farm products—Hay, 200 tons		$1,000 00		
Corn, 3,440 bushels		1,315 00		
Miscellaneous		375 00		
			$2,690 00	
Teams, 9 horses			1,200 00	
Machines and tools			1,950 00	
				$15,260 00
Sales for cash—Live stock	$4,865 49			
Butter and milk	160 33			
Hay and grain	871 00			
Miscellaneous	297 25			
		$6,194 07		
Notes and credits		698 12		
Total credits		$200 00		
Permanent improvements				$7,092 19
				$22,352 19
Debits: Inventory, December 1st, 1885.				
Live stock	$10,055 00			
Farm products	2,936 25			
Teams	1,250 00			
Machines and tools	1,800 00			
		$16,041 25		
Paid for labor	$2,452 00			
For stock	2,709 42			
Miscellaneous	1,107 90			
		$6,269 32		
Total debits				$22,310 47
Balance to credit of the farms				$41 72

No credits are given for the extra cost of work for purposes of experiment. This work is so interwoven with that of the general farm labor, that it is very difficnlt to separate tbem in a report. Could this be done, a moderate profit would appear.

Although the season was more favorable with us than in most parts of the State, tbe corn crop was reduced more than 1,000 bnshels by the drouth. The varieties yielded from 45 to 55 bushels per acre. The hay crop was quite good, but is valued at a lower rate than for a number of years. The live stock is in good condition and is intrinsically more valnable than ever before. This is notably true of the Shorthorn herd, bnt the valuation is at very moderate rate. We bave a pair of finely bred Hereford cows, one imported, with promising heifer calves; two imported Holstein-Friesian young cows of much promise. In general the stock has been in good health. Recognition sbould be made, however, of tbe very great care and attention given to them by Professor McIntosh in any case of sickness or accident.

The work on the farms is in a good state of advancement, and save for effects of time on the buildings and some of the fencing, the farms appear in better condition than at any time since I have known tbem.

As to my work in class-room and elsewhere, I have been gratified with a more tban usual degree of interest shown by tbe classes, but have not had any noticeable increase in numbers.

During the year I have attended or forwarded papers to the meetings of six National Conventions, seven State Societies and ten District, County or local Institutes, Fairs, etc, delivering twenty-two addresses on agricultural subjects. I bave attended the State Fair and Fat Stock Show—at the latter exhibiting a group of steers fed on the University farms—also, some county and local shows.

Very wide circulation has been given by the agricultural, live stock and general newspaper press to frequent brief reports of work in connection with tbe Agricultural Department.

Respectfnlly submitted.

G. E. MORROW.

Respectfully snbmitted,

S. H. PEABODY, *Regent.*

Trustee McKay was appointed to serve on the standing committee *vice* Follansbee, resigned. The Executive Committee asked, and was granted further time to report on water supply. Also the Committee on Ladies' Boarding Hall.

The following appropriations were made, as recommended in Regent's report:

$112 05 for repairs in chemical bnilding.

175 00 for painting outside woodwork of chemical building.

200 00 for fence In front of purchased lots.

50 00 for engineering museum.

100 00 for herbarinm.

Also, $100 was appropriated for repairs of fence on campus.

The Board learning of the severe sickness of Prof. T. J. Burrill, on motion of Trustee Eisenmayer, a leave of absence was granted him for 30 days.

On motion of Trustee McLean the following resolution was passed:

Resolved, That the President and Secretary be directed to draw their requisition npon tbe State Anditor for the several sums of money appropriated by the General Assembly for the use of the State Laboratory of Natural History and the State Entomologist's office for the quarter ending March 31, 1887.

For the field work and incidental expenses of the laboratory the snm of one hundred and fifty dollars.

For the traveling, office, and incidental expenses of tbe entomologist the sum of one hundred and fifty dollars.

For improvement of the library the sum of two hundred and fifty dollars.

For the pay of the entomologist assistant the snm of two hundred and fifty dollars.

For the pay of the botanical assistant the sum of five hundred dollars.

For miscellaneous assistance the snm of two hundred and fifty dollars.

For the publication of bulletins the sum of one hundred and fifty dollars.

Treasurer Bunn read the following report, which was received and referred to the Auditing Committee:

JOHN W. BUNN, TREASURER, IN ACCOUNT WITH THE UNIVERSITY OF ILLINOIS.

1886.		*Dr.*		
Sept.	14	To balance		$23,881 42
	30	To amount received on account of University fees	$2,490 00	
	30	" " " preparatory year	500 00	
				2,990 00
Oct.	14	" " from State for State Laboratory of Natural History		3,200 00
	18	To interest due on land contract No. 1, A. Hubka, due January 1, 1886		135 95
	18	To redemption for taxes on two quarter sections in Nebraska		41 65
Nov.	30	To amount received on account of University fees	510 00	
		" " " mechanical department	75 00	
		" " " architectural department	529 94	
		" " " agricultural department	2,994 92	
		" " " horticultural department	125 60	
		" " " laboratories	204 60	
		" " " buildings and grounds	47 74	
		" " " fuel and lights	39 87	
		" " " library and apparatus	6 00	
		" " " incidentals	4 00	
		" " " music fees	44 00	
		" " " Illinois Central R. R. freight	415 89	
				4,997 56
				$34,246 58
		Cr.		
Nov.	30	By amount paid on account Board expenses	$124 53	
		" " salaries	3,277 00	
		" " buildings and grounds	29 20	
		" " fuel and lights	1,147 57	
		" " stationery and printing	149 14	
		" " preparatory year	480 00	
		" " Nebraska and Minnesota lands	275 08	
		" " mechanical department	301 20	
		" " architectural department	458 29	
		" " agricultural department	1,264 82	
		" " horticultural department	284 88	
		" " chemical department	380 84	
		" " military department	60 86	
		" " library and apparatus	5 90	
		" " incidental expense	93 27	
				8,332 58
		" " premium on bonds	100 62	
		" " boiler tubes	193 65	
		" " commencement expenses	18 75	
		" " furniture and fixtures	5 52	
		" " architectural drawings	6 00	
		" " music fees	44 00	
				368 54
		State appropriations—		
		To amount paid on account buildings and grounds	660 62	
		" " laboratories	543 59	
		" " mechanical and architectural shops	395 67	
		" " books and publications	685 08	
		" " expenses of instruction	7,064 79	
		" " machinist tools	798 03	
		" " fire walls and ventilators	728 01	
		" " Laboratory of Natural History	1,672 13	
		" " cabinets	98 17	
				12,646 09
		Balance		12,899 37
				$34,246 58

Urbana, Ill., December 14, 1886. JOHN W. BUNN, Treasurer.

The following report from a committee was submitted, received, and its recommendations approved:

To the Honorable Board of Trustees of the University of Illinois:

We, your committee to whom was referred the proposition of Mr. S. Goodrich at the September meeting of the Board, do not think the proposition practicable, considering the present financial condition of the University, and recommend that the communication be placed on file.

F. M. McKAY,
G. C. EISENMAYER.

The Business Agent submitted the following statements, with vouchers, which were received and referred to the Auditing Committee:

CURRENT APPROPRIATIONS.

September 1, 1886—March 31, 1887.	Appropriated	Receipts also Appropriated	Expended.	Balance.
Board expenses	$300 00		$124 53	$175 47
Salaries for instruction { Current / State }	19,914 00		{ 7,064 79 / 2,552 00 }	{ 10,297 21
Salaries for services	1,650 00		725 00	925 00
Buildings and grounds		47 74	29 20	18 54
Fuel and lights	2,000 00	39 87	1,147 57	892 30
Stationery and printing	350 00		149 14	200 86
Nebraska lands	296 08		275 08	21 00
Mechanical department	200 00	75 00	301 20	
Architectural "	200 00	524 94	458 29	261 65
Agricultural "	400 00	2,994 92	1,264 82	2,130 10
Horticultural "	400 00	125 60	284 88	240 72
Military "	80 00		60 86	19 14
Laboratories "	200 00	204 60	380 84	23 76
Library and apparatus	50 00	6 00	5 90	50 10
Incidental expenses	200 00	4 00	93 27	110 73
Sundries.				
Premium on bonds	100 62		100 62	
Boiler tubes	193 65		193 65	
Commencement exercises	55 83		18 75	37 08
Furniture and fixtures	25 00		5 52	19 48
Architectural drawings, balance	29 27		6 00	23 27
Architectural cabinet case	36 38			36 38
Music fees		44 00	44 00	
Preparatory year fees		500 00	480 00	20 00
Illinois Central freight		415 89		
University student's fees		3,000 00		3,000 00

STATE APPROPRIATIONS.

Of July 1, 1885.	Appropriated.	Received.	Expended.	Balance.
Taxes on land (½ per annum)	$4,000 00	$3,433 15	$3,433 15	
Buildings and grounds (¼ per annum)	6,000 00	6,000 00	4,698 44	$1,301 56
Laboratories (½ per annum)	3,000 00	3,000 00	1,437 47	1,562 53
Mechanical and architectural shops (½ per annum)	3,000 00	3,000 00	1,945 67	1,054 33
Books and publications (½ per annum)	3,000 00	3,000 00	2,185 08	814 92
Cabinets (½ per annum)	2,000 00	2,000 00	1,193 21	806 79
Current expenses of instruction (½ per annum)	24,000 00	24,000 00	21,419 72	2,580 28
Machines and tools (½ per annum)	4,000 00	4,000 00	2,798 03	1,201 97
Fire walls and ventilation	4,500 00	4,500 00	3,737 05	762 95
Laboratory of Natural History	18,000 00	11,460 65	8,658 47	2,802 18
Total	$71,500 00	$63,393 80	$51,506 29	$12,887 51

Trustee Bennett offered the following resolution, which was passed:

Resolved, That the President and Secretary of this Board be, and are hereby authorized to execute a lease of the Griggs farm to H. H. Darby at $640 per annum, as proposed and recommended by the Farm committee, for the period of four years, from March 1, 1887, with the privilege of either party to terminate same upon giving the other party six months notice thereof prior to the first day of March in any year.

Adjourned to meet at 8 P. M.

Evening Session.

The Board assembled at the time appointed. Present as before.

The Committee on Legislative Appropriations made the following report:

To the Trustees of the University of Illinois,

Gentlemen: Your committee, charged with the duty of considering the needs of the University and the aid to be asked for it of the General Assembly at its next session, has attended to this duty and respectfully reports as follows:

An estimate is presented of the cost of carrying on the usual work of the University for the two years following the first of July, 1887, and of the resources within the control of the University for meeting those expenses.

EXPENDITURES, PER ANNUM.

Salaries for instruction—		
Regent	$4,000 00	
Ten professors at $2,000	20,000 00	
Four " 1,800	7,200 00	
Three " 1,600	4,800 00	
Seven instructors at average of $900	6,300 00	
Two additional professors	4,000 00	
		$45,300 00
Salaries for services	2,735 00	
Fuel and lights	3,000 00	
Board expenses	600 00	
Stationary, printing, advertising, postage	1,500 00	
Incidentals, including water	1,200 00	
		9,035 00
Total		$54,335 00
Total expenses, forward		54,000 00

RESOURCES.

Interest on endowment	$19,000 00	
Interest on land contracts	6,000 00	
Fees from students	9,000 00	
Miscellaneous	2,000 00	
		$36,000 00
Deficit to be asked of the State		$18,000 00
Also the following items as heretofore allowed:		
For payment of taxes on lands in Minnesota and Nebraska, per annum	$2,000 00	
For repairs and improvements	3,000 00	
For mechanical shops	1,500 00	
For apparatus and chemicals	2,000 00	
For books and publications	1,500 00	
For collections of natural history	1,000 00	
For fitting laboratory of mining engineering	2,000 00	
		$13,000 00
Total asking per annum		$31,000 00

Your committee believes that all the items enumerated above are essential to the proper life and growth of the University. The two new professorships provided for are:

First—A professor of mechanical engineering, who will be imperatively demanded when the present naval officer is withdrawn at the end of the current college year; and

Second—A professor of pedagogy, as asked by a resolution of the Illinois State Teachers' Association, at their last meeting.

Your committee also approves the accompanying estimate presented by the Director of the Laboratory of Natural History and recommends that the legislature be requested to appropriate the sums named for carrying on the work of that department.

Estimate of expenses of the State Laboratory of Natural History for the years 1887-8 and 1888-9, per annum;

For salary of Director	$2,000 00
For traveling and incidental expenses	1,000 00
For entomological, botanical and miscellaneous assistants	3,000 00
For additions to library	1,000 00
For publication of bulletins	300 00
Total appropriation per annum	$7,300 00

All of which is respectfully submitted,

S. M. MILLARD,
S. H. PEABODY,
CHARLES BENNETT,
Committee.

That part of the report in regard to the general appropriations for the University was approved, and the regent was requested to present these askings to the legislature.

That part of the report regarding the appropriations asked for the Laboratory of Natural History was also approved, and the Director of the Laboratory was requested to present it to the legislature.

The following resolution, offered by Trustee Bennett, was passed:

Resolved, That a special committee of four be instructed to investigate and report in detail at the next meeting of this Board such recommendations as they may deem of advantage in the future management of the farm of the University.

The Chairman appointed Trustees Pearman, Cobb, Bennett and Eisenmayer.

The following report from the auditing committee was received and approved:

To the Board of Trustees of the University of Illinois:

We, your auditing committee, report that all the vouchers submitted by the business agent from 1,001 to 1,043 of '85-'86 and 1 to 225 of '86-87, inclusive, are in proper form and duly receipted, and we recommend that the same be approved. We have examined, also, the report of J. W. Bunn, treasurer, find it correct, and recommend its approval by your Board.

F. M. McKAY,
GEO. C. EISENMAYER,

Adjourned.

E. SNYDER,
Secretary.

S. M. MILLARD,
President.

MEETING OF MARCH 8, 1887.

The Board met at the University Parlor on Tuesday, March 8, 1887, at 4 p. m.

Present—Trustees Bennett, Cobb, Eisenmayer, McKay, McLean, Millard and Pearman.

Absent—Governor Oglesby, Trustees Dysart, Paden and Earle.

The minutes of last meeting were read and approved.

The Board then proceeded to the election of officers. The following were elected for one year: S. M. Millard, President of the Board; E. Snyder, Recording Secretary; T. J. Burrill, Corresponding Secretary. Executive Committee: S. M. Millard (*ex-officio*), E. Cobb and C. Bennett.

The following were elected for two years: Dr. S. H. Peabody, Regent; J. W. Bunn, Treasurer.

The questions of Regent's salary and Treasurer's bond were referred to the Finance Committee for report at this meeting.

The regent then read the following report, which was received for further consideration:

To the Trustees of the University of Illinois,

GENTLEMEN: In accordance with custom I present the following as a résumé of the educational and financial work of the University of Illinois, for the year ending March 1, 1887, accompanied with reports from the several professors in their various departments.

There is, however, and indeed there ought to be little change to be noted, as between the present condition of affairs and that one year ago reported. Stability is an important element in any enterprise of large and comprehensive character. Frequent and causeless changes should be deprecated. Of the work in general, it may be said that it has been marked with the regularity and the thoroughness which has hitherto been notable.

COLLEGE OF AGRICULTURE.

In the College of Agriculture these items may be worthy of note. Dr. McIntosh became Professor of Veterinary Science at the beginning of the year. His work continues to be efficient, and his classes have been well attended. The weekly clinic attracts a large number of the neighboring farmers, who bring animals for examination, prescription, and, if necessary, operations.

Professor Morrow has spent much time away from the University, in attendance upon Farmers' institutes held under direction of the officers of the State Board of Agriculture, and many neighborhood gatherings of an equally interesting and useful character. It is assumed that this work must serve a good purpose in the dissemination of information upon agricultural topics, and that it will create a larger interest in agricultural education, which, in turn, will reflect usefully upon the Agricultural College, and bring it larger number of recruits. One institute has been held at the University, and the attendance was very satisfactory.

The continned absence of the professor of agriculture conld not be permitted, but for the assistance of Mr. Hunt, who has conducted the class work while Professor Morrow was away. Mr. Hunt has done this work in a manner creditable to himself and serviceable to the classes.

THE COLLEGE OF ENGINEERING.

A few changes in the order of subjects, and in their assignment to instructors were made necessary, in order that the work of the new school, that of mining engineering, conld be arranged. This has given the instrnction in analytical mechanics, formerly by Professor Baker, and in resistance of materials, formerly by myself, to Assistant Professor Talbot. Professor Baker takes the snbject of topographical snrveying, and has extended his course in bridge construction. The descriptive astronomy, formerly by Professor Baker, is assigned to Mr. Stratton.

The nnmber of stndents in the course of mining engineering is not yet large, but is steadily increasing, and the whole of the cnrricnlum in that school will soon be in operation. The class in physics has been divided, both on account of its numbers, and because the division permits a better adjustment of the work to the students of different courses or schools.

It is expected that when the additional electrical apparatns now provided for shall be received, we shall be able to block out a conrse of instruction in electrical engineering, which shall be an adjunct to the conrse of mechanical engineering, or an option which may take the place of part of it. It is hardly possible, or desirable to add it to either of our engineering courses, all which are already replete to overflowing with work.

It is an evident error to suppose that one student may become expert in all sciences. It is equally an error to expect that a young man of rural or of city training, coming to us at sixteen to twenty years, can in four short years, become master of all the intricacies of any of the engineering professions. It is a mistake often made by professors, earnest in the development of a specialty, which crowds too many subjects, often of mere detail, into an undergraduate conrse. The tendency is to a neglect of principles, to a confnsion of ideas, and to a real weakening of the stndent, nnder the specious guise, of giving him greater stores of knowledge. Besides this the tendency is to allow technical studies to crowd out collateral work of general cultnre, fully as important to the proper development of the student, and which shonld by no means be overlooked.

Said a distinguished engineer at the Ann Arbor meeting of the American Association for the Advancement of Science: "Do not try to teach your students too many things. Ground them thoroughly in principles, and leave the details for fnture gathering." It is very probable, that any student who gradnates from college, will find that he has to learn some new things, and some things anew, before he is exactly adjnsted to the peculiar line of work that he finds for his employment.

In connection with this college, I am impelled to make some remarks, concerning the extended use of blne-print copies of drawings and lectnres. This has come into use gradnally, nntil now from 25,000 to 30,000 pages of blne-prints are made annnally. There is great difference in the quality of the work done in preparing the sheets, many being very indistinctly printed. It serves a purpose, in that it brings the work of the teacher to his class in a *quasi*-text-book, and saves the pnpil much time in taking and transcribing notes. The labor of preparing the copies on the part of the instructor is something, and has already come to be a matter of complaint; yet it cannot be so much as is required in preparing mannscript and reading the many proofs made in the preparation of a printed book. It appears to be the duty of an instructor to put his matter in snch a shape that it can most readily be secnred by his class.

Bnt I am becoming more and more convinced, as the years pass, that the constant use of blueprint lectnres is very deleterions to the eyes of the students. Year after year, stndents come with complaints of weak eyes, and many have been forced on this acconnt to leave study temporarily and some permanently, on account of failnre of eyesight, and almost always these stndents are from the schools which require a large nse of the blue-print. I believe that some other form of manifolding of lectnres should be adopted. I do not know that any action by way of rule should be taken, but I feel nnder obligation to pnt myself on record in this matter.

THE COLLEGE OF NATURAL SCIENCE.

The most notable item concerning this college, is the effort now in progress to bring to the University the State Collection of Natural History, now in the State Capitol at Springfield. The movement to do so, originated with the State officials, especially the Secretary of State, the State Geologist, and the State House Commissioners. The Geological part of the collection is very much needed here, as we have very little to illustrate the geology of the State of Illinois. If the movement is not snccessful, it will be because of the local opposition which desires to keep the collections as part of the elegant attractions of the State Capitol.

In the subjects of zoölogy, biology, physiology, and geology, as tanght in this college, noteworthy progress has been made, so that these subjects are acqniring a vigor and force comparable to the work of the college of engineers. This has been effected by the introduction of improved methods of work, aided by the better equipment for laboratory purposes. For a while yet, except in the school of chemistry, the attendance in the college of natural science will be small, and will be restricted to those for whom natural history offers peculiar attractions, and who expect to teach such subjects. The enlarged opportunities will doubtless gather gradually increased number of stndents.

THE COLLEGE OF LITERATURE AND SCIENCE.

To one who scans the whole range of work done at this institution, the conclusion seems unavoidable, that just here is the place where earnest and combined effort is now needed.

Without charging blame upon any one, and recognizing that the resnlt is one mainly dne to circumstances, which we have hitherto been but slightly able to control, it must be said that this department is now that which most needs to be built up Among the canses of the existing condition of things, I count first:

That we have hitherto felt that we could not insist upon an adequate preparation of the kind needed as a foundation for the work of this school. The privilege, if it were such, of "making up" preparatory Latin, after admission to college, worked as a premium upon inefficiency, and lack of preparation. The old opinion, which is said to have existed, that the requirements for admission to this University were of the lowest, has most certainly lost its significance for all the other colleges, and students are becoming seriously afraid of our examinations and requirements. But the requirements for this school have been such that many persons have been admitted who were not fitted for strenuous college work, including a large proportion of the women admitted. In consequence, and particularly because of these unprepared women, the tendency on the part of instructors, has been to temper the vigor of their work to the feebleness of the lambs; to pass them in low grades; to lighten the work; to discriminate between the same subjects as given for example to the engineers and to the literary students; as in trigonometry, physics, chemistry, geology, &c.. &c. It is true that the *scope* of a subject as presented to a class of literary students in a single term, should be quite different from that presented to a class of scientific students in a series of terms; but it is now urged that the *force* of the work should in no respect be diminished, and yet it has seemed impossible, from the nature of things that this should be otherwise.

The stronger students who seek literary courses are often attracted to other colleges which have acquired a more distinctively literary reputation. The very efforts which have lately been made to redeem the pledges given when the name of the University was changed, and which have driven the professors of the agricultural college into the lecturing field, to push that phase of our work and to keep it before the people, has reacted upon this, so that all over the State people are saying, "Don't go to an agricultural or mechanical college to study literature or the classics." These facts seem to me to present the problem of the hour, which is, How to revive and strengthen the Literary side of this University?

I think we should first look within and see if its intrinsic character needs invigorating, and how. Second, look without and see how we can reach the people who should be brought into that department as students.

Of the first I have nothing at present to say.

Of the second, I remark that the most reasonable source of aid seems to me to be found in the teachers of the State. While I believe that the colleges of the land would all be better off, if the system of accrediting schools had never been adopted, nevertheless it has been adopted, and we cannot help recognizing and using it.

Michigan University, finding that her attendance had lately fallen from 1,500 to 1,300 students, has sought to recoup herself by entering all the adjacent States for the accredited schools which she had before found only in her own State, and, if I am rightly informed, has materially lowered her standard of requirements in so doing. We must continue to attach to ourselves the schools of the State, and I have been actively engaged of late in visiting schools for that purpose and expect to continue so doing. In this connection I desire to renew a proposition made some time since. It is that a handsomely lithographed or engraved certificate be prepared, large enough and elegant enough to be framed, to hang conspicuously in the assembly halls of our accredited schools, which shall keep the fact of association constantly before the pupils of the school. It will lead them to think about us, to talk about us, and I believe will prove a permanent and a most serviceable advertisement. I believe an elegant certificate may be secured for say $150 for the plate, with a small sum for printing.

I trust it will not be deemed improper for me to refer again to a plan of establishing county honorary scholarships. I believe this may be so done, as to make each of a large number of county seats in the State the center of advertising that will do us much service. That while we should bring one student from a county who would come free of fees, the act of bringing him would draw a considerable number with him, who would pay fees, more than enough to make up for the loss of this one. This would, of course, not be true of Champaign county, perhaps not of Cook county, or McLean county, or a few others that might be named. Nor would all counties send. From some inquiries which I have made, I doubt if even fifty counties would undertake the needful examinations at first. I think the spirit of the original State law expects this, and it seems to me that the experiment is well worth the trial. If the trustees desire, I have a plan ready for their consideration.

THE PREPARATORY CLASS.

This continues to be the principal and the best feeder for the University. When the number of students in it increases, the subsequent attendance in the University is enlarged. But more than that, the students who have gone through with its drill, take up the work of the freshmen year with a vigor and earnestness that is not usually equaled by those who enter directly as freshmen.

THE AGRICULTURAL EXPERIMENT STATION.

You are doubtless informed of the fact that Congress has passed an act, which the President has signed, appropriating $15,000 per annum, during the pleasure of Congress, for establishing an experiment station at each of the agricultural colleges organized under the act of 1862.

An important duty and a large responsibility will rest upon this University in carrying out the details imposed by this act. I suggest that the subject be referred to a committee which shall have authority to take steps to secure the necessary legislative sanction, required by the act itself, which committee shall also be charged with the duty of presenting at a subsequent meeting a plan for the organization and conduct of the experiment station contemplated in connection with our University.

I am informed that a meeting of the presidents of agricultural colleges will be called in Washington during the month of April, to consult upon the methods, purposes, etc., of these stations, and I ask your authority to attend such a meeting when called.

The next annual meeting of the National Educational Association is to be held in Chicago, in the summer vacation, and a feature of the meeting will be a display of educational work in all forms, to be held in the Exposition building. It will be important that this University be represented there. I ask authority to make an exhibit there. An effort is making to get the State to appropriate for the expenses of this exhibition, which, if successful, will make an appropriation by this Board unnecessary; but it is desirable that provision should be made to be used if needed.

I call attention to the requests of Professor Forbes:

For leave to raise Mr. Weed's salary to $60 per month.

For instructions as to the distribution of his forthcoming report.

Professor Roos asks $25 for models and repairs, which asking I concur in.

Professor McMurtrie asks for leave to purchase chemicals and apparatus.

Professor Comstock asks for $100 for physical apparatus to be purchased with the chemical apparatus, and for $150 for purchase of the mining transit now loaned to his department.

Authority is asked for the publication of the annual catalogue; 5,000 copies, to cost not more than $250.

Authority is asked for building a gun house on the lot east of the drill hall, for housing the two field pieces and for storage of the ammunition furnished by the government, at a cost not to exceed $300.

FINANCIAL REPORT.

The following concerns those departments of the University which add business transactions to their educational work. It should not be expected that these departments should be absolutely self-supporting. It will appear that the expenses of the departments are lessened in some degree by the profits on the business which comes to them incidentally.

The Department of Agriculture.

The acreage in the two University farms is		610 acres
The lands used by the department of agriculture		500 "
Used in pasture	160 acres	
" meadow	170 "	
" tillage	170 "	
The products in 1886 were—Corn		5,500 bushels
Oats		1,600 "
Other grain		80 "
Value of grain produced		$2,400 00
Hay, tons, 225, value		1,125 00
Dairy products, sold		160 83

Balance Sheet of Agricultural Department.

Inventory, Dec. 1, 1886—			
Live stock	$9,420 00		
Farm products	2,640 00		
Teams	1,200 00		
Machinery and tools	1,950 00		
		$15,260 00	
Sales—Live stock, cash	$4,865 49		
Dairy products	160 83		
Hay and grain	871 00		
Miscellaneous	297 25		
		$6,194 07	
Notes and credits		698 12	
Permanent improvements		200 00	
			$22,352 19
Inventory, Dec. 1, 1885—			
Live stock	$10,055 00		
Farm products	2,936 25		
Teams	1,250 00		
Machinery and tools	1,800 00		
		$16,041 25	
Paid for labor	$2,452 00		
Stock	2,709 42		
Miscellaneous	1,107 90		
		$6,269 32	
			$22,310 47
Balance to credit of farm			$41 72

To which should be added the extra cost of so conducting the work as to derive useful experimental results therefrom, say $1,500.

The Griggs Farm.

Received for rent	$508 00
Expenses	10 00
Balance	$498 00

The Horticultural Department.

Cr.			
Cash, greenhouse	$348 45		
Nursery	54 75		
Small fruits	370 60		
Orchard	83 81		
Forest	27 80		
		$869 41	
Foreman's time on public grounds		165 00	
Plants for public grounds		540 70	
Trees for public gronnds		7 00	
			$1,592 11

	Material.	Labor.	Foreman.		
Dr.					
Greenhouse	$183 20	$177 37	$350 00	$710 65	
Nursery		16 21	25 00	41 21	
Small fruits	104 20	240 44	115 00	459 64	
Orchard		48 15	45 00	93 15	
Forest		9 96	15 00	24 96	
	$287 48	$492 13	$550 00	$1,329 61	
Foreman's time on public grounds				$165 00	
					$1,494 61
Balance in favor of department					$97 50

The Chemical Laboratory.

Cr.		
From State appropriations	$650 00	
Received from students	1,027 79	
Supplied other departments	31 81	
		$1,709 60
Dr.		
Permanent apparatus	$170 00	
Chemicals and apparatus, stock	920 64	
Gas	246 00	
Repairs, freight, etc	215 70	
		$1,552 34
Balance for department		$157 26
Inventory, March 1, 1887	$15,457 83	
" March 1, 1886	15,009 80	
		$448 03
Net balance for department		$605 29

The Machine and Carpenter Shops.

	Machine shop.		Carpenter shop.	
Cr.				
Work for University	$865 47		$2,110 01	
Work for other parties	27 22		212 97	
State appropriations	920 88		639 80	
		$1,813 57		$2,962 78
Dr.				
Materials and tools	$315 69		$987 18	
Labor	275 38		811 22	
Power	219 93		219 93	
Instructor	1,500 00		960 00	
		$2,311 00		$2,928 33
Balance against shop		$497 43		
Balance for shop				$34 45
Inventory, Feb. 28, 1887	$490 32		$924 50	
Inventory, Feb. 28, 1886	491 40		624 48	
		1 08		302 02
Net balance against		$498 56		
Net balance for				$336 47

General Balance Sheet.

	Loss.	Gain.
Agricultural department		41 72
Griggs farm		498 00
Horticultural department		87 50
Chemical laboratory		606 16
Machine shop	$498 56	
Carpenter shop		336 47
Totals	$498 56	$1,569 85
Net balance, gain		$1,071 29

Attention is asked to the report of the Professor of Agriculture for the last quarter.

FARM REPORT.

University, Champaign, Ill., March 1, 1887.

Dr. S. H. Peabody, Regent,

SIR: During the three months, ending with this date, the *receipts* from the *farms* have been $1,725.31. The *expenditures* have been $759.30.

The care of the live stock has been the principal work. In general, all classes of stock have done well. A small lot of fat cattle and two of hogs have been sold. An unusually good lot of young Shorthorn bulls will be for sale this spring, and a few cows and heifers may also be disposed of. It is believed desirable to unite with other breeders near Champaign in a second annual public sale of Shorthorn cattle about the last of May.

A report of experiments in Pig Feeding and a partial report of experiments in Cattle Feeding now in progress, are submitted, prepared by Mr. Hunt, who has had the special direction of this work.

After a consultation with the chairman of the Farm Committee, men have been employed to fill, in part, the places of Mr. John Dodds, and Mr. L. G. Lathrop who, for four years past, have lived on the farms, and acted as working foremen, discharging their duties with unusual fidelity. As the men employed are not expected to have equal responsibilities, their wages have been placed at a less rate—$28 per month.

It is expected to plant 90 to 100 acres in corn, and sow 50 to 70 acres in oats. The grass land may be about equally divided between meadow and pasture, although there is a larger acreage which might be wisely used for pasturage than will be necessary to support the stock now on the farms. It is believed the purchase of one or two car loads of steers to be grazed during summer, corn fed and sold next fall would be advisable.

During the three months I have attended ten farmers' institutes and agricultural meetings, making twelve addresses, and have forwarded papers to be read at three meetings, invitations to attend which I have been unable to accept. Five of these meetings have been institutes held under the direction of the State Board of Agriculture, including the one held at the University Feb. 3-4. These institutes I believe highly useful and think it appropriate that the University should continue its aid to them.

I should not have felt at liberty to leave my classes so frequently had it not been that the assistant in agriculture was well prepared to take charge of them.

A large percentage of my classes is of students taking the one year farmers' course. They have manifested a good degree of interest and made satisfactory progress.

Respectfully submitted,
G. E. MORROW, Professor of Agriculture.

The above reports are respectfully submitted,

SELIM H. PEABODY, Regent.

URBANA, March 9, 1887.

On leave given by the Board, the Regent presented the following plan for

HONORARY SCHOLARSHIPS.

In accordance with the spirit of Section 9 in the act of the General Assembly organizing the Illinois Industrial University, approved Feb. 28, 1867, it is hereby ordered that Honorary Scholarships be established in the University of Illinois to be filled and occupied in the manner and on the conditions following, viz.:

1. An examination shall be held at the county seat of each county in the State of Illinois which desires to secure an Honorary Scholarship in the University, by the county superintendent of said county, or by a suitable deputy to be named by him, on the first Friday and Saturday of June, 1887. The persons admitted to such examinations shall be residents of the county, fifteen years of age, and shall have been previously approved by the county superintendent as reasonably proficient in reading, writing, arithmetic, grammar, geography and history of the United States. Persons already admitted to the University may not be admitted to examination.

2. The questions used in said examination shall have been prepared under the direction of the Regent of the University, and shall be forwarded to the county superintendent in sealed envelopes with careful instructions as to the times and manner of using them, and the superintendent or his deputy shall return his written statement that such instructions have been fully observed.

3. Immediately after the close of the examination, the answers in the handwriting of the person examined, without note, comment, or correction, shall be collected and sealed up in a separate envelope for each person examined, and shall be forwarded forthwith to the Regent of the University, to be read and passed upon by him, with the aid of such members of the Faculty as he may designate.

4. Each competitor may choose whether he will be examined to enter upon a technical or upon a literary course. In the first case the subjects upon which he shall be examined shall be:

Algebra, to and including quadratic equations; geometry, plane, solid and spherical; physiology; natural philosophy; botany, and English rhetoric and composition, covering such parts of the several subjects as are usually taught in the better public high schools in the State.

In the second case the subjects shall be:

Algebra and geometry as before, physiology or natural philosophy, and the first four books of Cæsar's Commentaries, the four orations of Cicero against Cataline, that for Poet Archias, and that for the Manilian Law, and the first six books of Virgil's Æneid.

The two forms of examination shall be made as nearly as possible equivalent in difficulty and in the amount of preparation required.

5. That person in each county whose average standing in this examination shall be highest, shall be entitled to an honorary scholarship in the University, exempt from any fee for tuition or incidental expense. Provided, that a scholarship may not be awarded to any person whose standing in any subject offered for his examination shall be less than 75 upon the scale of 100, or whose general average shall be less than 80 upon the same scale. Other things being equal "the descendants of soldiers or seamen who served in the armies or navies of the United States during the late rebellion" shall be preferred.

6. The scholarships awarded as above shall be good for four years and shall not be transferable. The holder of a scholarship shall be deemed to have vacated the same if he shall graduate from the University or take a dismission therefrom. His scholarship shall be forfeited, if he shall be absent after his appointment for one term consecutively without a reason for such absence satisfactory to the Faculty, or for more than one term for any reason; or if he shall have failed to pass a standing of 75 in any two University examinations; provided that in case of any such failure, he may claim and receive a re-examination from his professor with the Regent of the University; or if he shall have accumulated 50 or more demerits for misconduct, or unexcused absence from duty.

7. If, at the examinations provided for in June, no person should secure the scholarship for any county, the Regent and the county superintendent may provide a second examination in the September following. If, before the end of the fall term following the examination, the person receiving the scholarship shall fail to appear and matriculate, or if he shall decline to accept the same, the scholarship shall be given to the next person in order who has passed the examination. If at any other time, or in any other way, a scholarship shall become vacant, or shall be likely to become vacant by the graduation of its incumbent, timely notice shall be given to the county superintendent of the county to which the vacancy shall belong; but no examination to fill the same may be held at other times than in June or September, as before provided.

9. The examinations provided for as above must be held without expense to the University, except that which may be incurred in preparing and forwarding questions. The examinations must be announced at least three times within the month preceding the date thereof, in at least two papers published in the county, evidence of which publication must be forwarded to the University with the results of the examinations.

10. The Trustees of the University reserve the right to modify, or to withdraw these regulations at their discretion.

On motion of Mr. Eisenmayer the plan was adopted, and the Regent was instructed to take the steps necessary to carry its provisions into effect.

The Board adjourned to meet at the Doane House at 8 p. m.

EVENING SESSION.

The Board assembled at the appointed time. Present, Trustees Bennett, Cobb, Eisenmayer, McKay, Millard, McLean and Pearman.

The Treasurer, J. W. Bunn, read the following report, which was received and referred to the Auditing Committee.

JOHN W. BUNN, TREASURER, IN ACCOUNT WITH THE UNIVERSITY OF ILLINOIS, *Dr.*

1886.				
Dec.	14	To balance		$12,899 37
1887.				
Jan.	1	To interest on Chicago water bonds	$875 00	
		" " " funds not invested	1,800 00	2,675 00
Jan.	15	" " " Champaign school bonds		360 00
Jan.	16	" Amount received from State for State Laboratory of Natural History		1,550 00
Jan.	19	" Amount received from C. Hesse for rent		14 25
Feb.	9	" interest on land contract No. 1, A. Hubka, past due	32 25	
		" " " " " 1½ "	96 60	
		" " " " " 2, J. T. Applegate	80 64	
		" " " " " 3 " "	88 08	
		" " " " " 4, " "	84 48	
		" " " " " 5, S. D. Miller & D. C. Bashor	138 00	
		" " " " " 6, T. A. Woodward	100 95	
		" " " " " 7, August Zahlten	80 00	
		" " " " " 9, C. M. Dawson	144 00	
		" " " " " 10, John W. Herbert	144 00	
		" " " " " 11, David Richardson	120 00	
		" " " " " 13, H. F. Willis & A. W. Mills	120 00	
		" " " " " 14, W. L. Collins	120 00	
		" " " " " 15, W. T. Maxwell	137 80	
		" " " " " 16, Robert L. Gilmore	72 00	
		" " " " " 17, " "	96 00	
		" " " " " 18, S. G. Bryant, Jan. 1, 1886	96 00	
		" " " " " 19, Lawrence Larson	144 00	
		" " " " " 20, Christian Anderson	144 00	
		" " " " " 21, Dennis Magner	120 00	
		" " " " " 22, H. H. Snyder & J. H. Martin	120 00	
		" " " " " 24, John Higgins	134 40	
		" " " " " 25, " "	134 40	
		" " " " " 26, M. R. O'Brien	113 75	
		" " " " " 27, Amos L. Wright	120 00	
		" " " " " 28, " "	120 00	
		" " " " " 29, Spencer G. Bryant	72 00	
		" " " " " 30, James A. Huston	120 00	
		" " " " " 31, John H. Hansen	120 00	
		" " " " " 34, J. and H. J. Swoboda	120 00	
		" " " " " 35, John and Wm. Losey	96 00	
		" " " " " 36, C. E. and C. O. Frothergill	120 00	
		" " " " " 38, D. M. Gilmore	120 00	
		" " " " " 39, John E. Blickenstaff	120 00	
		" " " " " 40, Joseph Dezort	120 00	
		" " " " " 41, J. S. Reynolds & A. L. French	120 00	
		" " " " " 42, W. S. Martin & F. L. Mane	120 00	
		" " " " " 43, Samuel Cox	67 20	
		" " " " " 44, C. E. Baker	67 20	
		" " " " " 45, J. Blevens & R. J Miller	124 48	
		" " " " " 47, M. Hubka	133 58	
		" " " " " 48, J. K. Cullen	85 70	

1887.				
Feb. 9	To interest on land contract No. 49, V. Hnizda	$39 47		
	" " " " " 50, R. T. Hnizda	80 00		
	" " " " " 51, J. S. Herbert&J. W. Hnizda	80 20		
	" " " " " 52, J. W. Hnizda	64 00		
	" " " " " 53, E. R. Fogg	61 00		
				$4,872 18
	To amount received on account mechanical department	$333 19		
	" " " " architectural "	69 06		
	" " " " agricultural "	1,725 31		
	" " " " horticultural "	158 20		
	" " " " fuel and lights	24 20		
	" " " " buildings and grounds	70 50		
	" " " " chemical laboratory	403 75		
	" " " " incidentals	4 00		
	" " " " music fees	31 00		
	" " " " Griggs farm	383 00		
	" " " " University fees	2,280 00		
	" " " " preparatory year	480 00		6,588 21
				$28,959 01
	Cr.			
Feb. 28	By amount paid on account board expense	$117 03		
	" " " " salaries	7,930 32		
	" " " " buildings and grounds	57 68		
	" " " " fuel and lights	907 83		
	" " " " stationery and printing	107 57		
	" " " " preparatory year	480 00		
	" " " " mechanical department	295 74		
	" " " " architectural department	501 10		
	" " " " agricultural department	763 67		
	" " " " horticultural department	313 82		
	" " " " laboratories	276 49		
	" " " " military department	12 52		
	" " " " library and apparatus	21 13		
	" " " " incidental expense	68 39		
				11,853 29
	By amount paid on account commencement expenses	$37 08		
	" " " " furniture and fixtures	19 28		
	" " " " architectural drawings	19 80		
	" " " " cabinet cases	34 66		
	" " " " music fees	31 00		
				141 82
	State Appropriations.			
	By amount paid on account buildings and grounds	$408 87		
	" " " " laboratories	25 32		
	" " " " mechanical and Arch. shops	534 88		
	" " " " books and publications	169 43		
	" " " " cabinets	377 71		
	" " " " expenses of instruction	2,580 28		
	" " " " machinist tools	80 01		
	" " " " fire walls and ventilators	6 00		
	" " " " State Laboratory of Natural Hist	1,437 37		
				5,569 87
	Balance			11,394 03
				$28,959 01

JOHN W. BUNN, Treasurer.

Urbana, March 8, 1887.

The following resolution was offered by Trustee McLean, and adopted:

WHEREAS, At the late session of Congress, a bill was passed relative to the establishment of agricultural experiment stations at the various agricultural colleges throughout the United States, and the necessary funds to carry into effect the objects of said bill were appropriated, the University of Illinois being one of the stations contemplated in said bill; therefore, be it

Resolved, That a standing committee of this Board be appointed, consisting of the Regent, who shall be chairman, Emory Cobb, Alex. McLean, Charles Bennett and S. M. Millard, to which is referred all matters pertaining to carrying out of the objects of said bill, and which shall report to the Board of Trustees from time to time such plans and suggestions as they may deem proper for the purposes aforesaid.

Resolved, That the Regent and Executive Committee be requested to obtain such legislation as they may deem necessary to have said agricultnral experiment station properly and legally established as contemplated by said act of Congress, and that they obtain legislation during the present session of the legislatnre.

The Business Agent, S. W. Shattuck, submitted his report, which was read, received, and, together with accompanying vouchers, referred to the Auditing Committee.

STATE APPROPRIATIONS.

Of Jnly 1, 1885.	Approp't'd.	Received.	Expended.	Balance.
Taxes on land (½ per annnm)	$4,000 00	$3,433 15	$3,433 15	.....
Buildings and gronnds (½ per annum)	6,000 00	6,000 00	5,107 31	$892 69
Laboratories (½ per annum)	3,000 00	3,000 00	1,462 79	1,537 21
Mechanical and architectural shops (½ per annnm)	3,000 00	3,000 00	2,480 55	519 45
Books and publications (½ per annnm)	3,000 00	3,000 00	2,354 51	645 49
Cabinets (½ per annum)	2,000 00	2,000 00	1,599 14	400 86
Current expense of instruction (½ per annnm)	24,000 00	24,600 00	24,000 00	.....
Machines and tools (½ per annum)	4,000 00	4,000 00	2,828 04	1,171 96
Fire walls and ventilation	4,500 00	4,500 00	3,714 83	785 17
Laboratory of Natnral History	18,000 00	13,010 65	10,095 84	2,914 81
	$71,500 00	$65,943 80	$57,076 16	$8,867 64

CURRENT APPROPRIATIONS.

Sept. 1, 1886—March 31, 1887.	Approp't'd.	Receipts also approp't'd.	Expended.	Balance.
Board expense	$300 00	.....	$241 56	$58 44
Salaries for Instruction { State	19,914 00	.....	9,645 07	640 42
Salaries for Instruction { Cnrrent..		.....	9,628 51	
Salaries for services	1,650 00	.....	1,578 81	71 19
Buildings and grounds	.....	118 29	86 88	31 41
Fuel and lights	2,000 00	64 07	2,055 40	8 67
Stationery and printing	350 00	.....	256 71	93 29
Nebraska and Minnesota lands	296 08	.....	275 08	21 00
Mechanical department	200 00	408 19	596 94	11 25
Architectural department	200 00	1,225 00	959 39	465 61
Agricultnral department	400 00	4,720 23	2,028 49	3,091 74
Horticnltural department	400 00	283 80	598 70	85 10
Military department	80 00	.....	73 38	6 62
Laboratories	200 00	608 35	657 33	151 02
Library and apparatus	50 00	6 00	27 03	28 97
Incidental expense	200 00	8 00	161 66	46 34
Premium on bonds	100 62	.....	100 62	.....
Boiler tubes	193 65	.....	193 65	.....
Commencement exercises	55 83	.....	55 83	.....
Furnitnre and fixtures	25 00	.....	24 80	20
Architectural drawings, balance	29 27	.....	25 80	3 47
Architectural cabinet case	36 38	.....	34 66	1 72
Music fees	.....	75 00	75 00	.....
Preparatory year fees	.....	980 00	960 00	20 00
Illinois Central freight	.....	415 98	.....	.....
University students' fees	.....	5,280 00	.....	5,280 00
Griggs farm	.....	383 00	.....	383 00

The Board adjourned to meet at the University, March 9, at 9 o'clock a. m.

SECOND DAY'S SESSION.

The Board met at 9 o'clock a. m.

Present—Trustees Bennett, Cobb, Eisenmayer, McKay, McLean, Millard and Pearman.

A short recess was taken to attend chapel exercises.

Trustee Pearman presented the following report from a special committee on farm administration:

To the Board of Trustees of the University of Illinois:

Your committee to whom was referred the matter of future farm management, beg leave to report that they have met and considered the matter referred to them, and do not deem it expedient at the present time to recommend any material change in the general policy heretofore pursued in the management of the University farms.

J. T. PEARMAN,
CHAS. BENNETT,
EMORY COBB,
GEO. C. EISENMAYER,

The report was received and the committee discharged.

Trustee Bennett made the following report:

To the Board of Trustees of the University of Illinois:

The Finance Committee, to whom was referred the matter of the Regent's salary for the ensuing two years, recommend that said salary be fixed at $4,000 per annum.

CHAS. BENNETT,
GEO. C. EISENMAYER,
F. M. McKAY.

The report was received and its recommendation adopted.

On recommendation of the same committee, it was

Resolved, That the amount of the Treasurer's bond be fixed at $150,000, and that the Executive Committee be authorized to receive and approve the same.

The committee on Nebraska and Minnesota lands made the following report, which was received:

UNIVERSITY OF ILLINOIS, URBANA, March 8, 1887.

To the Trustees of the University of Illinois:

Your committee, charged with the care of the lands belonging to the University in Nebraska and Minnesota, reports as follows:

Since the last report one tract has been sold in Nebraska:

No.	*Name.*	*Tract.*	*Price.*	*Cash.*
54.	Benj. F. Leiby.	N. W. 6, 2, 8, 151.84.	$2,125.76.	$531.44

Some discrepancies have crept into former reports, as printed, on account of errors in proof reading. An examination of the books shows the following:

Number of acres originally for sale in Nebraska		9,340.09
Number of acres sold	8,405.40	
Number of acres yet for sale	934.69	9,340.09
Total price of land sold		$110,120 94
Cash received at making of contracts	$29,553 23	
Cash received, principal paid on contractts	8,357 37	$37,910 60
Amount outstanding on contracts		$72,210 34
Interest received on contracts, 1885		1,551 89
Interest received on contracts, 1886		4,449 61
Interest received on contracts, 1887		4,766 19
Interest due January 1, 1887, not yet paid		905 88

All interest due before January 1, 1887, has been paid.

The last corp in Nebraska was not so good as usual, and some requests have been made for extension of time for payment of principal and interest due. Extensions of principal have been agreed to, but parties have been notified that the payments of interest must be made. There is little doubt that all delinquent interest will soon be paid.

Negotiations having been opened with the Minneapolis and Pacific Railroad for payment for the University lands taken by that company in Pope county, Minnesota, the company offers $10 per acre for the land which they have used. The committee recommends that a settlement be made with the railway company upon those terms, and that the proper officers be instructed to complete the necessary papers.

All of which is respectfully submitted,

S. H. PEABODY,
CHAS. BENNETT, } *Committee.*

The Auditing Committee made the following report:

To the Board of Trustees, University of Illinois:

The Auditing Committee, to whom was referred the report of the Business Agent, respectfully report that they have examined vouchers for the items contained in said report, Nos. 226 to 450, inclusive, and find them correct and properly receipted, except No. 370 for $1.00, in which case the absence of the voucher is satisfactorily explained in the Business Agent's report.

CHAS. BENNETT,
F. M. McKAY,
GEO. C. EISENMAYER.

The report was received and approved.

The Finance Committee submitted the following report, which was received and ordered to be placed on file:

To the Board of Trustees, University of Illinois:

Your committee would respectfully report that we have examined and compared the books of the Treasurer with the warrants upon him for the past two years, beginning March 1, 1885, with Nos. 384 to 800 to September 1, 1885, No. 1 to 1043 up to September 1, 1886 and No. 1 to 488 up to March 1, 1887, and found all to be in order and correct. The warrants have been cancelled and left in the hands of the Treasurer.

F. M. McKAY,
GEO. C. EISENMAYER,
CHAS. BENNETT, } Finance Committee.

The following resolution was offered by Trustee McLean, and adopted:

Resolved, That the President and Secretary of the Board be and they are hereby empowered and directed to execute and deliver a deed to the Minneapolis & Pacific Railroad for the lands taken by said company and duly belonging to the University of Illinois, in constructing their railway across sections 23 and 25, tp. 124, R. 36 in Pope county, Minnesota, and to receipt for the payment for the same at ten dollars per acre.

The matter of form of the deed for the land was referred to the Executive Committee.

On motion of Trustee McLean the following resolution was passed:

Resolved, That the President and Secretary be directed to draw their requisition upon the State Auditor for the several sums of money appropriated by the General Assembly for the use of the State Laboratory of Natural History and the State Entomologist's office for the quarter ending June 3, 1887.

For the field work and incidental expenses of the laboratory the sum of one hundred and fifty dollars.

For traveling, office, and incidental expenses of the Entomologist the sum of one hundred and fifty dollars.

For improvement of the library the sum of two hundred and fifty dollars.

For the pay of the entomologist assistant the sum of two hundred and fifty dollars.

For the pay of the botanical assistant the sum of two hundred and fifty dollars.

For miscellaneous assistance the sum of two hundred and fifty dollars.

The following report from the Farm Committee was received and approved:

To the Board of Trustees of the University of Illinois:

Your Farm Committee, to whom was referred the report of Professor Morrow, would recommend that the report be received, and that permission be granted to Professor Morrow to make public sale of shorthorn cattle as indicated in his report. The granting of authority to purchase cattle we do not recommend.

J. T. PEARMAN,
EMORY COBB.

The following special appropriations were made:

$300 for the construction of a building to receive the artillery. (State appropriation for buildings and grounds.)

$300 for the printing of catalogue (5,000 copies) for 1887-8. (Current appropriations for stationery and printing.)

$650 for purchase of chemicals and chemical apparatus. (Current appropriation for laboratories.)

$100 for purchase of apparatus for physical laboratory. (State appropriations for laboratories.)

$150 for purchase of mining transit for mining laboratory. (State appropriation for laboratories.)

$25 for purchase and repairs of models for drawing and designing. (Current appropriations.)

$45.36 for traveling expenses of Dr. Peabody.

The following appropriations were made from current funds for the six months ending August 31, 1887:

Board expenses	$300 00
Salaries for instructions	19,196 00
Salaries for services	1,159 00
Fuel and lights	1,000 00
Stationery and printing (catalogue, etc)	600 00
Nebraska and Minnesota lands	21 00
Library and apparatus	50 00
Incidental expenses	200 00
Mechanical department	200 00
Architectnral "	200 00
Agricultural "	400 00
Horticultural "	200 00
Military "	50 00
Laboratories	200 00
Furniture and fixtures	50 00
	$23,826 00

The salary of C. M. Weed, assistant in Laboratory of Natural History was made $60 per month for the present quarter.

The question of distribution of the reports of the Laboratory of Natural History was referred to the Director of the Laboratory and the Regent.

It was moved and carried that the Regent be requested to attend the meeting of presidents of agricultual colleges at Washington, D. C.

The Regent was authorized to prepare an educational exhibit of the University for the National Teachers' Convention at Chicago.

It was decided that the receipts from the earnings and sales from the mechanical, architectural and horticultural departments and the laboratories be appropriated subject to the order of the Business Agent; those from the agricultural department, subject to the approval of the Farm Committee and Business Agent.

Plans for dormitories were submitted by a special committee; they were received and the committee continued.

The President of the Board appointed the following standing committees:

Farm Committe—Bennett, Pearman and Cobb.
Buildings and Grounds—Earle, Eisenmayer and Paden.
Finance Committee—McLean, Bennett and Cobb.
Auditing Committee—McKay, Earle and Eisenmayer.
Publications—President, Regent and Corresponding Secretary.

Adjourned.

S. M. Millard, *President.*

E. Snyder, *Secretary.*

MEETING OF JUNE 7, 1887.

The Board met at the University parlor, Tuesday, June 7 1887, at 3 o'clock p. m.

Present—Trustees Bennett, Millard, McLean and McKay.

Absent—Governor Oglesby, Trustees Dysart, Cobb, Earle and Eisenmayer.

George R. Shawhan, of Urbana, and W. W. Clemens, of Marion, presented their commissions from the Governor appointing them members of this Board, and, having been duly sworn, took their seats.

The records of the March meeting were approved.

The Regent then read his report, as follows:

To the Trustees of the University of Illinois:

GENTLEMEN: Another year in the calendar of the University draws to its close. While the year has had little of special note to distinguish it from others, it has been marked by faithful and progressive work within the precincts of the University, and a large amount of what may be called missionary work has been done by its officers throughout the State in attending and addressing educational, agricultural, and scientific gatherings. The interests of the University has affected by the action of the legislature have made an unusual draft upon the time and care of the Regent The legislation now finished is as follows:

1. A bill appropriating for the use of the University $27,250 per annum, in these items:

For taxes on lands in Minnesota and Nebraska	$1,750
For repairs and improvements in buildings and grounds	2,000
For apparatus and material	1,500
For mechanical shops	1,500
For books and publications	1,500
For specimens of natural history	1,000
For metallurgical laboratory	2,000
For general purposes of instruction	16,000
	$27,250

2. A bill providing that as the terms of office of the present members of the Board of Trustees expire, their successors shall be elected by the people, instead of being appointed by the Governor. This bill adds the Superintendent of Public Instruction as an *ex-officio* member of the Board.

3. A joint resolution giving the assent of the State to the reception by the University of such money as congress may appropriate it for the support of an agricultural experiment station, and authorizing the organization and maintenance of such a station.

4. A bill appropriating for the State Laboratory of Natural History $7,300 per annum.

The appropriations granted are perhaps all that could be expected from this legislature. They will maintain the University fairly upon its present basis, but do not provide for that expansion and development which its friends so earnestly desire, and which the good name of the State and its essential interests imperatively demand. The present financial condition of the University is one that requires the utmost caution in providing for needful purposes without exceeding the resources within the control of the Trustees.

I present herewith the list of professors and instructors for your annual consideration and approval, with the usual detailed report of the work of the past term:

The period for which Assistant Professor Arthur T. Woods, U. S. N., was detailed for service here comes to a close, and he is ordered back to the regular duties of his profession. Professor Woods has been with us four years, and has performed the duties assigned him in the department of mechanical engineering with rare skill, tact and success. For the good of the school with which he has been connected, we could wish that he would resign from the navy and cast his lot permanently with us. I request that you will enter upon your records such a recognition of Professor Woods's services as they so well merit, and communicate it to his superiors at Washington.

Anticipating the vacancy which this removal creates, I have been in communication with several persons, but have no recommendation ready.

Lieut. H. H. Sargent, 2d Cavalry, U. S. A., has been compelled, on account of the continued ill health of his wife, to ask a relief from his detail for special duty at this University. The department has granted his request, and has ordered him back to his regiment. I much regret the necessity which has taken him from us, as the year's service has shown him to be a prudent and useful officer. No steps have yet been taken to secure a successor.

The question as to how best to secure an efficient woman in our educational force is still open. Circumstances, which at the time seemed beyond our control, have left us for the past year without such an officer. Without attempting to make any recommendation, I present the subject as one needing careful attention. It is my purpose to present a full discussion of the relations of women to the University at a later meeting.

I present a list of persons recommended by the Faculty for degrees and certificates to be awarded at the commencement, and of those who have been named to the Governor for brevet commissions in the State militia.

LIST OF GRADUATES.

College of Engineers—DEGREE OF BACHELOR OF SCIENCE.

School of Mechanical Engineering—

John B. Blake,
Ervin Dryer,
Charles W. Henson,
Clarence A. Lloyde,
Henry M. Lyman,
Grant W. Spear.

School of Civil Engineering—

William Barclay,
Edward I. Cantine,
Mark Fargusson,
Phil A. Goodwin.

School of Mining Engineering—

Herbert B. Williams.

College of Natural Science—DEGREE OF BACHELOR OF SCIENCE.

School of Chemistry—

Percival L. Clark,
Mark Powers,
Bedros Tatarian.

School of Natural History—

Bruce Fink,
Walter R Mitchell,
Merton B. Waite.

College of Literature and Science—DEGREE OF BACHELOR OF LETTERS.

School of English and Modern Languages—

Grant Gregory,
Albert C. Moore,
Mary H. Williamson.

Certificates for Elective Courses—

Ida Eisenmayer,
Angelina Gayman,
Frank M. Gilbert,
Rudolph Z. Gill.
Edward W. Goldschmidt,
Edward S. Johnson,
Frank B. Long,
Albert L. Richards,
John I. Rinaker, Jr.,
Horace Taylor.

Recommended to Governor for Military Commissions—

Edward I, Cantine,
Mark Fargusson
Phil A. Goodwin,
Albert C. Moore,
Merton B. Waite.

REPAIRS AND IMPROVEMENTS.

Assignments for account of State appropriations for buildings and grounds have been made from time to time which have not yet been reported upon. I give a statement of sums assigned, sums used, and balances unused, or yet needed for completing the work desired. From this it appears that $594.90 remain assigned for items of improvement which are not yet completed, while the Business Agent's report shows that $564.39 remain to credit of account State appropriations for buildings and grounds, 1886-7.

I have no doubt that all these improvements may be completed within the amount of the appropriation about to expire.

The sum asked of the legislature for this purpose for the years 1887-9 was unfortunately reduced from $3,000 to $2,000 per annum, and this reduction will make it necessary to postpone some much needed improvements.

I have to present several items which need attention, and to ask that you will direct what, in your judgment, should be done, and to what extent.

1. You have the report of the Executive Committee as to a contract for furnishing the University with water. The water company will bring its main south on Wright street and into the grounds at such point as you shall designate. I recommend that the line be laid parallel to the front of the main building, at a distance of about 80 feet. That one of the hydrants be set a little west of the line of the west front of the main building, and the other opposite a point midway between the main and the chemical buildings. The connections with the buildings themselves must be made by the University at its own expense. I suggest that a four-inch pipe be laid from a suitable point in front of the main building, running under the main building to a point near the boiler house. That this pipe be connected with both the inside and outside stand pipes of the main building, and that a hydrant be set in the area near the boiler house.

Also, that from the end of the company's main in the grounds, a two-inch pipe be laid to connect with the water system of the chemical building.

Also, that a one inch pipe be run from the hydrant at corner of Springfield avenue and Wright street to connect with the machine shop.

The estimates for this work are as follows:

For connections with main building	$197 00
For connection with chemical building	63 00
For connection with machine shop	69 00
Total	$329 00

2. Pursuant to authority given by you, apparatus for instruction in electrical engineering has been ordered and will be received before the opening of the fall term. This apparatus is delicate in its action, and needs to be as far as possible from causes which induce vibration—that is, it should be brought down to the ground. The best way that I can see to accomplish this end, short of building for this work an entirely new house, which is not now practicable, is to take a portion of the unoccupied basement of the east wing in the main building, sometimes called the modelling room. I have had estimates prepared for the proper fitting of this room, which amount to $703.17. This sum is evidently more than can be spared. I therefore propose simply to erect a partition cutting off twenty feet in width from the south end of the room, and to lay a brick floor upon a properly concreted and asphalted surface of the ground. I have, therefore, selected the items that seem indispensable, which amount to $284.50.

3. Professor Forbes asks that $300 be given to put suitable cases in the middle room of the laboratory apartments in basement of west wing, to furnish accommodation for the books and specimens of the Entomologist's office. He wishes to connect more closely the work of the Entomologist's office with that of the State Laboratory and to vacate the room on the first floor for lecture purposes. This is doubtless desirable.

4. The fence about the old campus has been a subject for inquiry for a long time. It is much decayed and should be replaced. The whole distance to be fenced is 3,360 feet. The estimate for a neat board fence, with oak posts, four boards high, with two crossed and cap, thoroughly made and painted is $695.10. A cheaper fence could be made, but would hardly seem fitting for so conspicuous a place. I should prefer to wait another year rather than to put up a fence less suited to the place.

These four items sum up as follows:

Water connections	$329 00
Physical laboratory	284 50
Laboratory for natural history	300 00
New fence	695 10
Total	$1,608 60

The total appropriation available for buildings and grounds for the year is $2,000, of which one-half should be reserved for current care of grounds and buildings. It is evident that certain ones of the items named must be omitted.

I present a report from Professor Forbes, as Director of the State Laboratory of Natural History, and second his request that authority may be given him to print it as a bulletin from the Laboratory.

I present the quarterly report from the farms, made by Professor Morrow.

It will be observed that a considerable balance appears to account of State appropriations for physical and chemical laboratories. Most of this has already been assigned for purchases already ordered, which have not been received, mostly importations. I ask leave to use the balance of this appropriation, about $50 unassigned, and so much as may be needed of the new appropriation for apparatus and supplies, available July 1, as follows:

For steel tapes and other items for civil engineering (Professor Baker)	$25
For continuing purchase of photographs and mounting the same, school of architecture (Professor Ricker)	100
For additional apparatus for testing machine	100
For continuing work on museum of industrial art	50

From State appropriations for cabinets for current year, not expended:

For continuing work on herbarium (Professor Burrill)	$100
For material for use in zoölogical laboratory (Professor Forbes)	50

I have arranged to have the University as fully illustrated as may be at the exhibition to be made in connection with the coming meeting at Chicago of the National Educational Association. The Illinois Central R. R. will send and return our goods free of charge; but some other expenses will necessarily be incurred, and I ask leave to use $100 for this purpose, if necessary.

I have to ask such appropriation for advertising purposes as you shall find can be spared for that purpose. Respectfully submitted,

S. H. PEABODY, Regent.

The report was received for further consideration.

On recommendation of the Faculty, degrees and certificates were granted. See list in Regent's report.

The report from Professor S. A. Forbes upon the work of the Laboratory of Natural History was received, and authority given to have the same printed in form of a bulletin.

Trustees McLean and Shawhan were temporarily appointed on the Auditing Committee to take places of absent members.

The report from Professor Morrow was referred to the Farm Committee:

UNIVERSITY, JUNE 2, 1887.

Dr. S. H. Peabody, Regent:

SIR: During the three months ending May 31, 1887, the receipts from the University farms have been $1,384 86
The expenses have been 565 79

Leaving balance to credit of farm $819 07

The receipts may be classified as follows: Cattle, $820.50; hogs, $79.75; mare, $90.00; butter and milk, $47.55; poultry and eggs, $13.05; hay, $212.26; seed corn, $115.45; miscellaneous, $6.30.

In addition to these amounts, notes have been taken for $385 for shorthorn cattle sold at public sale May 26. At this sale six young bulls and six yearling heifers were sold for $740.

The season has been favorable for the work on the farms, which is well advanced. In general the live stock and growing crops are in good condition.

Respectfully submitted,

G. E. MORROW, Professor of Agriculture.

The Executive Committee submitted the following report, which was approved;

To the Board of Trustees of the University of Illinois:

GENTLEMEN: The undersigned, your Executive Committee, respectfully report that the Treasurer has duly presented his bond to this Board in the sum of $150,000, as required by resolution of this Board, together with his sureties, and we find the bond in due form and the sureties reported to us from reliable sources as ample, and your committee have approved the bond.

S. M. MILLARD,
C. BENNETT, } *Committee.*

The Business Agent submitted the following report, which was received and referred to the Auditing Committee:

S. M. Millard, Esq., President Board of Trustees, University of Illinois:

SIR: I have the honor to hand you herewith the financial statements due from the Business Agent at this time.

Paper A is a statement of the current appropriations made March 9, 1887, with expenditures and receipts under the same.

Paper B is a showing of the State appropriations.

Paper C is a list of vouchers presented for auditing, 451 to 675 inclusive.

Paper D is an estimate of receipts and expenses to September 1, 1887.

Paper E presents several asked for appropriations. These will be covered by receipts credited to the accounts, or very nearly so.

Respectfully submitted,

S. W. SHATTUCK, *Business Agent*

STATE APPROPRIATIONS.

Of July 1, 1885.	Appropriated.	Received.	Expended.	Balance.
Taxes on land (⅛ per annum)	$4,000 00	$3,433 15	$3,433 15	.....
Buildings and grounds (⅛ per annum)	6,000 00	6,000 00	5,435 61	$564 39
Laboratories (⅛ per annum)	3,000 00	3,000 00	1,791 10	1,208 90
Mechanical and architectural shops (⅛ per annum)	3,000 00	3,000 00	2,830 95	169 05
Books and publications (⅛ per annum)	3,000 00	3,000 00	2,589 44	410 56
Cabinets (⅛ per annum)	2,000 00	2,000 00	1,614 59	385 41
Current expenses of instruction (⅛ per annum)	24,000 00	24,000 00	24,000 00	.....
Machines and tools (⅛ per annum)	4,000 00	4,000 00	4,000 00	.....
Fire walls and ventilation	4,500 00	4,500 00	3,714 83	785 17
Total	$53,500 00	$52,933 15	$49,409 67	$3,523 48
Laboratory of Natural History	18,000 00	14,310 65	11,421 89	2,888 76

CURRENT APPROPRIATIONS.

March 9 to September 1, 1887.	Appropriated	Receipts also Appropriated	Expended.	Balance.
Board expenses	$300 00	.....	$129 32	$170 68
Salaries for instruction	19,916 00	.....	9,731 79	10,184 21
Salaries for services	1,159 00	.....	775 32	383 68
Buildings and grounds	.....	$25 00	.....	25 00
Fuel and lights	1,000 00	85 20	461 68	623 52
Stationery and printing	600 00	.....	479 10	120 90
Nebraska and Minnesota lands	21 00	20 00	5 30	35 70
Mechanical department	200 00	83 14	279 99	3 15
Architectural "	200 00	125 95	248 42	77 53
Agricultural "	400 00	1,384 86	562 69	1,222 27
Horticultural "	200 00	226 95	386 43	40 52
Military "	50 00	.....	26 70	23 30
Laboratories	200 00	100 00	284 52	15 48
Library and apparatus	50 00	.....	31 20	18 80
Incidental expenses	245 36	.....	98 26	147 10
Sundries.				
Furniture and fixtures	50 00	.....	9 25	40 75
University students' fees	.....	2,245 00	.....	2,245 00
Preparatory year fees	.....	332 50	480 00	.....

On motion of Trustee McLean, the following resolutions were adopted:

Resolved, That the President and Secretary be directed to draw their requisition upon the State Auditor for the balances due the State Laboratory of Natural History, for the publication of

bulletins, two hundred and twenty-five dollars, and for preparation and publication of the second volume of the zoölogical report, fifteen hundred dollars, on the appropriation made by the General Assembly for the year ending June 30, 1887.

Resolved, That the President and Secretary be directed to draw their requisitions on the State Auditor for such moneys as may be due on State appropriation for the University and for the State Laboratory of Natural History for the year, 1887-8.

Treasurer J. W. Bunn read his report as follows:

JOHN W. BUNN, TREASURER, IN ACCOUNT WITH THE UNIVERSITY OF ILLINOIS.

1887.		*Dr.*		
March	8	To balance		$11,394 03
	30	To interest on contract No. 1, A. Hubka	$7 50	
		" " " " 23, James Lowe	121 60	
		" " " " 33, Christian Hesse	136 20	
				265 30
	31	To amount received on account of University fees	$1,305 00	
		" " " preparatory year	175 00	
		" " " buildings and grounds	25 00	
		" " " architectural department	20 20	
		" " " rent Minnesota lands	20 00	
				1,545 20
April	13	" " from State, account of State Laboratory of Natural History		1,300 00
May	1	To interest on Sangamon school bonds		390 00
	17	" " on contract No. 40, Joseph Dezort		82 40
	26	" " " " " 4, J. T. Applegate, due January 1, 1888	56 32	
		To interest on contract No. 4, J. T. Applegate, due January 1, 1889	28 16	
				84 48
	31	To amount received on account of mechanical department	$83 14	
		" " " architectural department	105 75	
		" " " agricultural department	1,384 86	
		" " " horticultural department	226 95	
		" " " chemical laboratory	100 00	
		" " " fuel and lights	85 20	
		" " " university fees	960 00	
		" " " preparatory department	157 50	
				3,103 40
				$18,164 81
		Cr.		
		By amount paid on account Board expenses	$129 32	
		" " salaries	10,507 11	
		" " fuel and lights	461 68	
		" " stationery and printing	479 10	
		" " preparatory year	480 00	
		" " Nebraska lands	5 30	
		" " mechanical department	279 99	
		" " architectural department	247 42	
		" " agricultural department	562 59	
		" " horticultural department	386 43	
		" " chemical laboratory	285 52	
		" " military department	26 70	
		" " library and apparatus	31 20	
		" " incidental expense	98 26	
		" " furniture and fixtures	9 25	
				13,989 87
		State appropriations -		
		By amount paid on account buildings and grounds	$328 30	
		" " laboratories	328 31	
		" " mechanical and architectural shops	350 40	
		" " books and publications	234 93	
		" " cabinets	15 45	
		" " machines and tools	1,171 96	
		" " State Laboratory of Natural History	1,326 05	
				3,755 40
		Balance		419 54
				$18,164 81

Urbana, Ill., June 7, 1887. JOHN W. BUNN, Treasurer.

The report was received and referred to the Auditing Committee.

The Executive Committee submitted the following report:

To the Trustees of the University of Illinois:

GENTLEMEN: At the meeting of the Board held in September last, authority was given to the Regent and the Executive Committee to negotiate with the Champaign and Urbana Water Company (now the Union Water Supply Company) to bring their lines within the University grounds, and to supply the University buildings with water. This improvement has been deemed especially desirable as farther protection against fire. The Committee has attended to this duty, and the Executive Committee has entered into contract with the said Water Supply Company to lay a six inch main to the University grounds, and into them on such a line as the trustees may determine, to set at proper places two donble fire hydrants, and to furnish water to the University as required, not to exceed 500,000 gallons per annum; the University is to pay for this service, $400 per annum in equal quarterly payments of $100 each, and if an excess of 500,000 gallons per annum is used, to pay 25 cents per thousand gallons. The contract is to run for five years. A double hydrant is to be set at corner of Springfield avenue for protection of machine shops.

All of which is respectfully submitted.

S. H. PEABODY, *Regent.*
S. M. MILLARD, } Executive
CHAS. BENNETT, } Committee.

The report was received and the contract approved.

Dr. Peabody, as chairman of committee on agricultural experiment stations, submitted the following report:

To the Trustees of the University of Illinois:

GENTLEMEN: Your committee to whom was referred the matters concerning the organizing of an agricnltural experiment station at the University, pursnant to the provisions of an act of congress passed at its last session, respectfully reports:

That in accordance with a decision made by the Comptroller of the Treasury, it appears that no appropriation was made by congress for carrying into effect the provisions of the act referred to, and therefore no action can at present be taken by this University.

On receipt of a copy of the act of congress, the Governor of the State referred it to the General Assembly by a message, and the Assembly has, by joint resolution, a copy of which is hereto appended, given the assent required by the act of congress, and has authorized the University to establish and conduct such experiment station whenever congress shall appropriate funds for the support of such a station. All of which is respectfully snbmitted.

For the Committee,

S. H. PEABODY, *Chairman.*

SENATE JOINT RESOLUTION—35TH GENERAL ASSEMBLY.

WHEREAS, The Congress of the United States has passed an act approved by the President March 2, 1887, entitled "An act to establish agricultural experiment stations in connection with the colleges established in the several States nnder the provisions of an act approved July 2, 1862, and of the act supplementary thereto;" and

WHEREAS, It is provided in section nine of the aforesaid "that the grants of money authorized by this act are made subject to the legislative assent of the several States and Territories to the purposes of said grants;" therefore, be it

Resolved by the Senate, the House of Representatives concurring herein, That the assent of the General Assembly of the State of Illinois be, and is hereby given to the purposes of the grants made in said act, and that the Trustees of the University of Illinois be, and they are hereby authorized and empowered to organize and conduct an agricultural experiment station in connection with the agricultural college of said University of Illinois, in accordance with the terms and conditions expressed in the act of congress aforesaid.

Adopted by the Senate April 14, 1887.

JOHN C. SMITH, *President.*

Concurred in by the Honse of Representatives May 11, 1887.

W. F. CALHOUN, *Speaker.*

Filed in the office of the Secretary of State May 17, 1887.

UNITED STATES OF AMERICA, } ss. Office of Secretary.
STATE OF ILLINOIS, }

I, HENRY D. DEMENT, Secretary of State of the State of Illinois, do hereby certify that the foregoing is a trne copy of a joint resolution adopted by the 35th General Assembly of the State of Illinois now on file in this office.

IN WITNESS WHEREOF, I hereto set my hand and affix the Great Seal of State, at the City of Springfield, this 23d day of May, A. D. 1887.

HENRY D. DEMENT, *Secretary of State.*

The report was received and ordered to be placed on file.

Adjourned to 8 o'clock a. m.

Second Day's Session.

The Board met at 8:30 a. m. and adjourned to 3 o'clock p. m. in order to attend commencement exercises.

AFTERNOON SESSION.

The Board met at 3:30 p. m.

Present—Trustees Bennett, Clemens, Cobb, McLean, Millard, and Shawhan.

The Regent's report was taken up for consideration.

The recommendations in regard to the connections, etc., of the water works were approved and the Regent was authorized to locate the line of water pipes within the grounds of the University.

The committee on dormitories asked and were granted further time.

The expenditure of the State appropriation of $2,000 for the laboratory of metallurgy and mining was referred to the Regent and Professor Comstock, with power to act.

The following appropriations were made:

From State Appropriation for Buildings and Grounds—

$350 for water connections.
$300 for electrical laboratory.
$200 for building fence on west side of campus.

From State Appropriation for Cabinets—

$150 for partitions and cases.
$100 for work on herbarium.
$50 for material for laboratory.

From Current Funds—

$100 for Chicago exhibition, (sundries.)
$600 for advertising,
$100 for commencement expenses.
$50 for buildings and grounds.
$200 for fuel and light.
$100 for stationery and printing.
$35.48 for Regent's expenses to Springfield.

From State Appropriation for Apparatus and Material—

$275 for sundry purchases of apparatus.

The following appointments of professors and instructors, etc., were made for the academic year 1887–8:

T. J. Burrill, professor of botany and horticulture	$2,000	per annum
S. W. Shattuck, professor of mathematics	2,000	"
E. Snyder, professor of modern languages	2,000	"
J. C. Pickard, professor of English language and literature	2,000	"
N. C. Ricker professor of architecture	2,000	"
J. D. Crawford, professor of history and ancient langnages	2,000	"
G. E. Morrow, professor of agriculture	2,000	"
P. Roos, professor of industrial art and designing	1,800	"
I. O. Baker, professor of civil engineering	2,000	"
Wm. McMurtrie, professor of chemistry and mineralogy	2,000	"
S. A. Forbes, professor of zoölogy and entomology	1,000	"
T. B. Comstock, professor of mining engineering	1,800	"
J. H. Brownlee, professor of rhetoric and oratory	1,800	"
C. W. Rolfe, professor of geology	1,500	"
D. McIntosh, professor of veterinary science	1,800	"
N. Butler, Jr., professor of Latin	1,600	"
A. N. Talbott, assistant professor of engineering and mathematics	1,400	"

————————, assistant professor of mechanical engineering	1,800	per annum.
W. H. Garman, professor of zoölogy	1,000	"
E. A. Kimball, instructor in iron work and foreman	1,500	"
G. W. Parker, instructor in wood work and foreman	1,080	"
————————, instructor in mathematics	800	"
————————, instructor in modern langnages	600	"
Maud Kimball, teacher of vocal and instrumental music	150	"
A. W. Palmer, first assistant in chemical laboratory	900	"
————————, second assistant in chemical laboratory	400	"
T. F. Hunt, assistant in agriculture	960	"
————————, assistant in drawing	250	"
A. B. Baker, janitor	840	"

Trustee Bennett moved that the Regent be given authority to fill such places of assistants as may be vacant. Carried.

The Farm Committee made the following report:

To the Board of Trustees:

Your Farm Committee, to whom was referred the report of Professor Morrow, respectfully report that they recommend that the report be approved, and that authority be given to Prof. Morrow to purchase a sufficient number of steers to utilize the surplus grass and other feed on the farm, and that the necessary appropriation of $1,000 be made for that purpose.

CHAS. BENNETT,
E. COBB,
G. R. SHAWHAN,
} *Farm Committee.*

The report was approved, and $1,000 were appropriated for the purchase of steers.

The Auditing Committee submitted the following report, which was received:

CHAMPAIGN, June 8, 1887.

To the President and Board of Trustees of the University of Illinois:

The undersigned Auditing Committee would respectfully report that we have carefully examined the accounts and bills on which vouchers Nos. 451 to 675, inclusive, were issued and paid and find the same correct as reported by the Business Agent.

We also examined the books of the Treasurer and find them correct as reported and on file.

ALEX. McLEAN,
G. R. SHAWHAN,
} *Committee.*

A proposition of boring for natural gas on the University lands was referred to the Executive Committee.

Trustee Bennett moved the adoption of the following resolution:

Resolved, That this Board desires to put upon record its high appreciation of the excellent service rendered to the University by Assistant Engineer Arthur T. Woods, U. S. N., during the four years of his detail as Assistant Professor of Mechanical Engineering. His thorough scholarship, his tact and skill as an instructor, his conscientious efficiency as an officer, always tempered by his genuine courtesy as a man, have won for him the confidence of his superiors, the esteem of his associates, and the affection of his pupils, all of whom join in earnest wishes for his success in his chosen profession.

The resolution was adopted unanimously, and it was ordered that a copy thereof be transmitted to the Secretary of the Navy.

Adjourned.

S. M. MILLARD, *President.*

E. SNYDER, *Secretary.*

List of Warrants Belonging to the Fiscal Year Ending August 31, 1886.

No.	Date.	To Whom.	For What.	Amount.
	1886.			
1001	Aug. 31....	Trevett Bros	Hardware	3 53
1002	" 31....	J. E. Lindsey	Sand	11 00
1003	" 31....	M. E. Lapham	Cement	9 25
1004	" 31....	Robinson & Burr	Castings, etc	20 39
1005	" 31....	Besore & Bro	Lumber, lime, etc	449 37
1006	" 31....	J. A. Fay & Co	Belting	13 78
1007	" 31....	W. Price	Paints and oils	50 28
1008	" 31....	Trevett & Green	Hardware	55 90
1009	" 31....	Jones & Laughlin	Iron	18 36
1010	" 31....	Champaign County Gazette	Printing	47 95
1011	" 31....	Henry & Kariher	Soap, brooms, etc	26 06
1012	" 31....	Illinois Machine Works	Repairs	3 00
1013	" 31....	James B. Clow & Son	Registers, etc	90 42
1014	" 31....	C. W. Anderson	Plastering	34 74
1015	" 31....	Mattoon Manufacturing Co	Coal	100 00
1016	" 31....	Enterprise Coal Co	"	121 50
1017	" 31....	Crane Bros. Manufacturing Co.	Wrench and packing	3 37
1018	" 31....	D. McLennan	Police service	5 00
1019	" 31....	G. E Marshall	Index	4 50
1020	" 31....	Kellogg Newspaper Co	Advertisement	208 00
1021	" 31....	Farm, Field & Stockman Pub Co	"	17 00
1022	" 31....	Prairie Farmer Pub. Co	"	16 80
1023	" 31....	Century Co	"	22 50
1024	" 31....	Milton George	"	16 80
1025	" 31....	Country and Village Schools	"	10 00
1026	" 31....	J. A. Cline	Lathing	12 00
1027	" 31....	A. Iten	Labor	27 75
1028	" 31....	S. Yamada	"	5 75
1029	" 31....	P. Coffey	Cleaning well	2 00
1030	" 31....	Mrs. A. B. Baker	Washing towels	2 00
1031	" 31....	R. Birkholz	Painting, etc	18 40
1032	" 31....	C. G. Morrow	Hauling	7 50
1033	" 31....	Miller Lock Co	Locks	5 00
1034	" 31....	Lord & Thomas	Advertisements	61 70
1035	" 31...	Illinois State Register	"	5 65
1036	" 31....	Illinois Central Railroad	Freight, 6 months	566 85
1037	" 31....	E. W. McAllister	Postage, 3 "	97 75
1038	" 31....	S. W. Shattuck	Petty expense	44 74
1039	" 31....	Architectural department	Labor and material	257 23
1040	" 31....	" "	" " "	560 83
1041	" 31....	Mechanical "	" " "	151 85
1042	" 31....	" "	" " "	92 67
1043	" 31....	Architectural "	" " "	40 23

List of Warrants for the Fiscal Year Ending August 31, 1887.

No.	Date.	To Whom	For What.	Amount.
	1886.			
1	Sept, 30....	S. H. Peabody.....	Salary, September, 1886.....	$333 33
2	" 30....	T. J. Burrill.....	" "	166 66
3	" 30....	S. W. Shattuck.....	" "	166 66
4	" 30....	E. Snyder.....	" "	166 66
5	" 30....	J. C. Pickard.....	" "	166 66
6	" 30....	N. C. Ricker.....	" "	166 66
7	" 30....	J. D. Crawford.....	" "	166 66
8	" 30....	G. E. Morrow.....	" "	166 66
9	" 30....	P. Roos.....	" "	141 66
10	" 30....	I. O. Baker.....	" "	150 00
11	" 30....	W. McMutrie.....	" "	166 66
12	" 30....	S. A. Forbes.....	" "	96 66
13	" 30....	T. B. Comstock.....	" "	150 00
14	" 30....	J. H. Brownlee.....	" "	150 00
15	" 30....	N. Butler.....	" "	125 00
16	" 30....	C. W. Rolfe.....	" "	125 00
17	" 30....	A. T. Woods.....	" "	40 00
18	" 30....	A. N. Talbot.....	" "	100 00
19	" 30....	D. McIntosh.....	" "	150 00
20	" 30....	W. H. Garman.....	" "	84 00
21	" 30....	E. A. Kimball.....	" "	125 00
22	" 30....	G. W. Parker.....	" "	80 00
23	" 30....	S. W. Stratton.....	" "	60 00
24	" 30....	A. W. Palmer.....	" "	70 00
25	" 30....	T. F. Hunt.....	" "	80 00
26	" 30....	G. W. McCluer.....	" "	60 00
27	" 30....	A. B. Baker.....	" "	70 00
28	" 30....	C. E. Eggert.....	" "	50 00
29	" 30....	S. Millard.....	Expense to meeting.....	20 48
30	" 30....	P. Earle.....	" "	17 25
31	" 30....	A. McLean.....	" "	22 05
32	" 30....	G. A. Eiseumayer.....	" "	15 50
33	" 30....	J. W. Buun.....	Premium on bonds and taxes.....	173 20
34	" 30....	Burnham, Trevett & Mattis.....	Expense on land sales.....	73 50
35	" 30....	Abendroth & Root.....	Boiler tubes.....	193 65
36	" 30....	Singer & Talcott Stone Co.....	Cut stone.....	23 33
37	" 30....	Trevett & Green.....	Tin work and plumbing.....	563 19
38	" 30....	Nettie Ayers.....	Work on herbarium.....	46 20
39	" 30....	Illinois Central Railroad.....	Freight.....	221 00
40	" 30....	W. R. Mitchell.....	Assistant in laboratory.....	10 80
41	" 30....	T. J. Burrill.....	Assistance Nat. Hist. Laboratory.....	100 00
42	" 30....	A. B. Seymour.....	" " "	83 34
43	" 30....	C. W. Weed.....	Salary, September, 1886.....	50 00
44	" 30....	C. F. Hart.....	" "	45 00
45	" 30....	C. W. Woodworth.....	" "	40 00
46	" 30....	C. M. Maltby.....	" "	45 00
47	" 30....	M. J. Snyder.....	" August and September 1886.....	44 23
48	" 30....	N. Bardwell.....	Drawings.....	20 00
49	" 30....	E. Shattuck.....	"	7 00
50	" 30....	S. A. Forbes.....	Expenses Lab. Nat. Hist.....	183 33
51	Oct. 5....	C. Bennett.....	Expenses to Board meeting.....	2 00
52	" 5....	H. Taylor.....	Salary, September, 1886.....	25 00
53	" 5....	A. J. Stoneburner.....	" "	22 50
54	" 5....	G. Peabody.....	" "	14 74
55	" 5....	A. Iten.....	Work.....	18 87
56	" 5....	W. R. Mitchell.....	Advertising.....	2 50
57	" 5....	R. Birkhoiz.....	Painting and glazing.....	18 60
58	" 5....	J. Tierney.....	Work in Architectural shop.....	58 50
59	" 5....	J. Creek.....	" " "	58 05

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
60	Oct. 5....	Agricultural department	Farm expense	$358 43
61	" 5....	R. S. Wilber	Hauling	68 00
62	" 5....	Central Union Telephone Co	Rent of instrument	15 00
63	" 5....	J. Lindsey	Sand	6 00
64	" 5....	J. Furst	Hauling	2 50
65	" 5....	J. Wilske	Mason work	18 25
66	" 5....	I. B. & W. R. R.	Freight	53 65
67	" 5....	Nellie Bardwell	Drawings	10 00
68	" 5....	C. Woodworth	Salary, September, 1886	33 33
69	" 5....	Publishers Education	Subscription	1 20
70	" 5....	E. D. Bosworth	Books	26 00
71	" 5....	Am. Inst. of Mining Eng	Transactions	5 00
72	" 5....	Brown & Co	Books	11 00
73	" 5....	McClurg & Co	"	62 52
74	" 5....	Pay roll of women	Cleaning building	51 50
75	" 5....	Students' pay roll	Labor, September, 1886	180 27
76	" 31....	S. H. Peabody	Salary, October 2, 1886	333 33
77	" 31....	T. J. Burrill	" "	166 66
78	" 31....	S. W. Shattuck	" "	166 66
79	" 31....	E. Snyder	" "	166 66
80	" 31....	J. C. Pickard	" "	166 66
81	" 31....	N. C. Ricker	" "	166 66
82	" 31....	J. D. Crawford	" "	166 66
83	" 31....	G. E. Morrow	" "	166 66
84	" 31....	P. Roos	" "	141 66
85	" 31....	I. O. Baker	" "	150 00
86	" 31....	W. McMurtrie	" "	166 66
87	" 31....	S. A. Forbes,	" "	96 66
88	" 31....	T. B. Comstock	" "	150 00
89	" 31....	J. H. Brownlee	" "	150 00
90	" 31....	C. W. Rolfe	" "	125 00
91	" 31....	D. McIntosh	" "	150 00
92	" 31....	N. Butler, Jr	" "	125 00
93	" 31....	A. T. Woods	" "	40 00
94	" 31....	A. N. Talbot	" "	100 00
95	" 31....	W. H. Garman	" "	84 00
96	" 31....	E. A. Kimball	" "	125 00
97	" 31....	G. W. Parker	" "	80 00
98	" 31....	S. W. Stratton	" "	60 00
99	" 31....	A. W. Palmer	" "	70 00
100	" 31....	T. F. Hunt	" "	80 00
101	" 31....	G. W. McCluer	" "	60 00
102	" 31....	C. E. Eggert	" "	50 00
103	" 31....	C. B. Green	" "	40 00
104	" 31 ...	H. Taylor	" "	25 00
105	" 31....	A. B. Baker	" "	70 00
106	" 31....	M. J. Snyder	" "	45 00
107	" 31....	C. M. Maltby	" "	45 00
108	" 31....	C. A. Hart	" "	45 00
109	" 31....	C. M. Weed	" "	50 00
110	" 31....	S. A. Forbes	Expenses Laboratory Natural History	550 00
111	" 31....	A. J. Stoneburner	Salary, October, 1886	40 00
112	" 31....	Lyon & Healy	Music rack, etc	34 36
113	" 31....	Enterprise Coal Co	Coal	157 50
114	" 31....	C. & U. Gas Co	Lights	94 00
115	" 31....	Fuller & Fuller	Glass and chemicals	59 67
116	" 31....	Larrabee & North	Sash cord, etc	11 37
117	" 31....	J. R. Reasoner	Books	22 00
118	" 31....	U. S. Patent Office	Binding reports	15 60
119	" 31....	Am. Philological Society	Book	2 00
120	" 31....	C. Schoenhof	Books	7 79
121	" 31....	J. H. Hickox	Periodicals	2 00
122	" 31....	Illinois Machine Works	Pump	47 88
123	" 31....	Browne & Sharpe M'f'g. Co	Tools	234 00
124	" 31....	C. W. Anderson	Plastering	31 75
125	" 31....	C H. Besly & Co	Tools	121 65
126	Nov. 15....	C. Bennett	Expense to meeting of trustees	7 00
127	" 15....	P. Earle	" " "	17 25
128	" 15....	S. H. Peabody	Expense in inspection of land	129 00
129	" 15....	Horticultural department	Expense September and October	6 09
130	" 15....	Agricultural department	Expense October	251 85
131	" 15....	W. G. Gwinn	Turning	5 00
132	" 15....	B. V. Page & Co	Engine oil	7 88
133	" 15....	J. Tierney	Work in shops	58 05
134	" 15....	T. Wright & Son	Castings	13 84
135	" 15...	Abendroth & Root M'f'g. Co	Boiler tubes	83 30
136	" 15....	Grace Peabody	Salary October	22 90

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1886.			
137	Nov. 15....	Department of Interior	Map	$1 50
138	" 15....	C. Schoenhof	Books	9 75
139	" 15....	A. C. McClurg & Co	Books and stationery	46 19
140	" 15....	P. Pryibil	Machine	198 00
141	" 15....	Kellogg, Johnson & Bliss	Hardware and tools	170 38
142	" 15....	C. H Besly & Co	Hardware	7 56
143	" 15....	A. N. Davis	Sand	6 25
144	" 15....	Phil Coffey	Cleaning well	11 00
145	" 15....	W. T. Pratt	Roof repairs	11 65
146	" 15....	R. Birkholz	Painting	12 90
147	" 15....	A. Iten	Work on grounds	7 51
148	" 15....	Nettie Ayres	Assistance in Nat. History Laboratory	36 00
149	" 15....	N. Bardwell	" " " "	14 00
150	" 15....	Students' pay roll	Labor, October, 1886	201 90
151	" 30....	S. H. Peabody	Salary, November, 1886	333 33
152	" 30....	T. J. Burrill	" "	166 66
153	" 30....	S. W. Shattuck	" "	166 66
154	" 30....	E. Snyder	" "	166 66
155	" 30....	J. C. Pickard	" "	166 66
156	" 30....	N. C. Ricker	" "	166 66
157	" 30....	J. D. Crawford	" "	166 66
158	" 30....	G. E. Morrow	" "	166 66
159	" 30....	P. Roos	" "	141 66
160	" 30....	I. O. Baker	" "	150 00
161	" 30....	W. McMurtrie	" "	166 66
162	" 30....	S. A. Forbes	" "	96 66
163	" 30....	T. B. Comstock	" "	150 00
164	" 30....	J. H. Brownlee	" "	150 00
165	" 30....	C. W. Rolfe	" "	125 00
166	" 30....	D. McIntosh	" "	150 00
167	" 30....	N. Butler	" "	125 00
168	" 30....	A. T. Woods	" "	49 00
169	" 30....	A. N. Talbot	" "	100 00
170	" 30....	W. H. Garman	" "	84 00
171	" 30....	E. A. Kimball	" "	125 00
172	" 30....	G. W. Parker	" "	80 00
173	" 30....	S. W. Stratton	" "	60 00
174	" 30....	A. W. Palmer	" "	70 00
175	" 30....	T. F. Hunt	" "	80 00
176	" 30....	G. W. McCluer	" "	60 00
177	" 30....	E. Eggert	" "	50 00
178	" 30....	C. B. Green	" "	40 00
179	" 30....	H. Taylor	" "	25 00
180	" 30....	A. B. Baker	" "	70 00
181	" 30....	A. J. Stoneburner	" "	40 00
182	" 30....	M. C. Kimball	" fall term and fees	94 00
183	" 30....	S. W. Shattuck	" Business Agent for 3 months	75 00
184	" 30....	M. J. Snyder	" November, 1886	55 00
185	" 30....	C. Maltby	" "	45 00
186	" 30....	C. A. Hart	" "	45 00
187	" 30....	C. M. Weed	" "	60 00
188	" 30....	D. Weeks	Sand	3 00
189	" 30....	Illinois Central Railroad	Freight on coal, etc	68 46
190	" 30....	I. B. & W. Railroad	" machines, etc	11 44
191	" 30....	American Express Co	Charges	15 10
192	" 30....	W. E. McKee	Stove pipe	1 00
193	" 30....	G. Ely	Coal	7 70
194	" 30....	W. U. Telegraph Co	Dispatches	8 25
195	" 30....	Mahla & Chappel	Acid	11 00
196	" 30....	Goodyear Rubber Co	Tubing	6 70
197	" 30....	Illinois Zinc Co	Granulated zinc	11 00
198	" 30....	Philip Boute	Apparatus	5 65
199	" 30....	West Electric Co	"	14 22
200	" 30....	Peoria Pottery Co	Clay	2 00
201	" 30....	F. Miller	Tuning piano	2 00
202	" 30....	E. Miller	Ribbons	1 80
203	" 30....	Bloomington Bulletin	Advertising	4 00
204	" 30	Stock Journal Co	"	13 30
205	" 30....	W. O. Davis	"	8 50
206	" 30....	Illinois School Journal	"	4 50
207	" 30....	Cranston & Stowe	"	13 44
208	" 30....	A. H. Andrews	Castings	3 00
209	" 30....	Lyon & Healy	Drum heads	4 50
210	" 30....	James Clow & Sons	Fittings	6 35
211	" 30....	G. F. Kimball	Glass	9 02

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1886.			
212	Nov. 30....	J. A. Fay & Co	Files and pulley	$10 23
213	" 30....	J. E. Wollensak	Hardware	5 53
214	" 30....	Nason M'f'g Co	Grates	4 60
215	" 30....	Meyer Bros. & Co	Chemicals	1 40
216	" 30....	R. N. Paden	Expense to meeting of Trustees	23 00
217	" 30....	G. Peabody	Salary, November, 1886	13 63
218	" 30....	P. Coffey	Work on grounds	9 90
219	" 30....	J. Hurst	"	15 65
220	" 30....	N. Ayers	" on herbarium	28 22
221	" 30....	M. B. Waite	Botanical assistant	17 70
222	" 30....	N. Bardwell	Botanical and other drawings	14 00
223	" 30....	Pay roll of women	Cleaning rooms	13 00
224	" 30....	Illinois Central Railroad	Freight on coal	32 80
225	" 30....	J. Tierney	Work in shop	23 40
226	" 30....	Academy Science, Phila	File of Journal	83 00
227	" 30....	Amer. Shorthorn Breeders'	Handbook, vols. 30 and 31	9 25
228	" 30....	University New York	Four vols. Nat. Hist. N. Y.	10 00
229	" 30....	Subscription News Co	Periodicals, 1887	298 15
230	" 30....	W. Price	Paint and oil	24 73
231	" 30....	Larrabee & North	Veneering, etc	45 15
232	" 30....	Enterprise Coal Co	Two cars coal	31 50
233	" 30....	Champaign & Urbana Gas Co	Gas, October, 1886	44 00
234	" 30....	G. C. Willis	Towels and flannel	7 83
235	" 30....	R. S. Wilber	Hauling	106 20
236	" 30....	Trevett & Green	Hardware	113 48
237	" 30....	H. Swannell	Chemicals, etc	63 85
238	" 30....	E. B. Benjamin	Apparatus	578 15
239	" 30....	J. W. Queen	Glass and tubing	52 45
240	" 30....	Robinson & Burr	Casting and work	35 69
241	" 30....	Champaign County Gazette	Printing and binding	149 49
242	" 30....	Agricultural department	Expense, November, 1886	597 94
243	" 30....	Illini	Printing and advertising	20 66
244	" 30....	E. N. McAllister	Postage, 3 months	35 50
245	" 30....	S. W. Shattuck	Petty expense, 3 months	52 27
246	" 30....	Credit Ill. Cent. R. R. donation	Freights	415 89
247	" 30....	" .mechanical department	Labor and material	74 01
248	" 30....	" architectural department	" "	469 34
249	" 30....	" agricultural department	" teaming	58 12
250	" 30....	Students' labor pay roll	November, 1886	181 00
251	Dec. 31....	S. M. Millard	Expense to meeting	20 68
252	" 31....	A. McLean	" "	37 35
253	" 31....	G. C. Eisenmayer	" "	43 50
254	" 31....	J. T. Pearman	" "	12 00
255	" 31....	C. Bennett	" "	3 50
256	" 31....	G. Gregory	Salary as band leader	15 00
257	" 31....	I. O. Baker	Petty expense C. E. department	4 80
258	" 31....	A. B. Baker	Washing towels	2 10
259	" 31....	E. M. Shaw	Work and straw	5 50
260	" 31....	Anton Iten	Work on grounds	4 50
261	" 31....	J. Morris	Hauling	2 25
262	" 31....	Kellogg, Johnston & Bliss	Hardware	3 32
263	" 31....	E. Jenkins	Work	3 00
264	" 31....	Besore & Bros	Lumber and lime	26 22
265	" 31....	Champaign & Urbana Gas Co	Gas, November, 1886	52 00
266	" 31....	J. Morrow	Work	3 80
267	" 31....	G. W. Franklin	Work with team	6 25
268	" 31....	S. Garrison	Mason work	13 47
269	" 31....	R. Birkholz	Painting and glazing	10 80
270	" 31....	J. Hamilton & Co	Keg of asphalt	3 00
271	" 31....	Bausch & Lomb. Optical Co	Slides and covers	21 56
272	" 31....	D. C. Long	Book	5 00
273	" 31....	A. C. McClurg & Co	Books	31 28
274	" 31....	N. Bardwell	Drawing	3 75
275	" 31....	J. Lindsley	Sand	1 50
276	" 31....	S. H. Peabody	Salary, December, 1886	333 33
277	" 31....	T. J. Burrill	" "	166 66
278	" 31....	S. W. Shattuck	" "	166 66
279	" 31....	E. Snyder	" "	166 66
280	" 31....	J. C. Pickard	" "	166 66
281	" 31....	N. C. Ricker	" "	166 66
282	" 31....	J. D. Crawford	" "	166 66
283	" 31....	G. E. Morrow	" "	166 66
284	" 31....	P. Roos	" "	141 66
285	" 31....	I. O. Baker	" "	150 00
286	" 31....	W. McMurtrie	" "	166 66

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1886.			
287	Dec. 31....	S. A. Forbes	Salary, December, 1886	$96 66
288	" 31....	T. B. Comstock	" "	150 00
289	" 31....	J. H. Brownlee	" "	150 00
290	" 31....	C. W. Rolfe	" "	125 00
291	" 31....	D. McIntosh	" "	150 00
292	" 31....	N. Butler	" "	125 00
293	" 31....	A. T. Woods	" "	40 00
294	" 31....	A. N. Talbot	" "	100 00
295	" 31....	W. H. Garman	" "	84 00
296	" 31....	E. A. Kimball	" "	125 00
297	" 31....	G. W. Parker	" "	80 00
298	" 31....	S. W. Stratton	" "	60 00
299	" 31....	A. W. Palmer	" "	70 00
300	" 31....	T. F. Hunt	" "	80 00
301	" 31....	G. W. McCluer	" "	60 00
302	" 31....	C. Eggert	" "	50 00
303	" 31....	C. B. Green	" "	40 00
304	" 31....	H. Taylor	" "	25 00
305	" 31....	A. B. Baker	" "	70 00
306	" 31....	A. J. Stoneburner	" "	65 00
307	" 31....	M. J. Snyder	" "	50 00
308	" 31....	C. M. Maltby	" "	45 00
309	" 31....	C. A. Hart	" "	45 00
310	" 31....	C. M. Weed	" "	55 00
311	" 31....	S. A. Forbes	Expenses State Laboratory Nat. History.	550 00
312	" 31....	C. Schoenhof	Books	7 96
313	" 31....	E. B. Benjamin	Mufflers	7 55
314	" 31....	A. B. Seymour	Three reams covers	18 00
315	" 31....	W., St. L. & P. R. R	Freight	2 14
	1887.			
316	Jan. 15....	Grace Peabody	Salary, December, 1886	12 87
317	" 15....	E. T. Engles	Firing nights	30 00
318	" 15....	Illinois Central R. R	Freight	66 15
319	" 15....	J. Tierney	Work in architectural shop	46 35
320	" 15....	Agricultural department	Expenses, December, 1886	183 30
321	" 15....	Horticultural department	" "	47 85
322	" 15....	N. Ayers	Work on herbarium	22 80
323	" 15....	W. T. Pratt	Roof repairs	14 80
324	" 15....	R. Birkholz	Painting and glazing	12 40
325	" 15....	Students' pay roll	December, 1886	132 83
326	" 31....	S. H. Peabody	Salary, January, 1887	333 33
327	" 31....	T. J. Burrill	" "	166 66
328	" 31....	S. W. Shattuck	" "	166 66
329	" 31....	E. Snyder	" "	166 66
330	" 31....	J. C. Pickard	" "	166 66
331	" 31....	N. C. Ricker	" "	166 66
332	" 31....	J. D. Crawford	" "	166 66
333	" 31....	G. E. Morrow	" "	166 66
334	" 31....	P. Roos	" "	141 66
335	" 31....	I. O. Baker	" "	150 00
336	" 31....	W. McMurtrie	" "	166 66
337	" 31....	S. A. Forbes	" "	96 66
338	" 31....	T. B. Comstock	" "	150 00
339	" 31....	J. H. Brownlee	" "	150 00
340	" 31....	D. McIntosh	" "	150 00
341	" 31....	C. W. Rolfe	" "	125 00
342	" 31....	N. Butler	" "	125 00
343	" 31....	A. T. Woods	" "	40 00
344	" 31....	A. N. Talbott	" "	100 00
345	" 31....	W. H. Garman	" "	84 00
346	" 31....	E. A. Kimball	" "	125 00
347	" 31....	G. W. Parker	" "	80 00
348	" 31....	S. W. Stratton	" "	60 00
349	" 31....	A. W. Palmer	" "	70 00
350	" 31....	T. F. Hunt	" "	80 00
351	" 31....	G. W. McCluer	" "	60 00
352	" 31....	C. Eggert	" "	50 00
353	" 31....	C. B. Green	" "	40 00
354	" 31....	H. Taylor	" "	25 00
355	" 31....	A. B. Baker	" "	70 00
356	" 31....	A. J. Stoneburner	" "	65 00
357	" 31....	W. R. Mitchell	Assistant in Nat. Hist. Lab	4 80
358	" 31....	F. W. Stevens	Work for " " "	14 55
359	" 31....	M. J. Snyder	Salary, January, 1887	50 00
360	" 31....	C. M. Maltby	" "	45 00

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
361	Jan. 31....	C. A. Hart	Salary, January, 1887	$45 00
362	" 31....	C. M. Weed	" "	55 00
363	" 31....	Central Union Telephone Co	Quarters' rent	15 00
364	" 31....	W. T. Comstock	Subscription	4 50
365	" 31....	A. Iten	Labor on grounds	5 53
366	" 31....	E. N. McAllister	Subscription for periodicals	3 15
367	" 31....	Enterprise Coal Co	3 cars coal	54 00
368	" 31....	Crane Bros. Manufacturing Co.	Rubber valves	3 00
369	" 31....	Champaign & Urbana Gas Co	Gas, December, 1886	48 00
370	" 31....	P. Boute	Repairs of apparatus	1 00
371	" 31....	A. M. Coffeen	Coal	68 72
372	" 31....	G. C Willis	Toweling	4 93
373	" 31....	Western Electric Co	Connectors	6 75
374	" 31....	S. V. Manspeaker	Soap and sundries	15 04
375	" 31....	E. W Blatchford	Tin and lead	17 68
376	Feb. 15....	Students' pay roll	January, 1887, labor	144 54
377	" 15....	E. Engle	Night firing	35 00
378	" 15....	G. Peabody	Salary, January, 1887	14 12
379	" 15....	S. Sallee	Work on boilers	8 00
380	" 15....	J. Tierney	" in shops	46 80
381	" 15....	Agricultural department	Expenses, January, 1887	432 85
382	" 15....	Horticultural "	" " "	3 50
383	" 15....	Perry & Ryer	Freight and charges	20 27
384	" 15....	Illinois Central Railroad	"	418 20
385	" 15....	Charles Smith	Cleaning boiler flues	9 38
386	" 15....	Pay roll of workmen	January, 1887	7 44
387	" 15....	R. Birkholz	Painting and glazing	8 20
388	" 15....	N. Ayers	Work on herbarium	16 73
389	" 15....	G. P. Johnson	" grounds	3 80
390	" 15....	E. N. McAllister	Periodicals	8 30
391	" 15....	Stearns & Co	1 barrel stucco	2 00
392	" 15....	B. F. Stevens	Books	8 74
393	" 15....	Ayers & Wilson	Forging	6 00
394	" 15....	J. Wilske	Mason work	11 35
395	" 15....	N. Ayers	Work for laboratory	2 70
396	" 15....	N. Bardwell	Work in laboratory	13 50
397	" 27....	M. J Snyder	Salary, February, 1887	50 00
398	" 27....	C. Maltby	" "	45 00
399	" 27....	C. A. Hart	" "	45 00
400	" 27....	C. M. Weed	" "	55 00
401	" 28....	S. H. Peabody	" "	333 33
402	" 28....	T. J. Burrill	" "	166 66
403	" 28....	S. W. Shattuck	" "	166 66
404	" 28....	E. Snyder	" "	166 66
405	" 28....	J. C. Pickard	" "	166 66
406	" 28....	N. C. Ricker	" "	166 66
407	" 28....	J. D. Crawford	" "	166 66
408	" 28....	G. E. Morrow	" "	166 66
409	" 28....	P. Roos	" "	141 66
410	" 28....	I. O. Baker	" "	150 00
411	" 28....	W. McMurtrie	" "	166 66
412	" 28....	S. A. Forbes	" "	96 66
413	" 28....	T. B. Comstock	" "	150 00
414	" 28....	J. H. Brownlee	" "	150 00
415	" 28....	C. W. Rolfe	" "	125 00
416	" 28....	D. McIntosh	" "	150 00
417	" 28....	N. Butler	" "	125 00
418	" 28....	A. T. Woods	" "	40 00
419	" 28....	A. N. Talbot	" "	100 00
420	" 28....	W. H. Garman	" "	84 00
421	" 28....	E. A. Kimball	" "	125 00
422	" 28....	G. W. Parker	" "	80 00
423	" 28....	S. W. Stratton	" "	60 00
424	" 28....	A. W. Palmer	" "	70 00
425	" 28....	T. F. Hunt	" "	80 00
426	" 28....	G. W. McCluer	" "	60 00
427	" 28....	C. Eggert	" "	50 00
428	" 28....	C. Green	" "	40 00
429	" 28....	H. Taylor	" "	25 00
430	" 28....	A. B. Baker	" "	70 00
431	" 28....	A. J. Stoneburner	" "	65 00
432	" 28....	S. W. Shattuck	" 3 months	75 00
433	" 28....	Agricultural department	Expenses, February, 1887	128 25
434	" 28....	Horticultural "	" "	1 70
435	" 28....	J. Tierney	Work in architectural shops	41 40

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
436	Feb. 28....	E. Engle	Night firing	$5 00
437	" 28....	G. Peabody	Salary, February, 1887	13 37
438	" 28....	J. Morrow	Work on earth closets	3 60
439	" 28....	R. Birkholz	Painting	2 50
440	" 28....	A. Iten	Work on grounds	1 20
441	" 28....	Pay roll of women	Cleaning building	19 00
442	" 28....	M. E. Lapham	Fencing	13 98
443	" 28....	C. F. Conover	Repairing fences	5 00
444	" 28....	J. Furst	Teaming	5 00
445	" 28....	J. Stewart	Work on sewer	6 53
446	" 28....	W. Pratt	Repair	22 54
447	" 28....	S. A. Forbes	Laboratory expenses	225 00
448	" 28....	I. B. & W. R. R.	Freight	2 83
449	" 28....	N. Ayers	Work on herbarium	24 60
450	" 28....	American Fxpress Co	Charges	13 05
451	" 28....	Besore & Bro.	Lumber	39 05
452	" 28....	R. S. Wilber	Hauling	105 00
453	" 28....	Champaign & Urbana Gas Co.	Lights and coke	53 25
454	" 28....	Enterprise Coal Co	Coal	229 50
455	" 28....	Henry & Kariher	Brooms, matches and sundries	15 95
456	" 28....	D. H. Lloyde & Son	Stationery and sundries	10 55
457	" 28....	H. A. Ward	Models of invertebrates	39 30
458	" 28....	Fuller & Fuller	Glass	9 57
459	" 28....	Bausch & Lomb Optical Co	Apparatus	3 00
460	" 28....	C. Dorflinger & Son	Glass jars	50 87
461	" 28....	C. Schoenhof	Book	2 35
462	" 28....	Johns Hopkins University,	Books	3 00
463	" 28....	School of Mines Quarterly	Periodicals	11 40
464	" 28....	A. C. McClurg & Co	Books	96 55
465	" 28....	H. Swannell	Chemicals, etc	13 05
466	" 28....	T. Price & Bro	Paint and oil	18 50
467	" 28....	Robinson & Burr	Forging and casting	35 64
468	" 28....	Champaign County Gazette	Printing and binding	72 15
469	" 28....	Trevett & Green	Hardware and plumbing	77 56
470	" 28....	U. S. Express Co	Charges	4 45
471	" 28....	P. Moon	Hauling	1 00
472	" 28....	Credit mechanical department	Material and labor	158 97
473	" 28....	" " "	" " "	167 97
474	" 28....	" architectural "	" " "	463 69
475	" 28....	" " "	" " "	193 99
476	" 28....	B. H. Van Vleck	Marine specimens	75 00
477	" 28....	C. West	Specimens	1 15
478	" 28....	H. A. Ward	Models of invertebrates	29 65
479	" 28....	N. Bardwell	Salary, February, 1887	35 00
480	" 28....	N. Ayers	Work for Laboratory Natural History	3 07
481	" 28....	Springfield Journal Co	Advertising	7 00
482	" 28....	Western Union Telegraph Co.	Dispatches	1 80
483	" 28....	J. W. Queen	Paper scales	1 75
484	" 28....	W. & E. Gurley	Chain links	1 13
485	" 28....	Maud Kimball	Music fees	31 00
486	" 28....	E. N. McAllister	Postage	35 97
487	" 28....	S. W. Shattuck	Petty expenses, 3 months	40 15
488	" 28....	Students' pay roll	Labor, February, 1887	140 26
489	" 28....	S. M. Millard	Expenses to Board meeting	17 13
490	" 28....	A. McLean	" " "	25 36
491	" 28....	G. C. Eisenmayer	" " "	33 50
492	" 28....	C. Benuett	" " "	11 68
493	" 28....	F. M. McKay	" " "	41 65
494	" 28....	S. H. Peabody	" in traveling	45 86
495	" 28....	Charles Bros	Kalsomining	6 50
496	" 28....	W. Pratt	Fencing campus	10 72
497	" 28....	Illinois Central Railroad	Freight	66 75
498	" 28....	I. B. & W. R. R.	"	43 14
499	" 28....	Grant Gregory	Band leader	15 00
500	" 28....	Maud Kimball	Salary as organist	50 00
501	Mar. 31....	S. H. Peabody	Salary, March, 1887	333 33
502	" 31....	T. J. Burrill	" " "	166 66
503	" 31....	S. W. Shattuck	" " "	166 66
504	" 31....	E. Snyder	" " "	166 66
505	" 31....	J. C. Pickard	" " "	166 66
506	" 31....	N. C. Ricker	" " "	166 66
507	" 31....	J. D. Crawford	" " "	166 66
508	" 31....	G. E. Morrow	" " "	166 06
509	" 31....	P. Roos	" " "	141 66

List of Warrants—Continued.

No	Date.	To Whom.	For What.	Amount.
	1887.			
510	Mar. 31....	I. O. Baker	Salary, March, 1887	$150 00
511	" 31....	W. McMurtrie	" "	166 66
512	" 31....	S. A. Forbes	" "	96 66
513	" 31....	T. B. Comstock	" "	150 00
514	" 31....	J. H. Brownlee	" "	150 00
515	" 31....	C. W. Rolfe	" "	125 00
516	" 31....	D. McIntosh	" "	150 00
517	" 31....	N. Butler	" "	125 00
518	" 31....	A. T. Woods	" "	40 00
519	" 31....	A. N. Talbot	" "	100 00
520	" 31....	W. H. Garman	" "	84 00
521	" 31....	E. A. Kimball	" "	125 00
522	" 31....	G. W. Parker	" "	80 00
523	" 31....	S. W. Stratton	" "	60 00
524	" 31....	A. W. Palmer	" "	70 00
525	" 31....	T. F. Hunt	" "	80 00
526	" 31....	G. W. McCline	" "	60 00
527	" 31....	C. E. Eggert	" "	50 00
528	" 31....	C. B. Green	" "	40 00
529	" 31....	H. Taylor	" "	25 00
530	" 31....	A. B. Baker	" "	70 00
531	" 31....	A. J. Stoneburner	" "	65 00
532	" 31....	Chicago Tribune	Papers	10 00
533	" 31....	Champaign & Urbana Gas Co.	Gas for February	74 00
534	" 31....	Perry & Reyer	Freights on chemicals	11 61
535	" 31....	J. Bishop & Co	Platinum ware	10 00
536	" 31....	H. Walker & Co	Crash toweling	18 59
537	" 31....	A. C. McClurg & Co	Books, etc:	142 55
538	" 31....	Stearns & Bros	1 bbl. stucco	4 00
539	" 31....	T. M. Wilmarth	Gas fittings	3 00
540	" 31....	Riehle Bros	Testing machine	1,100 00
541	" 31....	M. J. Snyder	Salary, March, 1887	50 00
542	" 31....	C. Maltby	" "	45 00
543	" 31....	C. A. Hart	" "	45 00
544	" 31....	C. M. Weed	" "	70 00
545	" 31....	S. A. Forbes	Expense in laboratory field	225 00
546	" 31....	N. Bardwell	Work in natural history laboratory	38 40
547	" 31 ...	N. Ayers	" " "	28 95
548	" 31....	T. J. Burrill	Botanical assistant	400 00
549	" 31....	Illinois Central Railroad	Freight, March, 1887	202 21
550	" 31....	W. Pratt	Painting, etc	44 27
551	Apr. 15....	Agricultural department	Expenses, March, 1887	115 40
552	" 15 ...	Horticultural "	" "	39 70
553	" 15....	John First	Hauling manure	11 00
554	" 15....	C. Hemsecke	Flower pots	51 61
555	" 15....	Consolidated Coal Co	1 car coal	15 60
556	" 15....	J. Tierney	Work in shop	39 37
557	" 15....	Enterprise Coal Co	6 cars coal	139 50
558	" 15....	Philip Bonte	Filtering paper	15 45
559	" 15....	Boston Belting Co	Apparatus	7 49
560	" 15....	E. Benjamin Manufacturing Co	"	16 95
561	" 15....	Champaign & Urbana Gas Co	Gas, March, 1887	54 00
562	" 15....	Central Union Telephone Co	3 months rent	15 00
563	" 15....	Butler Paper Co	Manilla wrappers	2 10
564	" 15....	Grace Peabody	Salary, March, 1887	16 75
565	" 15....	Library Bureau	Catalogue and cards	21 00
566	" 15....	Niagara Mining Co	Mining transit	150 00
567	" 15....	Nettie Ayers	Work on herbarium	3 15
568	" 15....	Fuller & Fuller Co	Mineral oil	3 25
569	" 15....	F. W. Stevens	Janitor work	17 55
570	" 15....	Crane Bros. Manufacturing Co.	Pipe	1 80
571	" 15....	Rudolph Birkholz	Painting and glazing	10 00
572	" 15....	C. J. Sabin	Grass seed	5 87
573	" 15....	Pay roll of workmen	Work on grounds	8 07
574	" 15....	J. Wilske	Mason work	11 65
575	" 15....	Students' pay roll	Labor, March, 1887	144 51
576	" 30....	S. H. Peabody	Salary, April, 1887	333 33
577	" 30....	T. J. Burrill	" "	166 66
578	" 30....	S. W. Shuttuck	" "	166 66
579	" 30....	E. Snyder	" "	166 66
580	" 30....	J. C. Pickard	" "	166 66
581	" 30....	N. C. Ricker	" "	166 66
582	" 30....	J. D. Crawford	" "	166 66
583	" 30...	G. E. Morrow	" "	166 66
584	" 30....	P. Roos	" "	141 66

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
585	April 30....	I. O. Baker.....	Salary, April, 1887.....	$150 00
586	" 30....	W. McMurtrie.....	" "	166 66
587	" 30....	S. A. Forbes	" "	96 66
588	" 30....	T. B. Comstock	" "	150 00
589	" 30....	J. H. Brownlee.....	" "	150 00
590	" 30....	C. W. Rolfe.....	" "	125 00
591	" 30....	D. McIntosh.....	" "	150 00
592	" 30....	N. Butler.....	" "	125 00
593	" 30....	A. T. Woods.....	" "	40 00
594	" 30....	A. N. Talbot.....	" "	100 00
595	" 30....	W. H. Garman.....	" "	84 00
596	" 30....	E. A. Kimball.....	" "	125 00
597	" 30....	G. W. Parker.....	" "	80 00
598	" 30....	S. W. Stratton.....	" "	60 00
599	" 30....	A. W. Palmer.....	" "	70 00
600	" 30....	T. F. Hunt.....	" "	80 00
601	" 30....	G. W. McCluer.....	" "	60 00
602	" 30....	C. Eggert.....	" "	50 00
603	" 30....	C. B. Green.....	" "	40 00
604	" 30....	H. Taylor.....	" "	25 00
605	" 30....	A. B. Baker.....	" "	70 00
606	" 30....	M. J. Snyder.....	" "	50 00
607	" 30....	C. Hart.....	" "	45 00
608	" 30....	C. Weed.....	" "	60 00
609	" 30....	N. Crouch.....	Assistant in Nat. Hist. Lab.....	2 70
610	" 30....	A. J. Stoneburner.....	Salary, April, 1887.....	40 00
611	" 30....	Schwertzer & Beer.....	Rubber goods.....	3 30
612	" 30....	Illinois Societies of Engineers.	Advertising.....	10 00
613	" 30....	E. P. Elliott & Co.....	Wrappers.....	6 45
614	" 30....	Chicago Carpet Co.....	Matting.....	7 25
615	" 30....	A. C. McClurg & Co.....	Books.....	53 72
616	May 14....	N. Bardwell.....	Work in Nat. Hist. Lab.....	25 50
617	" 14....	E. Shattuck.....	Drawing for Nat. Hist. Lab.....	10 00
618	" 14....	N. Ayers.....	Work in " "	29 55
619	" 14....	J. Tierney.....	Work in architectural shop.....	51 75
620	" 14....	Illinois Central Railroad.....	Freight, April, 1887.....	69 33
621	" 14....	Pay roll of men.....	Work in horticultural department.....	37 00
622	" 14....	Grace Peabody.....	Salary, April, 1887.....	13 87
623	" 14....	Pay roll of men.....	Work in buildings and grounds.....	44 62
624	" 14....	Agricultural department.....	Farm expenses.....	219 69
625	" 14....	Students. pay roll.....	Labor for April, 1887.....	175 86
626	" 31....	S. H. Peabody.....	Salary, May, 1887.....	333 33
627	" 31....	T. J. Burrill.....	" "	166 66
628	" 31....	S. W. Shattuck.....	" "	166 66
629	" 31....	E. Snyder.....	" "	166 66
630	" 31....	J. C. Pickard.....	" "	166 66
631	" 31....	N. C. Ricker.....	" "	166 66
632	" 31....	J. D. Crawford	" "	166 66
633	" 31....	G. E. Morrow.....	" "	166 66
634	" 31....	P. Roos.....	" "	141 66
635	" 31....	I. O. Baker.....	" "	150 00
636	" 31....	W. McMurtrie.....	" "	166 66
637	" 31....	S. A. Forbes.....	" "	96 66
638	" 31....	T. B. Comstock.....	" "	150 00
639	" 31....	J. H. Brownlee.....	" "	150 00
640	" 31....	C. W. Rolfe.....	" "	125 00
641	" 31....	D. McIntosh.....	" "	150 00
642	" 31....	N. Butler.....	" "	125 00
643	" 31....	A. T. Woods.....	" "	40 00
644	" 31....	A. N. Talbot.....	" "	100 00
645	" 31....	W. H. Garman.....	" "	84 00
646	" 31....	E. A. Kimball.....	" "	125 00
647	" 31....	G. W. Parker.....	" "	80 00
648	" 31....	S. W. Stratton.....	" "	60 00
649	" 31....	A. W. Palmer.....	" "	70 00
650	" 31....	T. F. Hunt.....	" "	80 00
651	" 31....	G. W. McCluer.....	" "	60 00
652	" 31....	C. E. Eggert.....	" "	50 00
653	" 31....	C. B. Green.....	" "	40 00
654	" 31....	H. Taylor.....	" "	25 00
655	" 31....	A. B. Baker.....	" "	70 00
656	" 31....	A. J. Stoneburner.....	" "	40 00
657	" 31....	W. B. Williams.....	Assistant in physical laboratory.....	37 50
658	" 31....	E. I. Cantine	" " "	37 50

List of Warrants—Continued.

No.	Date.	To Whom.	For Whom.	Amount.
	1887.			
659	May 31....	G. Gregory	Salary as band leader	$15 00
660	" 31....	M. Kimball	" spring term	50 00
661	" 31....	S. W. Shattuck	" Business Agent, three months	75 00
662	" 31....	M. Snyder	" May, 1887	50 00
663	" 31....	C. A. Hart	" "	45 00
664	" 31....	C. M. Weed	" "	60 00
665	" 31....	Western Union Telegraph Co.	Dispatches	3 15
666	" 31....	I. O. Baker	Expense civil engineering department	4 00
667	" 31....	H. Chester	Carriage hire	4 50
668	" 31....	P. Wright & Son	Storage and cartage	1 10
669	" 31....	P. H. Kirwan	Work on land records	5 00
670	" 31....	E. J. Carman	Work with team	27 25
671	" 31....	R. Birkholz	Setting glass	4 00
672	" 31....	A. J. Morris	Team work	2 50
673	" 31....	Lindsey & Davis	Two and a half yards of sand	2 50
674	" 31....	I. S. Morriss	Work of team and two men	5 50
675	" 31....	Otto Young & Co	Engravers' glasses	6 35
676	" 31....	Educational Supply Co	Celloidin	1 13
677	" 31....	U. S. Patent Office	Binding	15 60
678	" 31....	C. Schoenhof	Books	13 23
679	" 31....	A. C. McClurg & Co	Books	20 81
680	" 31....	Brown & Co	Book	5 50
681	" 31....	C. West	Materials for laboratory	2 00
682	" 31....	Richards & Co	Apparatus	1 10
683	" 31....	J. A. Fay & Co	Belting, hangings, etc	60 50
684	" 31....	United States Express Co	Charges	4 50
685	" 31....	American Express Co	Charges	15 73
686	" 31....	I., B & W. R. R	Freight	2 14
687	" 31....	Larrabee & North	Hardware	4 35
688	" 31....	Urbana Herald	Printing	6 50
689	" 31....	Champaign Times	Printing	11 25
690	" 31....	Illinois School Journal	Advertising	9 00
691	" 31....	Western Bank Note Co	Diplomas	31 25
692	" 31....	C. & U. Gas Co	Lights, May, 1887	56 00
693	" 31....	Dr. H. Geiss'er	Apparatus	69 60
694	" 31	Illini	Advertising and printing	43 07
695	" 31....	Pay roll of women	Cleaning building	17 50
696	" 31....	Oliver Bros. & Philipps	Iron pickets	41 44
697	" 31 ..	W. T. Pratt	Roof repairs	14 80
698	" 31...	R. S. Wilber	Hauling	72 60
699	" 31....	Agricultural department	Farm expenses, May, 1887	209 60
700	" 31....	D. Appleton & Co	Book	6 00
701	" 31....	Horticultural department	Expenses, May, 1887	34 53
702	" 31....	J. Bacon	Coal	6 75
703	" 31....	E. N. McAllister	Postage, three months	58 52
704	" 31....	A. B. Baker	Petty expenses	6 70
705	" 31....	E. H. Sargent & Co	Copper gauze	1 40
706	" 31....	F. Miller	Tuning piano	5 50
707	" 31....	N. Ayers	Work on herbarium	3 60
708	" 31....	N. Ayers	" in Natural History Laboratory	23 50
709	" 31....	M. Howe	" " " "	4 90
710	" 31....	Crane Bros. Manufacturing Co.	Fittings	1 00
711	" 31....	Carl Zeiss	Optical instruments	151 95
712	" 31....	Pay roll of workmen	May, 1887	58 84
713	" 31....	Mechanical department	Power for class instructure	60 00
714	" 31....	Architectural department	" " "	60 00
715	" 31....	S. W. Shattuck	Petty expenses, three months	38 01
716	" 31....	Champaign County Gazette	Printing catalogues	275 00
717	June 15 ..	S. M. Millard	Expense to Board meeting	21 91
718	" 15....	A. McLean	" " "	38 10
719	" 15....	C. Bennett	" " "	9 18
720	" 15....	W. W. Clemens	" " "	22 00
721	" 15....	S. H. Peabody	Expense to Springfield	35 48
722	" 15....	R. Birkholz	Painting and glazing	26 80
723	" 15....	J. Tierney	Work in architectural shop	41 40
724	" 15....	G. Peabody	Salary, May, 1887	13 25
725	" 15....	Students' pay roll	Labor, May, 1887	181 66
726	" 30....	S. H. Peabody	Salary, June 1887	333 33
727	" 30....	T. J. Burrill	" "	166 66
728	" 30....	S. W. Shattuck	" "	166 66
729	" 30....	E. Snyder	" "	166 66
730	" 30....	J. C. Pickard	" "	166 66
731	" 30....	N. C. Ricker	" "	166 66
732	" 30....	J. D. Crawford	" "	166 66
733	" 30....	G. E. Morrow	" "	166 66

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
734	June 30....	P. Roos	Salary, June, 1887	$141 66
735	" 30....	I. O. Baker	" "	150 00
736	" 30....	W. McMurtrie	" "	166 66
737	" 30....	S. A. Forbes	" "	96 66
738	" 30....	T. B. Comstock	" "	150 00
739	" 30....	J. H. Brownlee	" "	150 00
740	" 30....	C. W. Rolfe	" "	125 00
741	" 30....	D. McIntosh	" "	150 00
742	" 30....	N. Butler	" "	125 00
743	" 30....	A. T. Woods	" "	40 00
744	" 30....	A. N. Talbot	" "	100 00
745	" 30....	W. H. Garman	" "	84 00
746	" 30....	E. A. Kimball	" "	125 00
747	" 30 ...	G. W. Parker	" "	80 00
748	" 30....	S. W. Stratton	" "	60 00
749	" 30....	A. W. Palmer	" "	70 00
750	" 30....	T. F. Hunt	" "	80 00
751	" 30....	G. W. McCluer	" "	60 00
752	" 30....	C. E. Eggert	" "	50 00
753	" 30....	C. B. Green	" "	40 00
754	" 30....	H. Taylor	" "	25 00
755	" 30....	A. B. Baker	" "	70 00
756	" 30....	J. Bunn	Taxes on lands	1,461 69
757	" 30....	F. W. Stevens	Janitor services	16 35
758	" 30....	Marshall Field & Co	Prints, etc	34 06
759	" 30....	Maud Kimball	Music fees collected	48 00
760	" 30....	E. I. Cantine	Blue printing	16 74
761	" 30....	Champaign & Urbana Gas Co..	Gas, May, 1887	42 00
762	" 30....	Jameson & Morse Co	Printing	2 50
763	" 30....	G. C. Willis	Ribbons	2 62
764	" 30....	Enterprise Coal Co	Two cars coal	36 00
765	" 30....	M. E. Lapham	Lumber	13 40
766	" 30....	Besore & Bros	"	171 78
767	" 30....	F. D. Baker	Book	1 75
768	" 30....	A. C. McClurg & Co	Books	2 49
769	" 30....	Pay roll of workmen	May, 1887	17 75
770	" 30....	D. H. Lloyde & Son	Stationery, etc	13 45
771	" 30....	S. W. Stratton	Lettering diplomas	11 00
772	" 30	Champaign County Herald	Printing	26 50
773	" 30....	Champaign County Gazette	" and binding	166 55
774	" 30....	A. J. Stoneburner	Salary, June, 1887	10 66
775	" 30....	Illinois Central Railroad	Freight	3 45
776	" 30....	F. M. McKay	Expense to Board meeting	18 75
777	" 30....	S. A. Forbes	Labeling specimens, etc	115 42
778	" 30....	T. J. Burrill	Expense of herbarium	50 00
779	" 30....	N. Ayers	Work on specimens	50 00
780	" 30....	H. W. Rokker	Printing Zoological Report	788 70
781	" 30....	N. Bardwell	Drawing	16 00
782	" 30....	M. B. Waite	Salary, June, 1887	32 00
783	" 30....	C. M. Weed	" "	75 00
784	" 30....	C. A. Hart	" "	45 00
785	" 30....	M. J. Snyder	" "	50 00
786	" 30....	G. E. Stechert	Books	231 66
787	" 30....	A. C. McClurg & Co	"	13 24
788	" 30....	B. F. Stevens	"	39 30
789	" 30....	Architectural department	Work and material	502 01
790	" 30....	Mechanical department	"	31 45
791	July 15....	Grace Peabody	Salary, June, 1887	12 50
792	" 15....	Union Telephone Co	Rent of instrument	15 00
793	" 15....	Horticultural department	Expense, June, 1887	140 51
794	" 15....	Agricultural "	" "	1,262 47
795	" 15....	John Tierney	Labor in shop	52 09
796	" 15....	R. Birkholz	Painting	25 75
797	" 15....	A. J. Stoneburner	Digging trenches	40 50
798	" 15...	A. Iten	Work	6 88
799	" 15....	Pay roll of workmen	Labor in June	13 77
800	" 15....	Students' pay roll	" "	202 72
801	" 30....	S. H. Peabody	Salary, July, 1887	333 33
802	" 30....	T. J. Burrill	" "	166 66
803	" 30....	S. W. Shattuck	" "	166 66
804	" 30....	E. Snyder	" "	166 66
805	" 30....	J. C. Pickard	" "	166 66
806	" 30....	N. C. Ricker	" "	166 66
807	" 30....	J. D. Crawford	" "	166 66
808	" 30....	G. E. Morrow	" "	166 66

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
809	Jnly 30....	P. Roos	Salary, July, 1887	$141 66
810	" 30....	I. O. Baker	" "	150 00
811	" 30....	W. McMurtrie	" "	166 66
812	" 30....	S. A. Forbes	" "	96 66
813	" 30....	T. B. Comstock	" "	150 00
814	" 30....	J. H. Brownlee	" "	150 00
815	" 30....	C. W. Rolfe	" "	125 00
816	" 30....	D. McIntosh	" "	150 00
817	" 30....	N. Butler	" "	125 00
818	" 30....	A. N. Talbot	" "	100 00
819	" 30....	E. A. Kimball	" "	125 00
820	" 30....	G. W. Parker	" "	80 00
821	" 30....	T. F. Hunt	" "	80 00
822	" 30....	G. W. McCluer	" "	60 00
823	" 30....	A. B. Baker	" "	70 00
824	" 30....	E. N. McAllister	Subscription	7 40
825	" 30....	G. W. Fultham	Plastering	15 62
826	" 30....	S. A. Forbes	Expense of Natural History Laboratory.	700 00
827	" 30....	T. E. Price & Bro	Painting, paints, etc	194 06
828	" 30....	E. S. Ritchie & Son	Apparatus	96 75
829	" 30....	Bausch & Lomb Optical Co	"	8 89
830	" 30....	J. B. Clow & Son	Iron pipe and fittings	222 69
831	" 30....	R. Beaumont	Hydrant	30 00
832	" 30....	W. H. Garman	Salary, July, 1887	100 00
833	" 30....	C. M. Weed	" "	66 66
834	" 30....	C. A. Hart	" "	50 00
835	" 30....	M. J. Snyder	" "	50 00
836	" 30....	M. B. Waite	" "	41 66
837	Aug. 15....	T. B Comstock	Expense in physical laboratory	3 45
838	" 15....	Agricultural department	Expense, July, 1887	361 23
839	" 15....	Horticultural "	" "	86 17
840	" 15....	Illinois Central Railroad Co	Freight	115 65
841	" 15....	G. Peabody	Salary, July, 1887	7 00
842	" 15....	J. Tierney	Work in shop	54 67
843	" 15....	B. F. Keeler	Plastering	16 62
844	" 15....	J. S. Keer	Mason work	73 60
845	" 15....	A. J. Stoneburner	Work	15 08
846	" 15....	A. Iten	"	8 13
847	" 15....	R. Birkholz	Painting	5 00
848	" 15....	Pay roll of women	Cleaning	84 00
849	" 15....	" " men	Labor, July, 1887	9 60
850	" 15....	" " students	" "	211 04
851	Aug. 31....	W. H. Garman	Salary, August, 1887	100 00
852	" 31....	C. M. Weed	" "	66 66
853	" 31....	C. A. Hart	" "	50 00
854	" 31....	M. J. Snyder	" "	50 00
855	" 31....	M. B. Waite	" "	41 66
856	" 31....	Agricultural department	Expense, August, 1887	177 60
857	" 31....	Horticultural department	" "	33 77
858	" 31....	J. Tierney	Work in shops	57 82
859	" 31....	S. H. Peabody	Telegrams, etc	8 90
860	" 31....	E. N. McAllister	Postage, three months	76 00
861	" 31....	J. S. Terrill	Work in laboratory	4 05
862	" 31....	Butler Paper Co	Paper and boards	22 50
863	" 31....	American Express Co	Charges	5 95
864	" 31....	Illinois Machine Works	Repairs	2 50
865	" 31....	Ch. Anderson Press Brick Co	Brick	15 50
866	" 31....	Kemball & Charles	Calcimining, etc	178 40
867	" 31....	J. P. Stewart	Work	9 71
868	" 31....	Illinois Central R. R. Co	Freight	382 05
869	" 31....	L., B. & W R. R. Co	Freight	22 39
870	" 31....	Isham Smith	Work	10 43
871	" 31....	W. T. Pratt	Work on roof	50 17
872	" 31....	R. Birkholz	Painting	41 00
873	" 31....	Pay roll of women	Cleaning	103 00
874	" 31....	Pay roll of men	Labor, August, 1887	30 62
875	" 31....	Pay roll of students	" "	123 88
876	" 31....	S. H. Peabody	Salary, August, 1887	333 33
877	" 31....	T. J. Burrill	" "	166 66
878	" 31....	S. W. Sbattuck	" "	166 66
879	" 31....	E. Snyder	" "	166 66
880	" 31....	J. C. Pickard	" "	166 66
881	" 31....	N. C. Ricker	" "	166 66
882	" 31....	J. D. Crawford	" "	166 66
883	" 31....	G. E. Morrow	" "	166 66

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
884	Aug. 31....	P. Roos	Salary, August, 1887	$141 66
885	" 31....	I. O. Baker	" "	150 00
886	" 31....	W. McMurtrie	" "	166 66
887	" 31....	S. A. Forbes	" "	96 66
888	" 31....	T. B. Comstock	" "	150 00
889	" 31....	J. H. Brownlee	" "	150 00
890	" 31....	C. W. Rolfe	" "	125 00
891	" 31....	D. McIntosh	" "	150 00
892	" 31....	N. Butler	" "	125 00
893	" 31....	A. N. Talbot	" "	100 00
894	" 31....	E. A. Kimball	" "	125 00
895	" 31....	G. W. Parker	" "	80 00
896	" 31....	T. F. Hunt	" "	80 00
897	" 31....	G. W. McCIner	" "	60 00
898	" 31....	A. B. Baker	" "	70 00
899	" 31....	S. W. Shattnck	" Business Agent, three months	75 00
900	" 31....	G. Peabody	" August, 1887	7 50
901	" 31....	Milton George	Advertising	13 50
902	" 31....	Howard & Wilson Pub. Co	"	19 00
903	" 31....	Chicago Times	"	15 36
904	" 31....	Farmers' Call. Pnb. Co	"	9 12
905	" 31....	B. F. Peadro	"	5 00
906	" 31....	Inter Ocean Pub. Co	"	24 00
907	" 31....	Chicago Tribnne	"	24 00
908	" 31....	Le Baron & Lane	"	14 00
909	" 31....	Illinois State Journal	"	8 00
910	" 31....	Scientific Pnb. Co	"	20 04
911	" 31....	Farmers' Review Co	"	13 50
912	" 31....	Prairie Farmer Pub. Co	"	18 00
913	" 31....	Centnry Co	"	23 75
914	" 31....	Pantagraph	"	15 25
915	" 31....	A. C. McClnrg & Co	Stationery	17 44
916	" 31....	Champaign Connty Gazette	Printing	40 25
917	" 31....	Champaign & Urbana Gas Co	Gaslights, June, 1887	15 00
918	" 31....	Stearns & Co	Fire brick and clay	20 00
919	" 31....	Jas. B. Clow & Son	Pipe and fittings	11 85
920	" 31....	Enterprise Coal Co	Coal	229 50
921	" 31....	Henry & Kariher	Soap, etc.	4 80
922	" 31....	T. Price & Bro	Paints, etc.	39 88
923	" 31....	Besore & Bro	Lumber	320 28
924	" 31....	Trevett & Green	Hardware, etc.	83 90
925	" 31....	Champaign Manufacturing Co	Walnut	35 00
926	" 31....	Trevett Bros	Hardware	17 48
927	" 31....	Robinson & Bnrr	Castings, etc.	52 27
928	" 31....	Fuller & Fuller	Glass	24 87
829	" 31....	H. R. Spencer & Co	Repairs of microscope	12 00
930	" 31....	Hubbard & Son	Work on roof	66 25
931	" 31....	J. A. Fay & Co	Pnlleys, etc	93 43
932	" 31....	E. Steiger & Co	Plates	6 85
933	" 31....	J. W. Queen	Apparatus	341 44
934	" 31....	R. S. Wilber	Hauling	8 25
935	" 31....	H. Chester	Carriage hire	3 00
936	" 31....	A. P. Cunningham	Cork and sponges	2 23
937	" 31....	D. McLennan	Police services	4 00
938	" 31....	T. Butterworth	Advertising	10 00
939	" 31....	A. Iten	Work	14 38
940	" 31....	S. W. Shattuck	Petty expenses, three months	36 15
941	" 31....	Mechanical department	Labor and material	163 57
942	" 31....	Mechanical department	" "	133 24
943	" 31....	Architectural department	" "	107 29
944	" 31....	Architectural department	" "	307 59
945	" 31....	Lord & Thomas	Advertising	63 34
946	" 31....	English News Pub. Co	"	6 75
947	" 31....	J. H. Sanders Pnb. Co	"	18 00
948	" 31....	A. N. Kellogg Pub. Co	"	208 00
949	" 31....	J. M. Jones Pub. Co	"	12 50
950	" 31....	Walker & Mnlliken	Desk	11 50

Financial Statement of the University of Illinois [Not Including State Laboratory of Natural History] For the Year Ending August 31, 1887.

RECEIPTS, SEPTEMBER 1, 1886—AUGUST 31, 1887.		
Balance		$21,607 11
From State Appropriations—		
For taxes on lands in Minnesota and Nebraska	$1,461 69	
For buildings and grounds	2,000 00	
For laboratories	1,500 00	
For mechanical shops	1,500 00	
For books and publications	1,500 00	
For specimens for cabinets	1,000 00	
For current expenses of instruction	16,000 00	
For mining engineering	2,000 00	
		26,961 69
From other sources—		
Interest	$24,764 23	
Rents	747 25	
Fees of University students	7,690 00	
Fees of preparatory students	1,355 00	
Gross receipts of business departments	11,677 25	
Illinois Central Railroad, freights	415 89	
Miscellaneous	681 50	
Incidentals	16 00	
		47,347 12
		$95,915 92

EXPENDITURES, SEPTEMBER 1, 1886—AUGUST 31, 1887.		
From State Appropriations—		
Taxes on lands in Minnesota and Nebraska	$1,461 69	
Buildings and grounds	3,224 69	
Laboratories	1,401 99	
Mechanical shops	1,529 94	
Books and publications	1,500 00	
Cabinets	881 94	
Current expenses of instruction	11,700 00	
Metallurgical laboratory	117 54	
Tools	2,000 00	
Fire walls and ventilation	1,280 90	
Apparatus and material	38 00	
		25,136 69
From other funds—		
Expenses of Board of Trustees	$480 82	
Salaries for instruction	26,715 86	
Salaries for services	2,796 15	
Buildings and grounds	173 32	
Fuel and lights	3,274 41	
Stationery, printing and postage	1,484 81	
Preparatory department	1,440 00	
Gross expenses of business departments	10,419 08	
Miscellaneous	647 41	
Premium on bonds	100 62	
Boiler tubes	193 65	
Lands in Minnesota and Nebraska	286 38	
Incidentals	373 83	
		48,386 34
Balance August 31, 1887		22,392 89
		$95,915 92

Financial Statement of the Illinois State Laboratory of Natural History for the Fiscal Year Ending June 30, 1887.

RECEIPTS.		
Balance from report to Auditor, June 30, 1886	$495 89	
For field, office and incidental expenses	600 00	
Expenses of State Entomologist	600 00	
Improvement of library	1,000 00	
Pay of entomological assistants	1,000 00	
Pay of botanical assistants	1,000 00	
Miscellaneous assistance	1,250 00	
Publications of bulletins	150 00	
Publication of Zoölogical Report	1,500 00	
EXPENDITURES.		
For field, office and incidental expenses		$600 25
Expenses of State Entomologist		598 75
Improvement of library		999 97
Pay of entomological assistants		999 64
Pay of botanical assistants		1,270 82
Miscellaneous assistance		1,251 46
Publications of bulletins		375 00
Publication of Zoölogical Report		1,500 00
	$7,595 89	$7,595 89

PROCEEDINGS

OF THE

BOARD OF TRUSTEES

OF THE

UNIVERSITY OF ILLINOIS.

FOR THE YEAR ENDING AUGUST 31, 1888.

MEETING OF SEPTEMBER 13, 1887.

The Board met at the University Parlor Tuesday, September 13, 1887, at 3 o'clock p. m.

No quorum being present, the Board adjourned to meet in Chicago, October 12, 1887, at 10 o'clock a. m., at the President's office, 115 Dearborn street.

E. SNYDER,
Secretary.

ADJOURNED MEETING, CHICAGO, OCTOBER 12, 1887.

The Board met in Chicago, at the office of the President, 115 Dearborn street, at 10 o'clock a. m., October 12, 1887.

Present—State Superintendent, Richard Edwards, and Trustees Bennett, Cobb, Eisenmayer, McKay, McLean and Millard.

Absent—Gov. Oglesby, and Messrs. Dysart, Clemens and Shawhan.

On motion, Trustee McLean was appointed Secretary *pro tempore.*

On motion, the reading of the minutes of the June meeting was deferred, and, on motion, those of the meeting of September 13th were approved.

The Regent read the following report, which was received and referred for further deliberation:

REGENT'S REPORT.

To the Trustees of the University of Illinois:

GENTLEMEN: The first subject which I desire to call to your attention is that of arrangements for instruction during the year now beginning. The filling of the vacant professorship of mechanical engineering was very carefully considered. Efforts to find, or to secure when found, competent aid from other institutions, proved unsatisfactory. It was equally certain that aid could not be expected farther from the Secretary of the Navy. I am informed that with only a single exception no naval officer is now detailed for college duty. I had understood that Professor Woods, who had served the University with satisfaction for four years, had become fixed in his determination to return to his profession. He was already on board the Trenton, which was under orders to sail immediately. I believed it for the best interests of the University to offer him the nomination of the full professorship, with the full salary of $2,000 per annum, which nomination he has accepted, subject to your approval. I am confident that this is the best solution of the question which could be made. I ask that this nomination be confirmed.

Mr. S. W. Stratton declined to serve longer as instructor in mathematics, and, under authority given at your last meeting, I have engaged Mr. E. R. Boyer to perform this service for the coming year, at a salary of $600. Mr. Boyer is a graduate of the Normal University, has been a high school principal of some experience, and has lately closed a term of service as county superintendent of Fulton county. Mr. Boyer's inducement for coming here is not so much the salary earned, but the opportunity offered for pursuing his own studies in the school of natural history.

Miss Anna E. Maloney, of Washburn, Ill., has been appointed as instructor of music, to succeed Miss Maud Kimball, who has resigned.

Mr. C. E. Eggert has been reappointed instructor in modern languages, and Miss Essie G. Dana as instructor in free hand drawing, to assist Professor Roos. Mr. Bedros Tatarian has been appointed second assistant in the chemical laboratory.

The new year has opened with an unprecedented increase of students in the college of engineers. The number of the first years' students in the machine shops requires divisions into three sections, and I have been forced to engage aid temporarily, which will probably be needed during the whole year. I ask your approval of the appointment of Mr. F. D. Baker, at $20 per month.

A similar need exists in the class in projection drawing, which is more than twice as large as can be profitably taught by one person, while the needs of the programme will not permit the class to be divided, and part taught at another hour. I have therefore to ask leave to employ an assistant for such time as may be needed, at $20 per month.

Lieut. H. H. Sargent, U. S. A., having asked to have his detail as military instructor here cancelled, on account of the ill health of his wife, application was made to the Secretary of War for the detail of another officer. He has sent to the University 1st Lieut. Curtis B. Hoppin, 2d Cavalry, U. S. A., and this officer has entered upon his duties. We are confident that the military department is in good hands.

The exhibit made by the University at the educational exposition at Chicago, July 5–16, was very satisfactory. The cost of preparing this exhibit was paid from the appropriation of $100 made at the June meeting. A similar exhibit was sent to the State Fair at Olney. The last exhibit is in the same line as the first, and both have been made at an expense not greater than the amount authorized; but as no definite authority was given for it, I have to ask your approval, and your authority for payment of the bills incurred.

The expense to the University of the Chicago exhibit was	$60 82
That of the exhibit at Olney was	38 15
Total	$98 97

The following items of improvement have been completed during the summer vacation:

Additional cases in Professor Forbes's room, cost $136.80; appropriation $150.00.

The preparation of a room for electrical experiment in the basement of east wing was less expensive than was estimated, as it was found possible to avoid laying a new floor. Of the $300 appropriated, $154.06 has been used. Something more will be needed for shutters at the windows.

The fence ordered on west side of campus is not yet finished.

The connection with the water pipes of the Union Water Supply Company was made, and the water admitted to the buildings on the second day of July. The cost to the University of the fittings, etc., laid as ordered, has been $378.32, an excess above the appropriation, of $28.32, for which an appropriation is asked. A check valve should be added to each building, to guard the plumbing against excessive pressure when the water works use extra force in case of fire.

I have to call attention to the need of a supply of hose and a proper reel for handling the same in order that the fire hydrants may be made serviceable. This seems to be the last link needed in this outfit, and without it what has already been done will be of little avail in case of danger.

The following appropriations are asked from the several State funds:

From State appropriation for apparatus and material:

For objectives and other apparatus for the botanical laboratory	$125 00
For repairs of level to theodollte	25 00
For purchase of new mannikin	400 00

From State fund for cabinets:

For purchase of zoölogical specimens, exotic types	225 00
For material for zoölogical laboratory	25 00
For mounting and labeling fossils, and incidental expenses of museum	100 00
For purchase of type series of rocks and minerals	140 00

From State fund for buildings and grounds:

For case of drawers in mechanical drawing room	20 00

I ask that authority to expend the State appropriation for books and periodicals be given to the usual committee of the Faculty.

Also leave to publish two bulletins from the agricultural department; one upon Pig Feeding: the other upon Moisture in Soils and its Relation to Drainage and Crops.

I transmit the usual farm report for the last quarter.

THE FARM REPORT.

Dr. S. H. Peabody, Regent University of Illinois:

SIR: The receipts from the farm during the quarter ending August 31, 1887, have been as follows:

From sales of cattle	$209 00	
Hogs	34 75	
Hay	185 35	
Pasture	93 65	
Corn	22 75	
Miscellaneous	24 30	
		$569 80
The expenditures have been		2,047 85

Of the expenditures, $1,088.75 were for steers bought for feeding under authority given at the last meeting of the Trustees. The excess over the amount authorized, $1,000, results from the buying of the cattle in lots, rather than singly.

The severe drouth reduced the yield of all crops somewhat. Hay and pasture suffered very severely, and potatoes, of which we had three and a half acres, failed entirely. Grass seed, sown last fall and spring, also failed entirely. The total injury, however, was much less than could be expected. The dry weather enabled us for the first time to finish haying, harvesting wheat and oats, and threshing, before the end of July.

We harvested in good condition, of Wheat	515	bushels
Oats	2,250	"
Hay	180	tons

During August a small silo was filled with 27¼ tons of corn.

Some stock wells have failed; others have furnished sufficient water. Some extra feeding has been needed, but the stock has generally kept in good health and in fair condition.

Between 55 and 60 acres have been plowed; 15 to 20 acres will be sown to wheat; the remainder will be kept for oats and corn.

A report by Mr. T. F. Hunt on the Moisture of Soils, and its Relations to Drainage and Crops is transmitted. It seems to me of especial value at present, showing, as it does, the moisture in eighty samples of soil from different portions of the state, and under different conditions.

Respectfully submitted,

G. E. MORROW, *Professor of Agriculture.*

Reports from Professors Burrill and Forbes are also presented.

All of which is respectfully submitted.

S. H. PEABODY, *Regent University of Illinois.*

The report, of the Treasurer, John W. Bunn, was read, and was referred to the Finance Committee.

JOHN W. BUNN, TREASURER, IN ACCOUNT WITH THE UNIVERSITY OF ILLINOIS.

1887.		Dr.		
June	7	To balance		$419 54
		" interest on Urbana bonds		577 50
		" " " land contract 29, S. G. Bryant	$48 00	
		" " " " " "	24 00	
				72 00
	10	" " " " 12, H. C. Klndas	$120 00	
			4 42	
				124 42
	15	To interest on Morgan county bonds		1,750 00
July	1	" " " Champaign county bonds	$4,950 00	
		" " " Pike county bonds	2,100 00	
		" " " Sangamon county bonds	880 00	
		" " " Maconpin county bonds	660 00	
		" " " Cbicago water bonds	875 00	
		" " " Pittsfield scbool bonds	630 00	
		" " " Cbristian county school bonds	300 00	
		" " " Litcbfield school bonds	440 00	
		" " " Sangamon county scbool bonds	140 00	
		" " " Kankakee county bonds	1,500 00	
				12,475 00
		To interest on Kankakee county bonds		900 00
July	6	Rec'd from State for taxes on lands in Neb. and Minn	$1,461 69	
		" " " " for buildings and grounds	2,000 00	
		" " " " laboratories	1,500 00	
		" " " " mechanical sbops	1,500 00	
		" " " " books and pnblications	1,500 00	
		" " " " specimens for cabinet	1,000 00	
		" " " " expenses of instruction	16,000 00	
		" " " " mining engineering	2,000 00	
				26,961 69
		Rec'd from State for State Laboratory of Natural History for field work, office and incidental expenses	$1,000 00	
		Rec'd from State for improvement of library	1,000 00	
		" " " " pay of assistants	3,000 00	
		" " " " publication of bulletins	300 00	
		" " " " illustration of report of State Entomologist	500 00	
				5,800 00
August	31	Rec'd from mecbanical department	$353 46	
		" " architectural department	934 74	
		" " agricultural department	567 80	
		" " horticultural department	335 10	
		" " laboratories	339 68	
		" " bnildings and grounds	60 00	
		" " fuel and lights	51 60	
		" " stationery and printing	105 00	
		" " Minnesota and Nebraska lands	10 00	
		" " library and apparatus	1 74	
		" " incidentals	8 00	
		" " mnsic fees	48 00	
		" " Griggs farm rent	320 00	
		" " students' fees	145 00	
		" " preparatory fees	42 50	
				3,302 62
				$52,382 77

1887.		Cr.		
August	31	By amonnt paid on account board expense	$109 94	
		" " " salaries	7,797 58	
		" " " building and gronnds	86 44	
		" " " fuel and llgkts	757 33	
		" " " stationery and printing	749 00	
		" " " Nebraska and Minnesota lands	6 00	
		" " " mecbanical department	242 60	
		" " " architectural department	951 14	
		" " " agricultural department	2,047 85	
		" " " borticnltural department	457 59	
		" " " laboratories	117 10	
		" " " military department	8 45	
		" " " library and apparatns	12 70	
		" " " incidental expense	113 91	
				13,457 63

Treasurer's Report—*Continued.*

1887.		*Cr.*		
August 31	By amount paid on account commencement expenses		$99 76	
	" " " music fees		48 00	
	" " " art department		4 25	
	" " " Chicago Exposition		60 82	
	" " " furniture and fixtnres		29 78	
				242 61
	State appropriation—			
	By amount paid on account taxes on lands in Neb. and Minn.		$1,461 69	
	" " " bnildings and grounds		1,826 90	
	" " " apparatus and material		38 00	
	" " " laboratories		504 77	
	" " " mechanical shops		248 99	
	" " " books and pnblications		410 56	
	" " " cabinets		390 61	
	" " " metallnrgical laboratory		117 54	
	" " " expenses of instruction		2,054 93	
	" " " fire walls and ventilation		546 89	
				7,600 88
	" " " Laboratory of Natural History			2,343 74
	Balance			28,737 91
	Total			$52,382 77

JOHN W. BUNN, Treasurer.

URBANA, September 13, 1887.

The Business Agent's report was presented, as follows:

President Board of Trustees University of Illinois:

SIR: I have the honor to hand you herewith the following statements:

Paper A is a statement of current appropriations for the six months ending September 1, 1887.

Paper B is a statement of the State appropriations September 1, 1887.

Paper C is a list of vonchers presented for auditing, being nnmbers 676-900.

Paper D is an estimate of the receipts and expenses for the twelve months ending September 1, 1888.

Paper E is an estimate of the receipts for the six months ending March 1, 1888.

Paper F is a list of appropriations asked for the six months ending March 1, 1888.

Yon are asked to appropriate also the credits on collections which may be made in favor of the several items.

Respectfully submitted,

S. W. SHATTTCK, Bnsiness Agent.

STATE APPROPRIATIONS.

	Appropriated	Received.	Expended.	Balance.
Taxes on land (⅓ per annnm)	$3,500 00	$1,461 69	$1,461 69	.....
Buildings and grounds (⅓ per annnm)	4,000 00	2,000 00	1,262 51	$737 49
Laboratories (⅓ per annum)	3,000 00	3,000 00	2,302 32	697 68
Mechanical and archit'ral shops (⅓ per annnm)	3,000 00	1,500 00	178 69	1,321 31
Books and publications (⅓ per annum)	3,000 00	1,500 00	.....	1,500 00
Cabinets (⅓ per annnm)	2,000 00	1,000 00	.....	1,000 00
Cnrrent expense of instruction (⅓ per annnm)	32,000 00	16,000 00	2,054 93	13,945 07
Apparatns and material (⅓ per annnm)	3,000 00	1,500 00	38 00	1,462 00
Metallurgical laboratory (⅓ per annum)	4,000 00	2,000 00	117 54	1,882 46
Fire walls and ventilation	4,500 00	4,500 00	4,261 72	238 28
	$62,000 00	$34,461 69	$11,677 40	$22,784 29
Laboratory of Natural History	14,600 00	7,665 71	1,320 69	6,345 02

CURRENT APPROPRIATIONS.

March 9 to September 1, 1887.	Appropriated	Receipts also appropriated	Expended.	Balance.
Board expense	$300 00		$239 26	$60 74
Salaries for instruction { State... / Current }	19,916 00		{ 2,054 93 / 17,087 35 }	773 72
Salaries for services	1,159 00		1,217 34	
Buildings and grounds	50 00	$85 00	86 44	48 56
Fuel and lights	1,200 00	136 80	1,219 01	117 79
Stationery and printing	1,300 00	105 00	1,228 10	176 90
Nebraska and Minnesota lands	21 00	30 00	11 30	39 70
Mechanical department	200 00	416 60	522 59	94 01
Architectural department	200 00	1,060 69	1,198 56	62 13
Agricultural department	1,400 00	1,952 66	2,610 44	742 22
Horticultural department	200 00	562 05	844 02	
Military department	50 00		35 15	14 85
Laboratories	200 00	439 68	402 62	237 06
Library and apparatus	50 00	1 74	43 90	7 84
Incidental expenses	280 84	8 00	212 17	66 67
SUNDRIES.				
Furniture and fixtures	50 00		39 03	10 97
Music fees		48 00	48 00	
Art department	25 00		4 25	20 75
Chicago Exposition	100 00		60 82	39 18
Commencement expenses	100 00		99 76	24
University students' fees		2,410 00		
Preparatory year fees		375 60	480 00	
Griggs farm		320 00		320 00

The report of the Business Agent was, on motion, referred to the Auditing Committee.

The Executive Committee presented the following report, which, on motion of Mr. McLean, was approved:

CHICAGO, Ill., June 15, 1887.

The Executive Committee of the Board of Trustees of the University of Illinois, acting during an adjournment of the said Board, hereby make the following appointments and assignments in the department of the State Laboratory of Natural History:

C. M. Weed, assistant for the year ending June 30, 1888. Salary to be $65 per month for the quarter ending June 3, 1887, under a former appointment, and the salary for the year ending June 30, 1888, to be $800.

C. A. Hart, assistant for the year ending June 30, 1888, at a salary of $600 for the year.

M. B. Waite, assistant for the year ending June 30, 1888, at a salary of $500 for the year.

W. H. Garman, assistant for July and August, 1887, with a salary of $200 for the two months.

Professor T. J. Burrill, botanist for the year ending June 30, 1888, salary of $400 for the year.

All of the above salaries to be paid monthly except that of Professor Burrill, which shall be payable quarterly.

Such salaries to be paid from funds appropriated for such purpose.

S. M. MILLARD,
EMORY COBB,
CHAS. BENNETT,
Executive Committee.

The farm report was, on motion, referred to the Farm Committee.

The Board then proceeded to consider the report of the Regent.

On motion of Mr. Cobb, the nomination of Arthur T. Woods, to be professor of mechanical engineering at a salary of $2,000 per annum, beginning September 1, 1887, was confirmed.

On motion of Mr. McLean, the following appointments reported by the Regent were confirmed, at the salaries named:

Emanuel R. Boyer, instructor in mathematics	$600 00
Anna E. Maloney, instructor in music	Fees and 150 00
Bedros Tatarian, second chemical assistant	400 00
Charles E. Eggert, instructor in modern languages	600 00
Essie G. Dana, instructor in drawing	250 00

On motion of Mr. Bennett, the Regent was authorized to employ an additional instructor in the machine shop, and another in the projection drawing room, each at $20 per month, for the time employed, the said instructors being required by the increased number of students in these departments.

On motion, that part of the Regent's report referring to the expenditure of $60.82 for exhibiting the work of the University at Chicago, and of $38.15 for a similar exhibition at the State Fair at Olney, was approved, and the expenditures were allowed, to be paid out of the appropriation of $100 made at the June meeting.

The Regent having reported a deficit of $28.32, caused by the expense of making water connections as ordered at the June meeting, and that additional check valves were needed, on motion of Mr. McKay, an appropriation of $75 was made to pay for completing said work as recommended.

On motion of Mr. Eisenmayer, the sum of $500 was appropriated, as recommended by the Regent, for the purchase of fire hose, a suitable carriage for same, and such other equipments as may be needed to make the present protection available against fire.

On motion of Mr. Bennett, the Regent was authorized to make purchases for the following named purposes and amounts from the State appropriations for apparatus and material:

For six objectives for botanical laboratory	$75 00
For other apparatus for same laboratory	50 00
For repair of theodolite	25 00
For new mannikin	400 00

On motion of Mr. Cobb, the Regent was likewise authorized to expend from the State appropriation for cabinets for the purposes and to the amounts named:

For purchase of zoölogical specimens for museum	$225 00
For purchase of material for zoölogical laboratory	25 00
For work in museum and incidental expenses	100 00
For purchase of geological specimens	140 00

On motion of Mr. Cobb, the Regent was likewise authorized to expend from State appropriations for buildings and grounds:

For case of drawers for mechanical drawing room	$20 00

On motion of Dr. Edwards, the expenditure of the State appropriation of $1,500 for the year 1887–8, for purchase of books and publications, was referred to a committee of the Faculty, consisting of the Regent, the Business Agent and the Librarian, with authority to use the same for binding, for purchase of periodicals, and for purchase of books, as the needs of the several departments may require.

On motion of Mr. Cobb, the matter of building a sidewalk on the south side of Green street, in front of the lots newly added to the college park, was referred to the Regent and the Executive Committee with power to act; such money as shall be expended for same to be taken from State appropriation for buildings and grounds.

On motion of Dr. Edwards, the Regent was authorized to print and distribute bulletins for the agricultural department; 2,000 copies of the same, and an amount not to exceed $60 was appropriated for this purpose.

On motion of Mr. McLean, the current appropriations for the University and appropriations for the State Laboratory of Natural History for the six months ending February 29, 1888, were ordered as per exhibit F made by the Business Agent, and recommended by the Regent, as follows:

APPROPRIATIONS FOR SIX MONTHS ENDING FEBRUARY 29, 1888:

Board expense	$300 00	
Salaries for instruction	21,560 00	
" " services	1,700 00	
Buildings and grounds	50 00	
Fuel and lights	2,000 00	
Stationery and printing	350 00	
Nebraska and Minnesota lands	25 00	
Mechanical department	200 00	
Architectural "	200 00	
Agricultural "	400 00	
Horticultural "	400 00	
Military "	50 00	
Laboratories	200 00	
Library and apparatus	50 00	
Incidentals	200 00	
		$27,685 00
Sundries—		
Furniture and fixtures	$50 00	
Art department, models, etc	20 75	
Water supply	200 00	
Boiler repairs	200 00	
		$470 75
For State Laboratory of Natural History		2,900 00

On motion of Mr. McLean, it was ordered that Professor George E. Morrow be appointed a delegate to represent the University at the National Convention of Cattle Growers to be held in Kansas City, Mo., October 31, and that a sum not to exceed $40 be appropriated for the expenses of such delegate.

The Farm Committee made the following report:

Your committee reports that it visited the farm during the last part of August, and found the farm and the stock in general good condition, notwithstanding the extreme drouth; and that the report of Professor Morrow, referring to it, is a fair statement of the condition of the farm and stock. The committee recommends that the purchase of steers to the amount of $88.75 in excess of the sum previously appropriated for such purpose by the Board, be approved.

Respectfully submitted,

CHARLES BENNETT, *Chairman Farm Committee.*

On motion the report of the committee was adopted, and the sum of $88.75 was appropriated for the purpose named.

On motion the Farm Committee was instructed to collect the arrearages of rent due on the Griggs farm, and make arrangements to secure prompt payment hereafter.

The President appointed Dr. Edwards on the committee on Buildings and Grounds, in place of Mr. Earle, resigned.

The report of the Auditing Committee was read, and on motion of Mr. Eisenmayer, was adopted.

Your committee reports that it has examined the reports of the Business Agent, with vouchers No. 676 to 950, both inclusive, that it finds the said reports and vouchers correct, and that it recommends that they be approved and placed on file.

Respectfully,

F. M. McKAY,
GEO. C. EISENMAYER.

The Finance Committee reported the Treasurer's report correct, and their report was, on motion, adopted.

Mr. Bennett offered the following resolution, and, on motion of Mr. McKay, it was adopted:

Resolved, That the Regent and Faculty be requested to take into consideration the advisability of holding at commencement an examination for admission of students, and report to this Board through the Regent at the December meeting.

On motion the Board adjourned.

ALEXANDER MCLEAN,
Secretary Pro Tempore.

MEETING OF DECEMBER 13, 1887.

The Board met at the University parlor at 3:30 o'clock p. m., December 13, 1887.

Present—Trustees Bennett, Cobb, Eisenmayer, McKay, McLean, Millard, Pullen and Shawhan.

Absent—Gov. Oglesby, State Superintendent Edwards, Trustees Clemens and Dysart.

The oath of office was administered to Mr. Burden Pullen, of Centralia.

The records of the June and October meetings were approved.

The Regent read the following report, which was received and referred for further deliberation:

Regent's Report.

To the Trustees of the University of Illinois:

Gentlemen: The term now drawing to a close may be reported as more successful in all its aspects than any other since my connection with the University. The attendance has been larger than in any similar term since 1879. The new students were reported by all examiners as being unusually well prepared. The general order has been creditable, leaving little to be regretted. The number of engineering students continues to increase, and the shops and drawing rooms are overcrowded. Should the rates of increase continue, some important changes will have to be made to enable us to accommodate especially the workers in wood and iron. We have all the machines in the iron shops that space and light will permit, and yet we have not now enough to employ properly the students in that speciality. The day seems to be not far distant when either the military or the mechanics must vacate the building in order that the machinists may have the space they need. This matter will need to be brought to the attention of the next legislature in such form as time may determine.

The work of fitting up the mining laboratory is progressing. An invoice of machinery has just been received, and will be put in place during the holiday vacation. It is hoped that this will help to arouse proper attention to this department, and stimulate its development. The college of agriculture has increased with the other technical schools. The entire drift of affairs refutes the statements urged that the tendencies at this University are away from the study of the practical arts and sciences.

At the same time a stimulus is felt upon the literary side. We are passing through a brief period of transition, which will without doubt aid in giving this department a better recognition as a school of sound learning.

The work in the department of rhetoric and oratory is bearing fruit. For the first time in many years, the prize in the intercollegiate oratorical contest came to the University of Illinois, since the term opened. It was taken by a student in the mechanical course, who is quite as good at the engine lathe as he is on the rostrum. The members of the senior class are now presenting two original exercises per week in chapel, and will continue until all have appeared in turn. This exercise has been entered upon with commendable zeal, and is doing good.

The next anniversary is the twentieth since the institution was opened for the reception of students. Arrangements are in progress to hold a suitable celebration on the occasion, and, as the day falls on Sunday, it is proposed to hold such a celebration on Tuesday, the 13th, which will be the day fixed for the annual meeting of the Trustees. President Pickard, of Iowa, has promised to deliver an address, and other suitable exercises will be arranged.

THE TESTING LABORATORY.

The new testing machine is now nearly equipped for work. By an inexpensive attachment, we are able to operate a mercury column for testing steam and water gauges up to 250 pounds pressure. While the machine and its adjuncts will be open to all instructors in the college of engineers, as a means of illustrating such subjects in any of their courses as may require such means of demonstration, it naturally comes under the special care of the professor of mechanical engineering. Frequent inquiries have been made already by outside parties who desire to have tests made. It is proposed, if the authority of the trustees be granted, to undertake such tests, at fixed and reasonable prices, the proceeds to be paid into the University, and, used, under the authority of the Trustees, for keeping the apparatus in repair, and possibly of extending the equipment hereafter.

THE OLD FARM HOUSE

on the south, or Busey farm, was destroyed by fire on the night of Saturday, December 3d. The fire appears to have been wholly accidental, probably caused by a defect in a chimney. The house was occupied by a workman on the farm, who, with his wife and three children, escaped, but lost furniture and clothing. What may need to be done by way of rebuilding permanently will be a subject of careful consideration, perhaps calling for legislative aid. It appears to be required, by the amount and kind of property that the University has at the south barn, that some person or persons should be always in its vicinity. I can not think it would be prudent to have a place provided in the barn itself where men could use fire and lights. It appears to me desirable that a cheap, temporary house should be made, where one or two of the laborers can stay as a protection to the barn and stock. The cost should not be great, and the lumber could subsequently be used in a more permanent structure.

The hose, cart, etc., ordered at the last meeting, have been obtained and are ready for use. The enclosure in which it is to be kept is not quite finished, but all will be completed within the amount appropriated.

Pursuant to your authority, the sidewalk on Green street in front of the new lots has been laid, at a cost of $51.42.

The two bulletins of the agricultural department have been issued, 2,000 copies each; at a cost of $60.40.

The fence on west side of north campus has been built, but not painted. Its cost, $224.50, has exceeded the allowance, which was $200, and it yet requires painting at a cost estimated at $50. It may be said that the original estimate for fence to enclose four sides of the campus was $685, and that each of the longer sides is rather more than one-third the whole distance.

The conveniences for washing at the machine shops are inadequate. I ask leave to construct a new sink, with water laid on, having room for 20 at once, at a cost not to exceed $30, to be paid out of State appropriations for the shops.

Also for leave to procure—

From State appropriations for apparatus and material:

For new desks in projection drawing and architectural rooms	$75 00
For case to hold models, mechanical class room	40 00
For case in Professor Pickard's room	15 00
For sundry apparatus for physical laboratory	100 00

From State appropriation for cabinets:

For continuing the work of labeling fossils, etc	100 00
For expenses in getting geological specimens from Springfield	15 00
For boxes, etc., to contain collections of fungi	30 00
For cases to contain glass models of invertebrates	40 00
For rearranging birds to occupy less room, and for case to contain display of insects	60 00

I present the annual report from the farm, with its balance sheet. The year, as is well known, has not been prosperous for farmers, particularly on account of the severe drought of the summer. The crops secured and sales made are not materially different from last year, but a careful economy in making purchases and in expense for labor, has left a considerably better balance than was then shown.

I also present the annual report of the horticultural department. Would it not be well that both these reports be brought up to the 1st of January, so that they can be more appropriately included in the general report of the business of the University, which is now expected at the annual meeting in March?

I present the report from the State Laboratory of Natural History, and concur in the request that the current quarterly appropriations be made for the support of that department, together with authority to use the whole of the sum appropriated for that department for books.

Respectfully submitted,

S. H. PEABODY, *Regent.*

Annual Farm Report.

University, December 1, 1887.

Dr. S. H. Peabody, Regent:

Sir: The financial operations of the University farms for the year ending at this date may be summarized as follows:

Receipts from sales of farm products	$5,579 83
Total expenditures	4,180 66
Excess of sales	$1,399 17
Inventory of personal property December 1, 1887	$15,430 00
Inventory of personal property December 1, 1886	15,958 12
Decrease during year	$528 12
Net balance in favor of the farms	871 05

A classified statement of sales, expenditures and of property included in the inventory, forms a part of this report.

The almost unprecedented drought reduced the yield of corn nearly 2,000 bushels; the hay crop, 75 tons or more, and made it necessary to use much more of each on the farms than in ordinary years. The price of that on hand has been correspondingly advanced. For the first time in my experience our cattle purchased for grazing and grain feeding in the fall have been a source of a slight loss.

The character of the season has been favorable to success in efforts to reduce the expenditures for labor. A large percentage of the sales has been of live stock instead of grain and hay.

I take much pleasure in acknowledging the great value of the services of the assistant in agriculture, Mr. T. F. Hunt, in the supervision of the farm work, as well as in the conduct of experiments and in the class room.

On the night of Saturday, December 3, the old residence on the stock farm, occupied by one of the farm laborers, was destroyed by fire. The house had been decided not worth repairing, so the direct loss is slight. Some provision for housing a laborer during the winter is desirable.

Respectfully submitted,

G. E. MORROW, *Professor of Agriculture.*

Balance Sheets Agricultural Department, December 1, 1886, and December 1, 1887.

	1886.	1887.	1886.	1887.
Inventories:				
Credits—				
Live Stock—Cattle, Shorthorns	$5,500 00	$5,000 00		
Herefords and Holsteins	1,400 00	1,700 00		
Jerseys	600 00	500 00		
Grades	475 00	625 00		
			$8,025 00	$7,825 00
Colts			775 00	1,100 00
Hogs and fowls			620 00	475 00
			$9,420 00	$9,400 00
Teams			1,200 00	1,250 00
Farm products—Hay	$1,000 00	$1,225 00		
Corn	1,315 00	550 00		
Oats		300 00		
Wheat		330 00		
Straw, fodder and ensilage		310 00		
Fall wheat and plowing		175 00		
Miscellaneous	375 00			
			2,640 00	2,880 00
Machinery and tools			1,970 00	1,800 00
Notes and credits			698 12	100 00
Total inventory			$15,958 12	$15,430 00

Balance Sheets--Continued.

	1886.	1887.	1886.	1887.
Sales for cash—				
Live Stock—Cattle	.....	$3,176 33		
Hogs	.....	874 44		
Horses	.....	270 00		
Fowls	.....	19 55		
Total	$4,865 49	4,345 31		
Butter and milk	160 33	67 70		
Hay and grain	871 00	912 06		
Miscellaneous	297 25	254 89		
			6,194 07	5,579 86
Total credits			$22,352 19	$21,009 86
Debits—				
Inventories last year	$16,041 25	$15,958 12		
Expenses—Labor	2,452 00	2,012 52		
Stock	2,709 42	1,589 55		
Miscellaneous	1,107 90	578 62		
			22,310 47	20,138 81
Balances	.....	.....	$41 72	$871 05

ANNUAL HORTICULTURAL REPORT.

UNIVERSITY OF ILLINOIS, Dec. 10, 1887.

S. H. Peabody, Regent:

DEAR SIR: I hereby hand you a report from the horticultural department for the year ending December 1, 1877.

The drouth during the summer greatly affected the plants and crops, and, doubtless, has been the cause of serious injuries to trees, beyond those which now appear. When trees are thus checked in midsummer, they are very likely to start somewhat in autumn, and so enter the winter in an unfit condition to withstand the vicissitudes of the season. This was made the subject of studies and a report published in the last volume of the Transactions of the Board under the head of Climatic Destruction of Orchard Trees. This season the most marked results, so far observedin this line, are upon grapes. They, too, like other woody plants, ceased growing early, and then started after the September rains. This month continued warm with not sufficient frost to kill the leaves. The latter half of October, however, was notable for the unusually severe frosts, reaching on the 28th a minimum of about 16° Fahr. The grape vines made, during September, but little actual growth; yet so softened were the tissues that the comparatively slight frosts of October, i. e., slight in comparison with usual midwinter temperatures, killed all the young wood of unprotected vines. Much more than an average winter destruction for these plants occurred this season in October.

Grapes, as a crop, were seldom better. The quantity was not remarkable, but the quality was much above the average—the bright sun of summer evidently favoring the fullest development of the fruit, which was entirely exempt from disease. Several new kinds fruited for the first time with us. Among those promising best are Moore's early and Vergennes. The latter adds to its other excellent qualities that of long keeping.

Strawberries were practically a failure, owing: (1) to a rather light stand of vines from the peculiarities of last season; (2) to a failure in sufficient fertilization, attributed by many to the depredations of thrips which swarmed in the flowers, but more probably due to deficient pollen from some other cause; and (3) to the drouth, which cut short the season of picking and otherwise reduced the yield. In 1885 picking continued from June 6 to 30—25 days, in 1886 from May 28 to June 16—20 days; in 1887 from May 31 to June 15—16 days. It is a curious fact that our neighbors, growing strawberries on the clayey soil originally covered with timber, began picking eleven days before the berries ripened on the black loam of the University fields.

On the 9th of April, after the strawberry plants began to grow, an accidental fire swept over about an acre of the plantation. The mulch being very dry at the time, burned furiously and of course killed everything above ground. Wishing to test spring cultivation the opportunity was taken to work thoroughly the surface soil between the rows. The new leaves soon appeared and developed rapidly. Probably no plants were killed by the fire. After cultivating twice, fresh mulch was applied, and careful watch kept to note the effect of the treatment. The flowers came later than upon the adjoining area not burned over and not cultivated. The first picking was also two days later, but the bulk of the crops came at same time and ceased simultaneously. The total yield upon the burned portion was conspicuously less Two test plats of the same size gave respectively 70 and 44½ quarts. The berries from the burned area were somewhat larger. A part of the decrease in yield was due to the number of plants destroyed by the cultivators.

Burning the mulch, after the crop is gathered, has been practiced for some years with much advantage, but it is not probable that such burning in early springtime can be beneficial, unless in the elimination of disease. There still remains a question, however, as to spring cultivation. During such dry weather as we had last season, persistent shallow cultivation would, doubtless, pay in the quality and quantity of the fruit produced.

Notes were taken during the season upon sixteen varieties of strawberries. Among these but one has seemed equal to crescent fertilized with Capt. Jack during several years trial. This exceptional one is the old green prolific. The berries in 1887 of this last much surpassed those of the cresent which were peculiarly knotty and uneven from imperfect fertilization. Bidwell, Piper, Capt. Jack and Sharpless are the best among the others which have been fully tried. Old ironclad perhaps suffered worst from the drouth. Longfellow was badly injured from same cause. Bubach and Jersey queen have not been sufficiently productive for profit. Glendale gives a good crop, but the plants rust badly and the large calyx is so discolored in same way as to injure the appearance and so the sale of the fruit. No plant among the number sets so many berries as James Vick; but with us, the fruit is small and of little value.

The experiments undertaken again to test the possible influence on the "fruit" of the strawberry, of pollen from different varieties were failures this year, mostly, it is thought, from the scarcity of pollen of any kind; but such information as was gained seemed to confirm the former results, that no difference could be observed. Experiments of similar kind were made upon maize and squashes, muskmelons and cucumbers. With these latter cucurbitaceous plants over fifty artificial crosses were made, but from these only two fruits were secured—one a cucumber crossed with a muskmelon, and the other a squash crossed by another squash of different variety. In the cucumber no seeds were produced. It showed nothing exteriorly of the muskmelon appearance. The squash developed normally, but showed no certain characteristics of the variety from which the pollen was taken. The seeds of this squash have been saved to test next year the effect of the cross upon them.

With maize very different results were obtained. In this case the effects of crossing show conspicuously in the kernels the first year. May 19 there were planted in each of three well separated plats two kinds of corn, viz.: A red pop-corn and Murdock, a well-known yellow dent variety. In the first plat there were five rows, four rods long—two of Murdock and three of pop-corn, planted alternately. The tassels were carefully removed from the Murdock, but as there was about ten days difference in the time of flowering of the two varieties there was little chance for crossing. A plat of white dent stood fourteen rods away and tasseled about same time as the pop-corn. At the harvest about one-third of the ears from the pop-corn stalks were white, sparsely mixed with yellow kernels. The others were red, and both had the true pop-corn appearance.

A second plat contained two rows of pop-corn and two of Murdock, but was only five rods northwest of a small plat of white dent corn. In this second plat the tassels were pulled out of the pop-corn and left in the Murdock. About one-third (17 to 36) the ears from pop-corn stalks were red pop-corn and two-thirds white or white and yellow mixed. It is remarkable that the red ears had very rarely a kernel of another color.

Plat No. 3 consisted of two rows of the red pop-corn and Murdock mixed, five rods north of white dent corn. Tassels all allowed to mature. Ears proved to be, on pop-corn stalks, in the proportion of 15 to 38 red and white, or white and yellow mixed. In no case did the Murdock variety or the white dent show signs of the pop-corn cross. This red pop-corn had been grown on the farm the year preceding and was believed to be pure seed. The Murdock was taken from seed that yielded pure corn elsewhere.

Now while the grain of the pop-corn showed unmistakably the results of foreign pollen, the cob retained its characteristic size and appearance. The corn kernels are comparable to the so-called seeds of the strawberry, while the cob bears the relation to the kernels that the pulp of the berry does to its seeds. While, therefore, the corn experiment shows the direct change due to pollen of a noticeable part of the production, it does not render more probable a similar change in the pulpy part of the strawberry.

During the season earnest studies were made upon many plant diseases, but, with one exception, none of these are completed. Many indications were found of the probable cause of the scab of potatoes, but further researches are needed to confirm results attained. A serious disease of field corn, first brought to our attention by Professor Forbes from a field belonging to Mr. Joseph A. Skeavington, of Albion, Ill., was presumably traced to the inimical action of a living vegetable organism found abundantly in the diseased parts. The malady is wide-spread, as we subsequently found, and seriously reduces the crop. Young corn plants are now growing in the greenhouse for the further study of this disease. Contributions were also made to the knowledge of the "rot" of tomatoes, and plants are also now in the greenhouse for further study.

The disease supposed to be well made out is a parasitic affection of broom-corn and sorghum. The diseased spots on the stalks, leaves and especially leaf-sheaths, become red and the tissues finally die. The roots are affected in the same way; and it is upon these organs that the principal mischief is done—the loss amounting in the aggregate to a very large sum. The minute parasitic organism lives over winter in the old stalks and roots. Crops are much more liable to suffer on land upon which sorghum or broom-corn grew the year before. Maize is is not affected by this organism, though it is probable some other grasses are preyed upon as is sorghum. An account of these investigations has been written up and the printed paper is herewith presented. (Proceedings of the Society for the Promotion of Agricultural Science, pp. 30-36).*

It is my duty to inform you that the woodwork of the greenhouse is badly rotted. The frame for the support of the roof is so far gone in many places that it is even now too weak to be secure. During the summer such repairs as could be made were attended to; but it will require extensive replacing of old parts by new before long, if indeed new roofs throughout, so far as the wood is concerned, are not demanded. No recommendation is now made concerning this repair, and no immediate action is asked. The facts are presented that proper provision may be made when delay can be no longer permitted with safety to the plants.

Reference is made to the report of the Business Agent for the financial condition of the department.

Respectfully submitted,

T. J. BURRILL.

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*The paper may be found later in this volume.

The report from the professor of agriculture was referred to the Farm Committee; that from the professor of horticulture, to the Committee on Publications.

The business agent submitted the following report, which was received and referred to the Auditing Committee:

DECEMBER 13, 1887

S. M. Millard, Esq., President Board of Trustees, University of Illinois:

DEAR SIR: I have the honor to present herewith the usual financial statements of the Business Agent, due at this time.

Paper A is a statement of current appropriations with the receipts under the same.
Paper B presents the condition of the State appropriations Nov. 30, 1887.
Paper C is a list of vouchers presented for auditing being 901-950 old series, and 1-200 new series.
Paper D is an estimate of receipts and expenditures for the nine months ending September 1, 1888.

Respectfully submitted,
S. W. SHATTUCK, *Business Agent.*

CURRENT APPROPRIATIONS.

Six months ending Feb. 28, 1888.	Appropriated	Receipts also appropriated.	Expended.	Balance.
Board expense	$300 00		$62 20	$237 80
Salaries for instruction { Current. / State.... }	21,560 00		{ 3,669 05 / 6,649 80 }	11,241 15
Salaries for services	1,700 00		710 57	989 43
Buildings and grounds	50 00	$25 00	28 27	46 73
Fuel and lights	2,000 00	11 94	199 05	1,812 89
Stationery and printing	350 00		177 28	172 72
Nebraska and Minnesota lands	25 00			25 00
Mechanical department	200 00	175 02	290 63	84 39
Architectural "	200 00	486 59	505 34	181 25
Agricultural "	400 00	2,141 97	801 57	1,740 40
Horticultural "	400 00	82 95	330 99	151 96
Military "	50 00		23 37	26 63
Laboratories	200 00	100 00	219 88	80 12
Library and apparatus	50 00		13 52	36 48
Incidentals	200 00	14 21	87 08	127 13
SUNDRIES.				
Furniture and fixtures	50 00		15 75	34 25
Art department models	20 75		6 72	14 03
Water supply	200 00		100 00	100 00
Boiler repairs	200 00		153 75	46 25
Fire apparatus	500 00		466 48	33 52
State Fair	38 15		38 15	
National Convention of Cattle Growers	40 00			40 00
Griggs farm		320 00		320 00
Music fees		34 00	34 00	
Preparatory year fees		600 00	489 99	110 01
University students' fees		3,025 00		3,025 00

STATE APPROPRIATIONS.

	Appropriated	Received.	Expended.	Balance.
Taxes on land, ½ per annum	$3,500 00	$1,461 69	$1,461 69	
Buildings and grounds, ½ per annum	4,000 00	2,000 00	1,726 64	$273 36
Mechanical and architectural shops, ½ per annum	3,000 00	1,500 00	712 66	787 34
Books and publications, ½ per annum	3,000 00	1,500 00	465 13	1,034 87
Cabinets, ½ per annum	2,000 00	1,000 00	253 74	746 26
Current expense of instruction, ½ per annum	32,000 00	16,000 00	8,704 73	7,295 27
Apparatus and material, ½ per annum	3,000 00	1,500 00	267 96	1,232 04
Metallurgical laboratory, ½ per annum	4,000 00	2,000 00	129 20	1,870 80
Fire walls and ventilation	4,500 00	4,500 00	4,367 00	133 00
	$59,000 00	$31,461 69	$18,088 75	$13,372 94
Laboratory of Natural History	16,325 00	9,390 71	2,996 02	6,394 69

The Executive Committee reported that they have caused to be constructed a sidewalk on the south side of Green street, and in front of the lots belonging to the University, 201 feet long, and five feet and 4 inches wide at a total cost of $51.42.

The report was received and approved, and the actual expense audited and allowed.

A report from the Faculty in regard to examinations at commencement was received and consideration deferred to March meeting.

It was moved and carried that the Regent and professor of mechanical engineering be authorized to use the apparatus of the testing laboratory for parties desiring such tests to be made, and to charge reasonable fees for the same, such fees to be covered into the University treasury.

The following appropriations were made as per recommendations in Regent's report:

From current funds:

For excess of cost of bulletins	$25 00
For temporary house for farm hands	100 00
For expense at anniversary exercises	50 00
For expense of committee on experiment stations	30 00
For traveling expenses of Regent	86 99

From State appropriations for apparatus and materials:

For case to hold models in mechanical class room	$15 00
For additional desks	75 00
For sundry apparatus for physical laboratory	100 00
For case in Prof. Pickard's room	15 00

From State appropriations for cabinets:

For moving geological specimens from Springfield	$15 00
For continuing work of labeling, etc	100 00
For cases for collection of fungi	30 00
For case for specimens of invertebrates	40 00
For work of rearranging cabinets (birds and insects)	60 00

From State appropriation for shops:

For new wash stand	$30 00

Section 1, article 1, of the by-laws was amended to read as follows:

All meetings of the Board of Trustees shall be held at the University building, in Champaign county, unless otherwise ordered, and a majority of all the members of the Board shall constitute a quorum.

Adjourned to meet at the Doane house at 8 o'clock p. m.

Evening Session.

The Board convened at 8 o'clock p. m.

Present—Trustees Bennett, Cobb, Eisenmayer, McKay, McLean, Millard, Pullen and Shawhan.

The Treasurer read the following report, which was received and referred to the Auditing Committee:

JOHN W. BUNN, TREASURER, IN ACCOUNT WITH THE UNIVERSITY OF ILLINOIS.

Dr.

1887.					
Sept.	13	To balance			$28 737 91
	15	" amount received from State on account State Laboratory of Natural History			1,725 00
		" amount received on account students' fees		$2,510 00	
		" " " " preparatory year		490 00	
		" " " " buildings and grounds		25 00	
		" " " " architectural department		32 00	
					3,057 00
Nov.	30	" " " " mechanical department		175 02	
		" " " " architectural "		454 59	
		" " " " agricultural "		2,141 97	
		" " " " horticultural "		82 95	
		" " " " laboratories		100 00	
		" " " " incidentals		14 21	
		" " " " fuel and lights		11 94	
		" " " " Griggs farm rent		320 00	
		" " " " music fees		34 00	
		" " " " preparatory year		110 00	
		" " " " students' fees		515 00	
					3,959 68
					$37,479 59

Cr.

Nov.	30	By amount paid on account board expense		$62 20	
		" " " " salaries		4,379 62	
		" " " " buildings and grounds		28 27	
		" " " " fuel and lights		199 05	
		" " " " stationery and printing		177 28	
		" " " " preparatory year		489 99	
		" " " " mechanical department		290 63	
		" " " " architectural department		505 34	
		" " " " agricultural department		801 57	
		" " " " horticultural department		330 99	
		" " " " chemical department		219 88	
		" " " " military department		23 37	
		" " " " library and apparatus		13 52	
		" " " " incidental expense		87 08	
					7,608 79
		By amount paid on account furniture and fixtures		15 75	
		" " " " art department		6 72	
		" " " " water supply		100 00	
		" " " " boiler repairs		153 75	
		" " " " fire apparatus		466 48	
		" " " " "State Fair"		38 15	
		" " " " music fees		34 00	
					814 85
		State Appropriations.			
		By amount paid on account buildings and grounds		$464 13	
		" " " " mechanical and arch. shops		533 97	
		" " " " books and publications		465 13	
		" " " " cabinets		253 74	
		" " " " expenses of instruction		6,649 80	
		" " " " apparatus and material		229 96	
		" " " " laboratories		697 68	
		" " " " metallurgical laboratory		11 66	
		" " " " fire walls and ventilation		105 28	
		" " " " State Laboratory of Natural Hist.		1,675 33	
					11,086 68
					$19,510 32
		Balance			17,969 27
					$37,479 59

JOHN W. BUNN, Treasurer.

Urbana, December 13, 1887.

The Treasurer made the following report of purchases of bonds and requested that the premiums paid be audited and allowed.

SPRINGFIELD, JULY 30, 1887.

University of Illinois to John W. Bunn, Dr.

For premium on $4,000 6½ per cent. Montgomery county school bonds, due in 5, 8, 10, and 12 years	$195 60
For premium on $3,500 7 per cent. Sangamon county school bonds, due in '88, '89, '90, '92, and '94	100 80
September 15, for premium on $12,000 6 per cent. Montgomery county school bonds due 1890 to 1901	348 00
	$644 40

JOHN W. BUNN, *Treasurer.*

The report was received and approved, and the premiums were audited and ordered paid.

The auditing committee made the following report:

Board of Trustees, University of Illinois:

Your committee respectfully report that they have examined the accounts and bills on which warrants No. 900 to 950 and 1 to 200, all inclusive, were issued and find the same correct as reported by the Business Agent.

They have also examined the report of the Treasurer, and find the same correct. We recommend that the same be filed.

F. M. McKAY,
GEO. C. EISENMAYER, } *Auditing Committee.*

The President announced the following changes in standing committees:

Shawhan *vice* Earle, Chairman of Committee on Buildings and Grounds; Pullen *vice* Shawhan, on Farm Committee, and Shawhan *vice* Earle on Auditing Committee.

The regular appropriation for the ensuing quarter for the Laboratory of Natural History, $1,700, was granted.

The Committee on Agricultural Experiment Station reported as follows:

A PLAN FOR THE ORGANIZATION OF AN EXPERIMENT STATION AT THE UNIVERSITY OF ILLINOIS.

SECTION 1. Pursuant to and in accordance with the provisions of an act of Congress, approved March 2, 1887, entitled an act to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July 2, 1862, and of the acts supplementary thereto, and of a joint resolution of the 35th General Assembly of the State of Illinois, giving assent thereto, as provided in section 9 of said act of Congress, there shall be, and is hereby, established a department of the University of Illinois, which shall be known and designated as the Agricultural Experiment Station of the University of Illinois.

Sec. 2. The object and duty of such experiment station shall be to fulfill in its scope and work the requirements of section 2 of the act of March 2, 1887, establishing the same, and to conduct such other researches and experiments bearing directly on the agricultural industry of the State of Illinois, as may be deemed advisable by the Board of Trustees of the University of Illinois.

Sec. 3. The experimental work of the Station shall be under the immediate charge of a Board of Direction, consisting of four members, one of whom shall be designated as President of such Board, when appointed, and all of the members of such Board shall be appointed by the Board of Trustees of the University, at the regular annual meeting of such Board. The persons so appointed shall hold their office for one year, and until their successors are appointed. Any vacancies in such Board of Direction shall be filled by the University Trustees.

Sec. 4. The Directors shall devise and arrange the methods by which investigation shall be pursued and experiments conducted. They shall divide the work of the station and assign the parts thereof to such persons as may be best fitted by experience and ability to carry forward such work. They shall keep accurate detailed accounts of all experimental work, and all the circumstances surrounding the experiments, which can in any way affect them, and work out such results as the facts may show and put the same in shape for proper reports, to be published from time to time, as required by the act of March 2, 1887.

The Directors may adopt such rules of organization as they may deem necessary, which shall not be in conflict with the laws under which the department is organized, or with such regulations as the Trustees may from time to time prescribe.

Sec. 5. The Directors shall report to the Regent and Trustees at each regular or quarterly meeting of this Board such experiments and investigations as they desire to undertake, also shall report the probable expense of the same, and shall designate such instruments, lands, help, and other requirements which they may need to carry out successfully the proposed work, and no experiments or investigations requiring the expenditure of money shall be made by the directors of such Station without the approval of the Board of Trustees of the University, or in case of emergency, the Executive Committee of said Trustees, first had and obtained.

Sec. 6. The Treasurer of the Board of Trustees is hereby designated and appointed to receive and have the custody of the moneys appropriated from time to time by the Congress of the United States and any and all other moneys appropriated or donated at any time for the purpose of such station, and he shall keep all such moneys in a separate fund account, and shall pay the same out upon warrants signed by the President of the Board of Trustees, and countersigned by the President of the Board of Direction of such station, but no money shall be drawn or used for any purpose except for the work and needs of the Experiment Station.

Sec. 7. The Board of Direction shall render to the Board of Trustees at each regular and quarterly meeting an account of all moneys received and expended together with the vouchers for all expenses and disbursements, and shall report to the Trustees any facts which shall affect the financial management of the Experiment Station.

Sec. 8. The Board of Direction with the consent of the Trustees shall appoint a secretary whose duty it shall be, under the direction of the President of the Board, to keep a complete record of the work of the station, to carry on the correspondence, supervise the editing and printing of all bulletins and reports, and shall do all other work necessary to be done about the business of such station, which may required of him by said Board or its President.

Sec. 9. In case any professor of the University is appointed as a Director or is otherwise employed in the work of the Experiment Station, he shall be paid for such service from the Experiment Station fund, and the amount so paid him shall be deducted from his salary as a regular professor, such assignment and payments to be made by the Trustees upon a fair and equitable apportionment of his service taking the regular salary of such professor as a guide.

Sec. 10. The Board of Trustees shall appoint all regular assistants on the Station work and fix the salaries of the Directors and all employés, but the Board of Direction may employ and pay from a fund, appropriated for that purpose, to be drawn by the usual warrant, all temporary assistants, laborers, janitors, and workmen, such employment and payment to be reported to the Trustees at each regular or quarterly meeting.

Sec. 11. The Trustees shall from time to time set off such lands belonging to the University as may be needed for experimental work; which lands shall be free of rent charge, but all produce therefrom, after its needs for purposes of experiment have ceased, shall belong to the University without charge and may be removed from the land by the University.

The Trustees shall likewise assign such farm tools, machinery, labor, and teams for the use of the station as may be convenient without interfering with the University work and its farms, and whenever necessary teams, tools, and machinery shall be purchased for the exclusive use of the Station, and whatever shall be furnished to the Experiment Station by the University either in help, materials, teams, or special work shall be paid for from the station fund at current values and rates.

Whenever deemed advisable for experiments on any subject requiring the use of buildings, tools, stock, or animals for feeding or dairy purposes, or the use of the laboratories, greenhouses, or veterinary buildings, for chemical work, plant experiments, or the treatment of diseases, the Board of Direction shall report to the Board of Trustees, such needs, specifying what arrangements can be made which will not conflict with the University work, and the Trustees shall make all necessary provisions which shall be reasonable and feasible, to promote the experimental work. It being the declared intention of the Board of Trustees to render every assistance possible to further the efficacy and success of the Experiment Station.

Sec. 12. The Trustees will assign rooms in the University buildings for an office or other purposes from time to time as shall be needed, under such terms as shall be provided when assigned.

Sec. 13. The Experiment Station shall be deemed a department of the University, and except as may be herein or hereafter specially provided, all its officers and employés shall be governed by the same regulations which govern other departments of the University. The Regent shall include the Experiment Station as one of the subjects of his regular quarterly report to the Trustees, with statements as to its progress, suggestions as to its current needs and prospective development, and recommendations as to appropriations and management as occasion shall seem to require. Questions which may arise touching the Station, its work, or its relationships, not herein provided for, shall be referred to the Trustees of the University, who may add to, rescind or amend these regulations at their discretion.

Respectfully submitted,

S. H. PEABODY,
A. McLEAN,
E. COBB,
C. BENNETT,
S. M. MILLARD,
Committee.

The report was adopted.

Trustee Bennett offered the following resolution, which was carried:

Resolved, That Dr. S. H. Peabody, Professors G. E. Morrow, T. J. Burrill, and W. McMurtrie, are hereby appointed, without salary, Directors of the Agricultural Experiment Station of the University of Illinois, to hold said positions until the next annual meeting of this Board, or until their successors are elected. Dr. S. H. Peabody is hereby designated President of said board.

The Regent was authorized to grant a leave of absence to Professor Burrill to attend the National Horticultural meeting at Riverside, Cal.

The Farm Committee returned the report of Professor Morrow, and recommended that it be put on file. Approved.

Adjourned.

S. M. MILLARD, *President.*

E. SNYDER, *Secretary.*

MEETING OF MARCH 13, 1888.

The Board met at the University parlor, at 4:30 p. m., March 13, 1888.

Present—State Superintendent Richard Edwards, Trustees Bennett, Eisenmayer, McLean, McKay, Millard, Pullen, and Shawhan.

Absent—Governor Oglesby, Trustees Dysart, Clemens, and Cobb.

The approval of the record of the December meeting was postponed.

The Board then proceeded to the election of officers. The following were elected for one year. S. M. Millard, President of the Board. Executive Committee: S. M. Millard (ex-officio), E. Cobb, and C. Bennett. The election of Secretaries was deferred to the June meeting.

The Regent then read the following report, which was received for further consideration:

[The first part of this report is inserted with the University Reports which appear in later pages of this volume.]

FINANCES.

The facts concerning the funds of the University, their investment, proceeds, and the estimates of income and expenses, you will learn from the reports of the Treasurer and Business Agent. I have endeavored to call upon you for no expenditures that did not seem imperatively needed, knowing that our funds for general purposes are always much less than the claims upon them.

The last report on the sale of Nebraska lands was made one year ago. Since then the following sales have been made:

55.	L. L. Ruyle, N. E. ¼, 27-3-8, 160 acres, $1,600.	Cash received	$400
56.	" S. E. ¼, 27-3-8, 160 acres, 2,000.	" "	500
			$900

The whole number of acres sold in Nebraska is	8,725.40
Number of acres yet for sale	609.69
The total price of land sold is	$113,720.94

The times still remain unfavorable for those who have settled upon their purchases and seek to make their payments from the harvests that they can gather. Payments of interest have been very well kept up, and, for the most part, those of principal have been met as they have fallen due. Some applications for extension of time for payment of principal have been made, and they have always been cordially granted.

It gives me pleasure to be able to report that the interest bearing capital of the University is now over $450,000. This sum will be materially increased when the time comes for the sale of the lands in Minnesota, but that time does not yet appear to have arrived.

The balance sheets for the several departments that are transacting business operations in connection with their educational work are herewith given. These departments are the agricultural, the horticultural, the chemical, and the mechanical shops.

The agricultural and chemical show gains, the horticultural and mechanical losses. The deficiency in the shops is largest, as a little reflection would lead one to suppose. Both of the shops have earned something, and the deficit has been thereby reduced. But it also appears that one hundred and thirty students have been instructed and that everything, including tools, power and material, has been furnished them. As the number of students increases the cost of their shop-training will continue to increase. This, as the figures show, is becoming a serious matter, and it may become a question whether these students should not pay something for the power and material they use. The total balance against the shops is $1,070. If the one hundred and thirty students had paid say $5 per term for two terms work each, it would have yielded $1,040.

It will be objected to this that the State makes an appropriation of $1,500 per annum for the support of the shops and instruction therein. But careful estimates, distinguishing between the instructional and the commercial work of the shops, show that the cost of instruction, tools, material and power for students' benefit solely, is from $3,000 to $3,500 per annum—a cost which, as was before suggested, is constantly increasing.

In this connection I have to request that authority may be given to Professor Woods to build by class work an engine lathe, and to use as may be required $200 for that purpose. Also, to spend $30 at once for necessary cutters for the milling machine.

Also, that $30 be appropriated to carry water across from the machine shops to the carpenter's shop, and thence up to the gymnasium.

I present the following request for appropriations:

From the State fund for apparatus and material:

For an additional case in Professor Ricker's room	$45 00
For continuing his collection of architectural designs	100 00
For a Thatcher's Calculating Machine for the engineering college	32 00

From the State fund for cabinets:

For additions to the collection in mineralogy	42 00

and that authority be given to the Regent and the Professor of Zoölogy to use the balance of that fund belonging to the current year for such purposes in connection with the museum as may seem to them needful.

From the State appropriation for buildings and grounds:

For painting fence on the west side of old campus	$50 00

And that the superintendent of grounds, Professor Burrill, be authorized to expend $300, on account of buildings and grounds, on the care and ornamentation of the University park during the season ending October 31.

That the Regent be authorized to use $150 for the necessary expenses of commencement.

The usually quarterly report of Professor Morrow is presented herewith.

The full report of the Board of Direction of the Experiment Station will explain the plans and estimates which it will bring before you. It is assumed that the Station will take in charge and carry forward the strictly experimental work that the University has hitherto cared for. That the Station will occupy and use, under the sanction and approval of the Trustees, whatever of the University facilities can be of service. There will remain, however, after the annual wants of the Station have been provided for, the larger part of the land, to be administered in such way as may best yield profit to the treasury. To this end it may be wise to rent parts of the land from time to time. It would hardly be best to rent much of it for long periods, as the Station may need in the more perfect carrying on of its work, to vary its selections of lands from year to year. If the Station can retain the opportunity to use, as may be required, the largest variety of soil, condition, etc., it will be of obvious advantage. It will be necessary, therefore, that suitable, and to some degree, skilled labor, be still furnished to Professor Morrow, in order that he may not be too closely confined to the details of farm management. But these claims upon his time and thought can not be entirely dispensed with.

Authority to publish 6,000 catalogues is asked, at a cost not to exceed $400.

All of which is respectfully submitted.

S. H. PEABODY, *Regent.*

BALANCE SHEET, AGRICULTURAL DEPARTMENT, DECEMBER 1, 1887.

Credits:		
Inventory, Dec. 1, 1887—		
Live stock	$9,400 00	
Teams	1,250 00	
Machinery and tools	1,800 00	
Farm products	2,880 00	
Notes and credits	100 00	
		$15,430 00
Sales—Live stock	$4,345 31	
Hay and grain	912 06	
Miscellaneous	322 59	
		5,579 86
		$21,009 86
Debits:		
Inventory, Dec. 1, 1886—		
Live stock	$9,420 00	
Teams	1,200 00	
Machinery and tools	1,950 00	
Farm products	2,640 00	
Notes and credits	698 12	
		$15,958 12
Paid for labor	$2,012 52	
Stock	1,589 55	
Miscellaneons	578 62	
		4,180 69
		$20,138 81
Balance in favor of department		871 05
		$21,009 86

BALANCE SHEET, HORTICULTURAL DEPARTMENT, MARCH 1, 1888.

[Including care of University park.]

Credits:		
Work and materials for University	$565 75	
Sales	744 27	
		$1,310 02
Debits:		
Foreman	$660 00	
Materials	319 22	
Labor	443 41	
		$1,422 63
Balance against department		112 61
Appropriated for department	$600 00	$1,310 02
Deduct balance against department	112 61	
Appropriation not used	$487 39	

BALANCE SHEET, CHEMICAL DEPARTMENT, MARCH 1, 1888.

Credits:		
State appropriations	$650 00	
Receipts from students	1,067 14	
Furnished other departments	6 40	
		$1,723 54
Debits—		
For chemicals and apparatus, permanent	$217 18	
For chemicals and apparatus, current	715 75	
Repairs, freights and sundries	142 60	
Gas	258 00	
		$1,333 53
Balance to credit of department		390 01
		$1,723 54
Inventory, March 1, 1887	$15,457 83	
Inventory, March 1, 1888	15,248 46	
Decrease during year		209 34
Net balance for department		180 64

BALANCE SHEET, MACHINE AND CARPENTER'S SHOPS, MARCH 1, 1888.

	Carpenter shop.		Machine shop.	
Credits:				
Work for University	$1,854 89		$759 15	
Work for other parties	277 80		28 34	
State appropriations	606 86		1,009 09	
		$2,739 55		$1,796 58
Debits:				
Materials and tools	$1,037 54		$323 24	
Labor	866 48		395 49	
Power	221 82		221 82	
Instruction	1,020 00		1,500 00	
		$3,145 84		$2,440 55
Balance against shop		406 29		643 97
		$2,739 55		$1,796 58
No. of different students taught during year		48		82
Inventory, Feb. 28, 1887	$924 50		$490 32	
Inventory, Feb. 28, 1888	1,043 10		343 58	
Gain		$118 60		
Loss				$146 74
Net balance against shop		$287 69		$790 71

GENERAL BALANCE SHEET.

	Loss.	Gain.
Agricultural department		$871 05
Horticultural department	$112 61	
Chemical department		180 64
Mechanical shops	1,070 40	
	$1,184 01	$1,051 69
Total balance against general fund		132 32
	$1,184 01	$1,184 01

INVENTORY OF THE PERSONAL PROPERTY OF THE UNIVERSITY OF ILLINOIS IN ITS VARIOUS DEPARTMENTS, MARCH 1, 1888.

	Articles enumerated.	Articles estimated.	Total.
Agricultural (Dec. 1, 1887)	$2,530 30	$12,899 70	$15,430 00
Architectural	4,083 95	1,043 10	5,127 05
Art and design	745 28		745 28
Art gallery	3,040 10		3,040 10
Botanical	3,022 85	918 75	3,941 50
Blue printing laboratory		100 00	100 00
Chemical	5,132 53	10,115 93	15,248 46
Civil engineering	2,715 52	100 00	2,815 52
Library	34,480 00		34,480 00
Furniture		3,150 00	3,150 00
Heating apparatus		20,700 00	20,700 00
Military and gymnasium	7,748 25	251 75	8,000 00
Mining and engineering laboratory		904 08	904 08
Mechanical engineering	13,284 71	343 58	13,628 29
Museum of natural history	6,430 00		6,430 00
Museum of industrial art		4,900 00	4,900 00
Zoölogical museum		2,226 75	2,226 75
			$140,867 13
Deduct that belonging to the United States			7,748 25
Total belonging to the University			$133,118 38

The report from the department of agriculture was referred to the Farm Committee.

Adjourned to meet Wednesday at 8:30 a. m.

Second Day's Session.

The Board convened at 8:30 a. m.

Present: State Superintendent Edwards, Trustees Bennett, McKay, McLean, Millard, Pullen and Shawhan.

The following resolution of Trustee Bennett was unanimously adopted:

Resolved, That the request of C. M. Weed, to he relieved from his engagement with the Laboratory of Natural History, April 1, 1888, he granted; and that in releasing him from his engagement this Board desires to express its appreciation of the ahle and faithful manner in which he has discharged the duties of his position. He carries with him to his new field of labor the kindest wishes of every member of this board for a brilliant and successful career in his chosen vocation.

On recommendation from the Director of the Laboratory, Mr. John Marten was appointed assistant in entomology in the State Laboratory of Natural History, with a salary of $800 per annum, *vice* Weed, resigned.

The Business Agent submitted the following report, which was received, and referred to the Auditing Committee:

S. M. Millard, Esq., President Board of Trustees University of Illinois:

Sir: I have the honor to present herewith my report as Business Agent for the three months ending February 29, 1888.

Paper A is a list of current appropriations, with receipts and expenditures under the same, for the six months ending February 29, 1888.

Paper B is a statement of the condition of the State appropriations February 29, 1888.

Paper C is a list of vouchers, 201 to 450, presented for auditing.

Paper D is an estimate of receipts and expenses for the six months ending September 1, 1888, from current funds.

Respectfully suhmitted,

S. W. SHATTUCK, *Business Agent.*

March 13, 1888.

STATE APPROPRIATIONS.

	Appropt'd.	Received.	Expended.	Balance.
Taxes on land (¼ per annum)	$3,500 00	$1,461 69	$1,461 69	.....
Buildings and grounds (½ per annum)	4,000 00	2,000 00	1,790 74	$209 26
Mechanical and architectural shops (½ per annum)	3,000 00	1,500 00	1,195 25	304 75
Books and puhlications (½ per annum)	3,000 00	1,500 00	514 57	985 43
Cabinets (½ per annum)	2,000 00	1,000 00	529 09	470 91
Expenses of instruction (½ per annum)	32,000 00	16,000 00	15,354 53	645 47
Apparatus and material (½ per annum)	3,000 00	1,500 00	896 13	603 87
Metallurgical laboratory (½ per annum)	4,000 00	2,000 00	1,095 92	904 08
Fire walls and ventilation	4,500 00	4,500 00	4,475 96	24 04
Total	$59,000 00	$31,461 69	$27,313 88	$4,147 81
Illinois State Laboratory of Natural History	16,325 00	9,390 71	4,950 48	4,440 23

CURRENT APPROPRIATIONS.

Six months ending Feb. 28, 1888.	Approp't'd.	Receipts also approp't'd.	Expended.	Balance.
Board expense	$300 00	.....	$199 21	$100 79
Salaries for Instruction { Current	21,560 00	.....	7,424 01	836 39
Salaries for Instruction { State		.....	13,299 60	
Salaries for services	1,700 00	.....	1,525 03	174 97
Buildings and grounds	50 00	190 32	131 37	108 95
Fuel and lights	2,000 00	62 94	1,647 17	415 77
Stationery and printing	435 00	.....	431 78	3 22
Nebraska and Minnesota lands	25 00	.....	.....	25 00
Mechanical department	200 00	310 89	495 44	15 45
Architectural department	200 00	1,072 00	1,251 88	20 12
Agricultural department	400 00	3,067 21	1,707 49	1,759 72
Horticultural department	400 00	182 22	601 09	.....
Military department	50 00	.....	48 37	1 63
Laboratories	200 00	706 15	447 44	458 71
Library and apparatus	50 00	.....	31 07	18 93
Incidentals	286 99	14 21	216 73	84 47
SUNDRIES.				
Furniture and fixtures	50 00	.....	26 45	23 55
Art department models	20 75	.....	12 62	8 13
Water supply	200 00	.....	200 00	.....
Boiler repairs	200 00	.....	197 25	2 75
Fire apparatus	500 00	.....	495 29	4 71
State Fair	38 15	.....	38 15	.....
National Convention of Cattle Growers	40 00	.....	12 00	28 00
Griggs farm	.....	424 16	.....	424 16
Premium on bonds	644 40	.....	644 40	.....
Agricultural Experiment Station	30 00	.....	30 00	.....
Music fees	.....	70 00	70 00	.....
Preparatory year fees	.....	1,100 00	979 98	120 02
University students' fees	.....	5,525 00	.....	5,525 00

Treasurer J. W. Bunn then read his report, which was received and referred to the Auditing Committee.

JOHN W. BUNN, TREASURER, IN ACCOUNT WITH THE UNIVERSITY OF ILLINOIS.

1887.	*Dr.*		
Dec. 13	To balance		$17,969 27
	" interest on Sangamon county school bonds		42 00
1888.			
Jan. 2	To interest on Chicago water bonds		875 00
	" interest		1,820 00
Jan. 16	" interest on Champaign school bonds		360 00
Feb. 7	" interest on land contract No. 1, A. Hubka, $64+$32.40	$96 40	
	" " " " " 2, J. T. Applegate	53 76	
	" " " " " 3, J. H. Cummings	58 72	
	" " " " " 5, S. D. Miller & D. C. Bashor	138 00	
	" " " " " 6, G. Ladd, $80+$1.32	81 32	
	" " " " " 7, August Zahlten	40 00	
	" " " " " 9, C. M. Dawson	144 00	
	" " " " " 10, John W. Herbert	144 00	
	" " " " " 11, Assignee of D. Richardson	120 00	
	" " " " " 12, H. C. Kludas	120 00	
	" " " " " 13, H. T. Willis & A. W. Mills	120 00	
	" " " " " 14, W. L. Collins	120 00	
	" " " " " 15, P. A. Moore	137 80	
	" " " " " 16, Robert L. Gilmare	48 00	
	" " " " " 17, " "	72 00	
	" " " " " 19, Lawrence Larson	144 00	
	" " " " " 20, Christian Anderson	144 00	
	" " " " " 21, Dennis Magner, $96.65+$2.	98 65	
	" " " " " 22, H. H. Martin & J. F. Snyder	96 00	
	" " " " " 26, M. R. O'Brien	113 75	
	" " " " " 27, Amos L. Wright	120 00	
	" " " " " 28, "	120 00	
	" " " " " 30, E. L. Baugh man, $120+53c	120 53	

Treasurer's Report—Continued.

1888.				
Feb. 7	To interest on contract No. 31, John H. Hansen	$120 00		
	" " " " " 32, P.C.O'Brien, $123.43+$10.39 +$4.43	138 30		
	" " " " " 33, C. Hesse	134 40		
	" " " " " 34, J. & H. J. Swoboda, $112+$8	120 00		
	" " " " " 35, John and Wm. Losey	96 00		
	" " " " " 36, E. and E. O. Frothergill	120 00		
	" " " " " 38, D. M. Gilmore	120 00		
	" " " " " 39, John E. Blickenstaff	120 80		
	" " " " " 41, S.S. Reynolds & A.L. French	120 00		
	" " " " " 42, W.S. Morton & F. L. Marrs	120 00		
	" " " " " 43, Samuel Cox	67 20		
	" " " " " 44, C. E. Baker	67 20		
	" " " " " 45, J. Blivens & R.J Miller	124 48		
	" " " " " 46, J. M. Thomas	60 00		
	" " " " " 47, M. Hubka	67 40		
	" " " " " 48, J. K. Cullen	96 00		
	" " " " " 49, V. Hnizda	59 20		
	" " " " " 50, B. F. Hnizda	120 00		
	" " " " " 51, J. Sknbal & J. W. Hnizda	120 00		
	" " " " " 52, J. W. Hnizda	96 00		
	" " " " " 53, E. R. Fogg	120 00		
	" " " " " 54, B. F. Leiby	120 30		
	" " " " " 55, L. L. Ruyle	23 47		
	" " " " " 56, "	29 33		
				$4,831 01
				$25,897 28
Feb. 28	To amount received on account buildings and grounds	$165 32		
	" " " fuel and lights	51 00		
	" " " mechanical department	135 87		
	" " " architectural department	585 41		
	" " " agricultural department	925 24		
	" " " horticultural department	99 27		
	" " " laboratories	606 15		
	" " " Grigg's farm rent	104 16		
	" " " University students' fees	2,500 00		
	" " " preparatory year	500 00		
	" " " music fees	36 00		
				5,708 42
				$31,605 70
	Cr.			
Feb. 29	By amount paid on account Board expenses	$137 01		
	" " salaries	4,569 42		
	" " buildings and grounds	103 10		
	" " fuel and lights	1,448 12		
	" " stationery and printing	254 50		
	" " preparatory year	489 99		
	" " mechanical department	204 81		
	" " architectural department	746 54		
	" " agricultural department	905 92		
	" " horticultural department	270 10		
	" " military department	25 00		
	" " laboratories	227 56		
	" " library and apparatus	17 55		
	" " incidental expense	129 65		
				9,529 27
	" " furniture and fixtures	10 70		
	" " art department—models	5 90		
	" " water supply	100 00		
	" " boiler repairs	43 50		
	" " fire apparatus	28 81		
	" " cattle growers' convention	12 00		
	" " premium on bonds	644 40		
	" " agricultural experiment station	30 00		
	" " music fees	36 00		
	State appropriations—			911 31
Feb. 29	By amount paid on account buildings and grounds	64 10		
	" " mechanical and architectural shops	482 59		
	" " books and publications	49 44		
	" " cabinets	275 35		
	" " expenses of instruction	6,649 80		
	" " apparatus and material	628 17		
	" " metallurgical laboratory	966 72		
	" " fire walls and ventilation	108 96		
	" " State laboratory of Natural History	1,954 46		
				11,179 59
	Balance			9,985 53
				$31,605 70

Urbana, Ill., Mar. 13, 1888. JOHN W. BUNN, Treasurer.

The matter of examinations at commencement, laid over from last meeting, was postponed indefinitely.

The following resolution, offered by Trustee McLean, was adopted:

WHEREAS, The Treasurer of the United States has issued and forwarded to this Board a certain draft, No. 13,054, on Treasury Warrant No. 323, for the sum of $7,500, payable to the Board of Trustees of the University of Illinois, for the use of the Agricultnral Experiment Station of the University of Illinois; now therefore

Resolved, That the President of the Board of Trustees of said University be and he is hereby authorized to endorse said draft to the order of John W. Bunn, Treasurer of this Board, to be by him drawn and used for the purposes in said draft designated.

Resolved, That a certified copy of this resolution, under the seal of this Board, signed by the President and attested by the Secretary, accompany this draft.

The Farm Committee returned the report from the agricultural department with recommendation that it be filed. Approved.

The following general appropriations, from current funds, for the six months ending August 31, 1888, were made:

Board expenses	$250 00	
Salaries for instructions	21,150 00	
Salaries for services	1,300 00	
Building and grounds	50 00	
Mechanical department	200 00	
Architectural "	200 00	
Horticultural "	200 00	
Agricultural "	200 00	
Military "	50 00	
Laboratories	200 00	
Fuel and lights	1,000 00	
Stationery and printing catalogue, etc	600 00	
Library and apparatus	50 00	
Incidental expenses	200 00	
		$25,650 00
Sundries.		
Furnitnre and fixtures	$50 00	
Water supply	200 00	
Anniversary expenses	50 00	
		$300 00
		$25,950 00

The following expenditures from State appropriations were authorized:

From State appropriation for apparatns and material:

For balance on piano for chapel	$175 00
For case in Professor Ricker's room and continuation of collection of architectural designs	100 00
For Thatcher's calculating machine	32 00
For machine cutters for shops	30 00
For safe for Regent's office	250 00

From State appropriation for buildings and grounds:

For painting of fence	50 00
For care and improvements, University grounds	300 00

From State appropriation for cabinets:

For purchase of mineralogical specimens	42 00

Authority was given to import chemicals and apparatus for ensuing year at cost not to exceed $650.

The Regent and professor of zoölogy were authorized to expend the remainder of the State appropriation for cabinets in purchases of specimens and material.

The following special appropriations from current funds were also made:

For printing of catalogues	$400 00
For commencement expenses	150 00
For certificates for accredited high schools	100 00
For Regent's traveling expenses	55 81

The Auditing Committee made the following report, which was received and approved.

Board of Trustees, University of Illinois:

Your committee respectfully report that they have examined the accounts and bills on which warrants, Nos. 201 to 450 (both inclusive) were drawn, and find the same correct as reported by the Business Agent. They have also examined the report of the Treasurer and find the same correct. We recommend that the same be filed.

F. M. McKAY,
G. R. SHAWHAN, } Anditing Committee.

The regular appropriation for the ensuing quarter for the Laboratory of Natural History, $450, was granted.

The Farm Committee was instructed to collect or secure the rent now due for the Griggs farm, or declare the lease forfeited.

Adjourned to meet at Chicago, in the Grand Pacific Hotel, on Wednesday, March 21, 1888, at 10 o'clock a. m.

S. M. MILLARD, *President.*

E. SNYDER, *Secretary.*

ADJOURNED MEETING, CHICAGO, MARCH 21, 1888.

The Board met, pursuant to adjournment, at the Grand Pacific Hotel in Chicago, at 10 o'clock a. m., March 21, 1888.

Present: Messrs. Bennett, Clemens, Cobb, Dysart, Eisenmayer, McKay, McLean, Millard, Pullen, and Shawhan.

Absent: Governor Oglesby, and State Superintendent Edwards.

In the absence of the Secretary, Alexander McLean was appointed Secretary *pro tempore.*

The minutes of the meeting of December 13, 1887, were approved.

The following named gentlemen present, by invitation, were invited to participate in the deliberations of the Board. They were,

Charles F. Mills, Secretary,

Hon. Lafayette Funk,

Representing the State Board of Agriculture.

Milo Barnard, President,

A. C. Hammond, Secretary,

Representing the State Horticultural Society.

Lovejoy Johnson, President.

R. Lespinasse, Secretary,

Representing the State Dairymen's Association.

President Millard explained that the meeting was held pursuant to adjournment of the annual meeting held March 12th at Champaign, and that the special subject for consideration was the more complete organization of the Agricultural Experiment Station. He gave an explanation in detail of the steps already taken under the law of congress of March 2, 1887, and asked for expressions of opinion from visiting gentlemen present.

The subject was discussed by Messrs. Dysart, Cobb, Barnard, Mills, Johnson, Hammond, Lespinasse, and the Regent, and as a result of the discussion it was agreed that the Board of Direction of the Experiment Station should be enlarged to consist of nine members, and that the several organizations named, to-wit: the State Board of Agriculture, the State Horticultural Society, and the State Dairymen's Association, should be represented in said Board of Direction.

The Board adjourned until 2 o'clock p. m.

AFTERNOON SESSION.

The Board convened pursuant to adjournment, at 2 o'clock p. m., at the same place as in the morning session. The same Trustees were present.

The Regent, as Chairman of the Standing Committee on Experiment Station, presented amendments to the plan of organization adopted at the December meeting, which, after full discussion, were severally adopted.

The plan thus amended is as follows:

PLAN FOR THE ORGANIZATION OF AN EXPERIMENT STATION AT THE UNIVERSITY OF ILLINOIS.

SECTION 1. Pursuant to and in accordance with the provisions of an act of Congress, approved March 2, 1887, entitled an act to estahlish agricultural experiment stations in connection with the colleges estahlished in the several States under the provisions of an act approved July 2, 1862, and of the acts supplementary thereto, and of a joint resolntion of the 35th General Assemhly of the State of Illinois, giving assent thereto, as provided in section 9 of said act of Congress, there shall be, and is hereby, established a department of the University of Illinois, which shall be known and designated as The Agricultural Experiment Station of the University of Illinois.

Sec. 2. The object and duty of such Experiment Station shall be to fulfill in its scope and work the requirements of section 2 of the act of March 2, 1887, estahlishing the same, and to conduct such other researches and experiments bearing directly on the agricultural industry of the State of Illinois, as may he deemed advisahle hy the Board of Trustees of the University of Illinois.

Sec. 3. The experimental work of the Station shall he under the immediate charge of a Board of Direction, consisting of nine persons, one of whom shall he designated as President, when appointed: and all the members of said Board shall he appointed hy the Board of Direction of the University, at its annual me-ting. The persons who may he appointed on such Board of Direction shall he: the Regent of the University; one person from each of the following named organizations in the State of Illinois, to be recommended to the Board of Trustees hy those respective organizations, or hy their respective Presidents and Secretaries, to-wit: The State Board of Agriculture, The State Horticultural Society, The State Dairymen's Association; and five other persons, at least two of whom shall he Trustees of the University.

The persons appointed shall hold office until the next annual meeting of the Trustees of the University, and until their successors are appointed. Any vacancies in the Board of Direction shall he filled by the Trustees of the University.

The President of the Board of Direction, and two members thereof appointed hy the Board of Trustees, shall constitute an Execntive Committee, which shall have authority to perform all the fnnctions of the Board of Direction when said Board is not in session.

Sec. 4. The Directors shall devise and arrange the methods hy which investigation shall he pursued and experiments conducted. They shall divide the work of the Station and assign the parts thereof to such persons as may he hest fitted hy experience and ahility to carry forward such work. They shall keep accurate detailed acconnts of all experimental work, and all the circum-

stances surrounding the experiments, which can in any way affect them, and work out such results as the facts may show and put the same into shape for proper reports, to be published from time to time as required by the act of March 2, 1887.

The Directors may adopt such rules of organization as they may deem necessary, which shall not be in conflict with the laws under which the department is organized, or with such regulations as the Trustees may from time to time prescribe.

Sec. 5. The Directors shall report to the Regent and Trustees at each regular or quarterly meeting of this Board such experiments and investigations as they desire to undertake, also shall report the probable expense of the same, and shall designate such instruments, lands, help, and other requirements which they may need to carry out successfully the proposed work, and no experiments or investigations requiring the expenditure of money shall be made by the directors of such Station without the approval of the Board of Trustees of the University, or in case of emergency, the Executive Committee of said Trustees, first had and obtained.

Sec. 6. The Treasurer of the Board of Trustees is hereby designated and appointed to receive and have the custody of the moneys appropriated from time to time by the Congress of the United States and any and all other moneys appropriated or donated at any time for the purpose of such Station, and he shall keep all such moneys in a separate fund account, and shall pay the same out upon warrants signed by the President of the Board of Trustees, and countersigned by the President of the Board of Direction of such Station, but no money shall be drawn or used for any purpose except for the work and needs of the Experiment Station.

Sec. 7. The Board of Direction shall render to the Board of Trustees at each regular and quarterly meeting an account of all moneys received and expended together with the vouchers for all expenses and disbursements, and shall report to the Trustees any facts which shall affect the financial management of the Experimental Station.

Sec. 8. The Board of Direction with the consent of the Trustees shall appoint a secretary whose duty it shall be, under the direction of the President of the Board, to keep a complete record of the work of the Station, to carry on the correspondence, supervise the editing and printing of all bulletins and reports, and shall do all other work necessary to be done about the business of such Station, which may be required of him by said Board or its President.

Sec. 9. In case any professor of the University shall be employed in the work of the Experiment Station, the Board of Direction shall estimate the value of his services while so employed, such estimate to be made upon the basis of his regular salary as such professor, and whatever sum shall be found as a proper compensation for such services, such amount shall be paid into the treasury of the University from the Experiment Station fund.

Sec. 10. The Board of Direction shall, at its discretion, appoint all officers and regular assistants employed upon the work of the Station, and shall fix the compensation of said appointees. The Board of Direction may employ, and pay from a fund appropriated for that purpose, to be drawn by the usual warrant, all temporary assistants, laborers, janitors, and workmen, such employment and payment to be reported to the Trustees at each quarterly meeting.

No member of the Board of Direction shall receive any compensation for acting as such, beyond his necessary expenses while engaged upon his duties as such member of the Board.

Sec. 11. The Trustees shall from time to time set off such lands belonging to the University as may be needed for experimental work; which lands shall be free of rent charge, but all produce therefrom, after its needs for purposes of experiment have ceased, shall belong to the University without charge and may be removed from the land by the University.

The Trustees shall likewise assign such farm tools, machinery, labor and teams for the use of the Station as may be convenient without interfering with the University work and its farms, and whenever necessary teams, tools, and machinery shall be purchased for the exclusive use of the Station, and whatever shall be furnished to the Experiment Station by the University either in help, materials, teams, or special work shall be paid for from the Station fund at current values and rates.

Whenever deemed advisable for experiments or any subject requiring the use of buildings, tools, stock, or animals for feeding or dairy purposes, or the use of the laboratories, greenhouses or veterinary buildings, for chemical work, plant experiments, or the treatment of diseases, the Board of Direction shall report to the Board of Trustees, such needs, specifying what arrangements can be made which will not conflict with the University work, and the Trustees shall make all necessary provisions which shall be reasonable and feasible to promote the experimental work. It being the declared intention of the Board of Trustees to render every assistance possible to further the efficacy and success of the Experiment Station.

Sec. 12. The Trustees will assign rooms in the University buildings for an office or other purposes from time to time as shall be needed, under such terms as shall be provided when assigned.

Sec. 13. The Experiment Station shall be deemed a department of the University, and except as may be herein or hereafter specially provided, all its officers and employés shall be governed by the same regulations which govern other departments of the University. The Regent shall include the Experiment Station as one of the subjects of his regular quarterly report to the Trustees, with statements as to its progress, suggestions as to its current needs and prospective development, and recommendations as to appropriations and management as occasion shall require. Questions which may arise touching the Station, its work or its relationships, not herein provided for, shall be referred to the Trustees of the University, who may add to, rescind or amend these regulations at their discretion.

On motion, the Board proceeded to appoint the members of the Board of Direction of the Agricultural Experiment Station of the University of Illinois, as provided for in the plan of organization.

On motion, Regent S. H. Peabody was appointed a member of said Board of Direction, and President thereof.

The Presidents and Secretaries of the several organizations previously referred to appeared before the Board, and nominated the following named persons as representatives of their respective organizations, to-wit:

For the State Board of Agriculture,

E. E. Chester, of Champaign county.

For the State Horticultural Society,

J. T. Johnson, of Hancock county.

For the State Dairymen's Association,

H. B. Gurler, of DeKalb county.

On motion, each of the persons so nominated was appointed a member of the Board of Direction.

On motion, Emory Cobb, of Kankakee, and Burden Pullen, of Centralia, from the Board of Trustees; and George E. Morrow, T. J. Burrill and William McMurtrie, from the Faculty of the University, were severally appointed members of the Board of Direction.

On motion, Messrs. Cobb and Chester were appointed as the members of the Board of Direction, who, together with the President, should constitute the Executive Committee thereof.

On motion, the Executive Committee of the Trustees of the University was authorized to take such action pursuant to the plan of organization, adopted by the Trustees, and to the act of congress, as may be necessary to bring the Station into action in the earliest and most efficient manner.

On motion, the Trustees adjourned.

S. M. Millard, *President.*

Alexander McLean *Secretary, pro tempore.*

MEETING OF JUNE 12, 1888.

The Board met at the University parlor, at 3 p. m., June 12, 1888, and no quorum being present, adjourned to meet at 9 o'clock a. m., June 13, 1888.

Second Day's Session.

The Board met at 9 o'clock a. m.

Present—Trustees Bennett, Eisenmayer, McKay, McLean, Millard, Pullen and Shawhan.

Absent—The Governor, Dr. Edwards, Messrs. Cobb, Clemens and Dysart.

The records of the meetings of March 13 and March 21, 1888, were read and approved.

The following report from the Executive Committee was received and the recommendations contained therein were approved:

To the Board of Trustees of the University of Illinois:

The nndersigned committee respectfully reports that pursuant to the call of the chairman, it held a meeting in Chicago, March 31, 1888, and transacted the following business:

Dr. S. H. Peabody, President of the Board oi Direction of the Agricultural Experiment Station of the University of Illinois, presented the following report and recommendations from said Board of Direction:

To the Board of Trustees of the University of Illinois:

The Board of direction of the Agricultnral Experiment Station presents this, its first report upon the subjects committed to it for consideration.

The Board has first songht to determine the general scope of experimental work which should be nndertaken, as indicated by the natnre of the agricnltural and kindred pursuits carried on in the State of Illinois, and the present condition of this great industry. While many topics present themselves as worthy of investigation, and such as, sooner or later, will demand consideration, the following appear to be the most important. Others seem to group themselves about these, or to be secondary issues naturally growing ont of these. These four have been selected by what seems a principle of natural selection:

1. Tbe cultnre of the cereal grains and the grasses.
2. The feeding of animals with reference to growth and meat product.
3. The feeding of cattle with reference to the milk product.
4. Orcharding and the culture of small fruits and garden products.

In each of tbese departments thonght has been taken as to:

1. Experiments which can be undertaken at once, in order that some report of the work done, or in progress, may be sent to the waiting public at an early day.

2. Experiments of a broader and more exhaustive character which may reqnire considerable time to bring about results, intelligible and reliable. As tbe working season is now upon us, most attention has been given to find wbat lines of work in these greater departments can be entered npon at once. Tbe following are recommended:

1. In the department of field experiments:

(A) Plat culture for testing varieties. For this season corn, oats and roots. Object, to determine the truthfulness of named varieties and their relative values under ordinary and similar cultivation.

(B) Plat culture of some carefully chosen varieties. Object, to determine the influence of definitely varied methods of cultivation; or conditions of soils; or methods of fertilization.

(C) The uses of fertilizers; as barn-yard manures; commercial fertilizers; mineral substances, etc.

(D) The following up of lines of crop experiments already undertaken, and partially worked out on the University farms upon the points named above, and upon rotation, drainage, etc. To corn and oats, named above, must be added wheat, the grasses and other forage plants, when the season comes for beginning such experiments.

2. In the department of stock-feeding:

Experiments should be undertaken to determine the relative values of different kinds of food, with reference to distinctly chosen and definite purposes:

(A) The value of ensilage fed to growing animals compared with other substances, as hay or special foods, etc.

(B) The comparison, later in the season, between grain and grass feeding, on cattle of various ages and conditions.

3. In the department of dairy feeding:

(A) The feeding of ensilage to dairy cows, in order to ascertain its value in comparison with other forage, hay, grain, or other foods.

(B) Experiments upon the use of certain salts with milch cows.

(C) Experiments upon the frequency with which water should be given to milch cows and the temperature which is best for their use.

(D) Experiments upon the composition and characteristics of the milk from animals of different breeds and their grades.

(E) In this connection it is deemed advisable to to begin a careful investigation with a view to discover some simple and exact method of determining the quantity of fatty matter in fresh milk. The subject is one of great importance in the operation of creameries, concerning both the farmer who sells milk and the manufacturer who buys it, and as a means of indicating the true value of milk giving animals. Some work already done in this direction leads to the belief that success may reward further effort.

4. In the department of horticulture:

(A) Experiment with a part of the old orchard now on the University farm, using varied cultivation, various fertilizers, etc.

(B) Plant a limited area with new trees; as apples, pears, plums, etc., with a view of testing their adaptability to the situation as well as the influences of varied culture upon them, particularly as to the use of fertilizers.

(C) To conduct similar experiments upon grapes, using in part the stock now on hand and in part new plantings.

(D) Plant small fruits for testing varieties, culture, hybridization, etc.

(E) Investigate carefully and exhaustively a few kinds of vegetables, one, two or more to determine identity of varieties, comparative values, adaptation, and culture.

(F) Begin some tests as to the use of special fertilizers about forest trees.

(G) Investigate plant diseases and the remedies therefor.

GENERAL PLANTING.

To prepare for feeding experiments upon live stock in the next fall and winter, a considerable planting of corn for ensilage, and of roots should be made. In this will be found also opportunity for experimenting upon the kinds of seeds, thickness of planting, etc., etc.

LAND.

It is proposed that the Station occupy for the coming season most of the land of the north farm, beginning at a point south of the University buildings and extending through to the south road on both sides of the central driveway. The agricultural experiments to be mainly east of the driveway; horticultural experiments to be west thereof. It is not thought desirable that a general and permanent assignment should be made, but that the matter may be so left open that such lands may be used in successive seasons as the varying needs of the Station may require.

Feeding experiments should be conducted as far as possible at the north barn. But feeding of ensilage must be done at the south barn, as the silo is there. Feeding of cattle on grass must be done at either place, as the exigencies of the season may require. In this respect it will be necessary to allow some latitude of discretion to the managers of the farm and of the Station.

QUARTERS.

The Board of Direction finds that the upper story of the chemical building, now nearly unoccupied, comprises a suite of rooms well adapted for the purpose of the Station, subject to the only objection that they are up two flights of stairs.

The Board would select the northeast room for an office; the middle room on the north for a library; the east room for mailing and work room; the large south room to be divided by a partition into two apartments, the southwest to be used as a chemical laboratory and the southeast room for collections. The laboratory must have a small room separated from it as a balance and record room, and should communicate with the photographic rooms, which are likely to be frequently used.

NEW BUILDING.

A building is needed in which various work intermediate between the field and the office shall find a place; such work as the handling of grains and seeds, receiving, weighing, storing, packing, etc. The agricultural and horticultural work will each need such space. Many experiments in feeding should be followed by a careful manipulation of the product, separating, for example, the different kinds of flesh in the ultimate, physical analysis of the animal. A place for such work should be provided. A plan of such a building is prepared to be 30x56 feet, in four rooms; to stand over a cellar eight feet deep, for storage and for such horticultural work as requires the protection of a relatively moist and cool place; the walls to be 16 feet high; the upper floor dropped 5 feet, furnishing a dry loft for the storage of grains, seeds, etc, The building should have a suitable platform along one side of which wagons may easily receive and deliver loads. The doors should open on this platform, and it should be covered with a light veranda roof,

This building should be placed on the rise of ground south of the veterinary house, and in the vicinity of the large sycamore tree now there standing. It will be convenient to the various agricultural and horticultural experiments, and may be used for tool house, etc. It is estimated that it may be built within the limit of the law, three thousand dollars ($3,000).

FERTILIZERS' HOUSE.

A small rough building, about 16x20 feet, should be built for the storing and mixing of fertilizers. It should be in some inconspicuous place near the warehouse named above.

The changes in the chemical laboratory require the erection of a partition across one room about 45 feet long and one about 25 feet long enclosing the balance room. These partitions should be of wood for four or five feet in height, and for the rest of the distance to the ceiling of glazed sash, for light and ventilation. Three doors must be opened, the rooms cleaned, painted and calcimined.

EQUIPMENT.

The requirements for chemical apparatus; for scales and other apparatus; for tools and light implements; for meteorological instruments, and for library will be found among the estimates.

OFFICERS AND ASSISTANTS.

Aside from the chiefs named elsewhere, the following are recommended at salaries not to exceed the sums named:

A secretary in charge of the office, as named in the plan of organization, at a salary of	$1,500 00
Assistant agriculturist	1,500 00
Assistant horticulturist	1,000 00
Assistant chemist, first	1,200 00
Assistant chemist, second	750 00
Assistant botanist	750 00

LIBRARY.

Mention is made of the purchase of books for the Station library. This is deemed of first importance. The Station should have a working library of its own, for use and consultation in its varied kinds of work; scientific journals, English, French and German will be much needed. What has been done should be known in order that plans may be wisely laid for the conduct of new work. In the reports of the Station it will be necessary to summarize that which has been done before in similar lines.

It is believed that no more important use of the funds can be made than in buying well chosen books of reference. It is not advised that the University library should be duplicated except in some works which may be required for constant use.

By order of the Board of Direction,

S. H. PEABODY, *President.*

G. E. MORROW, *Secretary pro tempore.*

On motion, the recommendations of the Board of Direction, as presented in said report, as to the conduct of experiments in the departments in said report named; to-wit: the department of field experiments, department of stock feeding, the department of dairy feeding, and the department of horticulture were approved.

And it was further ordered that the Board of Direction be and is authorized to enter upon and conduct the said experiments and to expend thereupon during the quarter ending June 30, 1888, exclusive of salaries of regular officers and assistants and special sums otherwise appropriated, a sum of money not to exceed fifteen hundred and ninety dollars ($1,590.00).

And it was further ordered by said Committee that the last named sum be appropriated from Agricultural Experiment fund for such purpose.

And it was further ordered by the said Committee that all lands belonging to the University and lying south of the University main building on the north farm, or so much thereof as the Station may require, be assigned for the use of the Station and that the use of the barns belonging to the University be granted for feeding experiments.

It was further ordered by said Committee that cattle may be fed, and special crops grown upon such parts of the south farm belonging to the University as may be needed, providing, such use of the sonth farm shall not interfere with the University crops growing.

On motion it was further ordered by said Committee that rooms upon the upper floor of the chemical bnilding and, if found necessary, a room for an office on the first floor of said building, be assigned for the use of said Station, and permission given to erect partitions dividing the large south room of the upper story in such building according to the plans presented, and to open necessary doors for convenient communication between the apartments; also to make connections with the water system of said bnilding and to arrange the gas system in such a manner that the expense thereof may be kept distinct from that used for the University, the charges, alterations and repairs in said chemical building not to exceed the cost of five hundred dollars ($500.00).

It was further ordered by the said Committee that the Board of Direction proceed to erect a building for the purposes of the Station according to the plans presented and approved by the Committee, and that the same be located west of the avenue leading south from the University main building and near the large sycamore tree as described in said report; that the cost of said bnilding when completed shall not exceed the sum of three thousand dollars ($3,000.00); also that said Board bnild a house for storage of fertilizers as recommended, in some position where it shall be neither conspicuous nor offensive, at a cost not to exceed one hundred dollars ($100.00), and that the Board of Direction be authorized to make such other and sundry repairs as may be found needful, not to exceed the cost of fifty dollars ($50.00).

On motion it was further ordered by the Executive Committee that the sum of three thousand dollars ($3,000) be appropriated from the Experiment Station fund to be used on the said building and repairs.

The following recommendations and nominations were presented by the Board of Direction as to officers of the Station, viz.: Prof. George E. Morrow to be agricultnrist, Prof. T. J. Burrill, to be horticulturist and botanist, Prof. William McMurtrie to be chemist.

On motion the committee approved the recommendations and appointed the respective persons named for the positions recommended, they to hold their respective offices until April 1, 1889, and nntil their successors are appointed.

And it was further ordered by the committee that a snm not to exceed one-third of the salaries of the said professors, for the time in which they shall be employed in the service of the Station, shall be transferred from the Experimen: Station fnnd to the treasnry of the University in accordance with the estimates for said services made and reported by the Board of Direction.

Upon the nomination of the Board of Direction the following persons were appointed at the salaries named, to-wit: Thomas F. Hnnt, assistant agricul'ur ist, at a salary of fifteen hundred dollars ($1,500) per annum; George W. McCluer, assistant horticulturist, at a salary of one thousand dollars ($1,000) per annum; and John A. Miller, assistant chemist, at a salary of twelve hundred dollars ($1,200) per annum, such persons to hold their respective offices until the first of April, 1889, and nntil their successors are elected.

Upon motion it was further ordered that the Board of Direction be authorized to employ persons to fill the following positions in said Station at the salaries named, viz.: An assistant chemist at a salary of seven hundred and fifty dollars ($750) per annum; an assistant botanist at a like salary. The employment not to extend beyond April 1, 1889.

On motion the following appropriations were made from the experiment fund for the purposes named, the moneys to be used from said appropriations for the respective purposes appropriated, not to exceed the snm so named for that purpose, to-wit:

For printing, including bulletin for first quarter, records, stationery and postage	$500 00
For tables, cases and apparatns in chemical laboratory	2,700 00
For botanical apparatus	320 00
For scales and tools	200 00
For type writer	100 00
For meterological instrnments	100 00
For books and periodicals	3,000 00
For incidental expenses	500 00
For salaries of officers and assistants	2,175 00

On motion the committee adjourned.

S. M. MILLARD,
EMORY COBB,
CHAS. BENNETT,
Executive Committe.

Treasurer J. W. Bunn read his quarterly report, which was received and referred to the Auditing Committee.

JOHN W. BUNN, TREASURER, IN ACCOUNT WITH THE UNIVERSITY OF ILLINOIS.

Dr.

1888.				
March	13	To balance		$9,985 53
		" interest on land contract No. 30, E. L. Baughman		5 96
March	31	" amount received on account University students' fees	$1,500 00	
		" " " preparatory year	300 00	
		" " " buildings and grounds	25 00	
				1,825 00
May	1	To interest on Sangamon county school bonds		325 00
May	12	" interest on land contract No. 18, D. A. Young, assignee	$212 20	
		" " " " " 33, C. Hesse	8 40	
		" " " " " 40, J. Dezort	61 20	
		" " " " " 47, M. Hubka	50 00	
				331 80
May	31	To amount received on account buildings and grounds	$77 00	
		" " fuel and lights	103 70	
		" " mechanical department	14 95	
		" " architectural department	29 45	
		" " agricultural department	1,870 03	
		" " horticultural department	182 65	
		" " laboratories	156 82	
		" " library and apparatus	50 00	
		" " music fees	22 00	
		" " Minnesota lands	10 00	
		" " preparatory year	197 50	
		" " University students' fees	744 00	
				3,458 10
				$15,931 39

Cr.

May	31	By amount paid on account board expenses	$133 62	
		" " salaries	10,454 79	
		" " buildings and grounds	23 90	
		" " fuel and lights	164 35	
		" " stationery and printing	55 30	
		" " preparatory year	489 99	
		" " mechanical department	216 60	
		" " architectural department	356 34	
		" " agricultural department	624 66	
		" " horticultural department	104 89	
		" " chemical department	25	
		" " military department	20 50	
		" " library and apparatus	48	
		" " incidental expense	70 81	
				12,716 48
		" " anniversary exercises	$31 26	
		" " music fees	22 00	
				53 26
		State appropriations—		
		By amount paid on account buildings and grounds	$195 67	
		" " mechanical and architect'al shops	270 25	
		" " books and publications	393 86	
		" " cabinets	131 04	
		" " expenses of instruction	645 47	
		" " apparatus and material	348 21	
		" " metallurgical laboratory	99 18	
		" " fire walls and ventilation	15 60	
		" " State laboratory of Natural Hist'y	1,058 17	
				3,157 45
		Balance		4 20
				$15,931 39

Urbana, June 12, 1888.

JOHN W. BUNN, Treasurer.

The Business Agent presented his report, which was received and referred to the Auditing Committee:

CURRENT APPROPRIATIONS.

Six Months Ending August 31, 1888.	Appropriated	Receipts also Appropriated	Expended.	Balance.
Board expenses	$250 00		$133 62	$116 38
Salaries for instruction. State			645 47	
Salaries for instruction. Current	21,150 00		9,593 79	10,910 74
Salaries for services	1,300 00		861 00	439 00
Buildings and grounds	50 00	$77 00	23 90	103 10
Mechanical department	200 00	14 95	216 60	
Architectural "	200 00	29 45	356 34	
Agricultural "	200 00	1,870 03	624 66	1,445 37
Horticultural "	200 00	182 65	104 89	277 76
Military "	50 00		20 50	29 50
Laboratories	200 00	156 82	25	356 47
Fuel and lights	1,000 00	103 70	164 35	939 35
Stationery and printing	600 00		55 30	544 70
Library and apparatus	50 00	50 00	48	99 52
Incidental expenses	255 81		70 81	185 00
Sundries.				
Furniture and fixtures	50 00			50 00
Water supply	200 00			200 00
Anniversary expenses	50 00		31 26	18 74
Commencement expenses	150 00			150 00
Certificates for accredited high schools	100 00			100 00
Preparatory year		497 50	489 99	7 51
Music fees		22 00	22 00	
University students' fees		2,244 00		2,244 00
Minnesota lands		10 00		10 00

STATE APPROPRIATIONS.

	Appropriated.	Received.	Expended.	Balance.
Taxes on land (¼ per annum)	$3,500 00	$1,461 69	$1,461 69	
Buildings and grounds (½ per annum)	4,000 00	2,000 00	1,986 41	$13 59
Mechanical and architectural shops (½ per annum)	3,000 00	1,500 00	1,465 50	34 50
Books and publications (½ per annum)	3,000 00	1,500 00	908 43	591 57
Cabinets (½ per annum)	2,000 00	1,000 00	660 13	339 87
Expenses of instruction (½ per annum)	32,000 00	16,000 00	16,000 00	
Apparatus and material (½ per annum)	3,000 00	1,500 00	1,244 34	255 66
Metallurgical laboratory (½ per annum)	4,000 00	2,000 00	1,195 10	804 90
Fire walls and ventilation	4,500 00	4,500 00	4,491 56	8 44
Total	$59,000 00	$31,461 69	$29,413 16	$2,048 53
Illinois State Laboratory of Natural History	16,325 00	9,390 71	6,008 65	3,382 06

The following resolution presented by Trustee Bennett was adopted:

Resolved, That the Treasurer of the Board of Trustees of the University of Illinois is hereby authorized to receive and receipt for all moneys and to endorse all orders, drafts and checks due and payable to the said Board of Trustees or to the said University of Illinois, and especially all drafts drawn by the Treasurer of the United States payable to said Board of Trustees or to said University of Illinois on account of the Agricultural Experiment Station of the said Univer sity.

The following resolution was offered by Trustee McLean, and adopted:

Resolved, That the President and Secretary be directed to draw three requisitions on the State Auditor for such moneys as may be due on State appropriation for the University and for the State Laboratory of Natural History for the year 1888.

The following report from the Auditing Committee was received and approved:

Board of Trustees, University of Illinois:

Your committee respectfully report that they have examined the accounts and bills on which warrants, Nos. 451 to 675 (both inclusive) were drawn, and find the same correct as reported by the Business Agent. They have also examined the report of the Treasurer and find the same correct. We recommend that the same be placed on file.

F. M. McKAY,
G. R. SHAWHAN, } Auditing Committee.

On recommendation of the Faculty degrees and certificates were granted as follows: [For list, see Regent's report below.]

Adjourned to meet at 3 o'clock p. m.

AFTERNOON SESSION.

The Board met at 3:30 p. m.

Present—Trustees Bennett, Cobb, McKay, McLean, Eisenmayer, Millard, Pullen, and Shawhan.

The Regent read his report, which was received.

To the Trustees of the University of Illinois:

GENTLEMEN: We are come to the close of another collegiate year, of whose progress and results it is fair to say that they are the most satisfactory of any year since my connection with the University. The class about to graduate numbers 35.

The Faculty recommends that degrees be conferred as follows:

Degree of B. S. in the College of Agriculture—

Harry S Grindley.

Degree of B. S. in the College of Engineers—

School of Mechanical Engineers:

Arthur Gustave Goldschmidt,
Jonathan Huntoon Samuels.

School of Civil Engineers:

Lincoln Bush,
Edward E. Ellison.
Warren R. Roberts,
John W. Taylor.

School of Architecture:

George R. Petty.

Degree of B. S. in the College of Natural Science—

School of Chemistry:

Benjamin Bing,
George B. McHugh.
Jacob A. Patton,
Charles P. Van Gundy.

School of Natural History:

Truman P. Carter,
Effie Anne Mathers.

Degree of B. L. in College of Literature and Science—

Frederick D. Bowditch.
Ralph E. Dewey,
Grant Frederick,
Nathan P. Goodell.
George W. Myers,
Raymond M. Place.
Mary Lena Barnes,
Ella Connet,
Mary A. Eldridge,
Nellie McLean.

Degree of B. A. in College of Literature and Science—

Edward W. Pickard.

Degree of M. S. in College of Natural Science—
John A. Miller.

Degree of M. L. in College of Literature and Science—
George M. Savage.

Degree of M. A. in College of Literature and Science—
Samuel A. Harrison.

The Faculty farther recommends that the following receive the full certificate of the University:

J. Grant Beadle,
William C. Bryant.
Frank L. Davis,
Adolphus D. Folger,
George Greaves,
John V. E. Schaefer.
Etta L Beach,
Nellie W. Jillson.
Mary C. McLellan,
Ida M. Stolley.

The following, having satisfied the conditions required by the military department of the University, have been recommended to the Governor of the State, and he has caused commissions to issue to them as Captains by brevet in the State Militia:

Frederick D. Bowditch,
Frank L. Davis,
Edward E. Ellison,
George B. McHugh,
George W. Myers,
Jacob A. Patton,
Edward W. Pickard,
Jonathan H. Samuels.

I am requested by the Faculty to ask the decision of the Trustees upon this question:

Does the act of the legislature, which gives authority for the issue of certificates of scholarship under the seal of the University, sanction the insertion in such certificates of any record of studies other than those which have been studied by the recipients during their attendance at the University?

Prof. McMurtrie desires leave of absence for the summer vacation.

The time has come when a competent assistant should be employed in the machine shop. The large number of students in this department at the opening of the year, made it necessary to appoint temporary aid, and we may expect as large a number next fall. I would advise that a competent person be secured for this work at a salary not less than, say, $80 per month.

I again call attention to the fact that the largely increased number of students has increased the cost of this department much beyond that of former times. I see no way to meet this expense but to charge a small fee for material and power, and suggest that a fee of $2.50 per term, while it would be inconsiderable to the student, would relieve what is becoming a very serious outlay. It would at least pay the expense of the added instructor.

The same reasons have made it necessary to employ more teaching force in the drawing departments. Another assistant is needed in the college of engineers, whose work shall be chiefly drawing, and who could, by a readjustment, give relief in other quarters.

Other recommendations would be made, if it were not too evident that the finances of the University will not permit such recommendations to be received.

REPAIRS AND IMPROVEMENTS.

In most respects our buildings are in good condition, but the following items should receive attention on State account.

Buildings and Grounds 1888–9.

1. The roofing of the main building needs renewal on the south slope of the main part. About forty squares should be relaid at an expense estimated at $250.

2. The wood work of the greenhouse is in need of repair. The sills of the glass work are decayed, as well as many of the uprights. It is not easy to say how extensive the repairs may need to be, but it has been thought that as much as must be done can be done for $200.

3. The heating apparatus in the chemical building needs a thorough overhauling and some extension. The boiler has been tested and needs new pipes, gaskets and repairs of furnace. Estimated at $120.

Also the main steam pipe and branches and returns and for four new radiators, the estimate is $235.80.

A part of this might with propriety be paid by the Experiment Station, as it is needed for warming the upper rooms.

4. For care of lawn to October 1, $150.

5. For cleaning, etc., $300.

Other improvements are much needed, but these seem to be imperative, and to make as great a draft upon this fund as can be permitted at this time.

From the State appropriation for books and periodicals, 1888-9, there is asked for binding $125.

From State appropriation for apparatus and material, 1888-9, for apparatus for instruction in steam testing, $50.

For a steam indicator and fitting, $100.

I present the following reports:

The report of the Professor of Agriculture upon the farm:

UNIVERSITY, June 11, 1888.

Dr. S. H. Peabody, LL. D., Regent:

SIR: During the three months closing June 1st,

The receipts from the farms have been	$1,870 03
Expenditures have been	624 66
Leaving balance in favor of farms	$1,245 37

Work on the farm is well advanced for the season. As a whole the prospect is fair for good crops. The live stock is in good condition.

Respectfully submitted, G. E. MORROW.

The report of the Director of the State Laboratory of Natural History.

The report of the Board of Direction of the Agricultural Experiment Station.

The list of Professors and Instructors for the year beginning September 1, 1888.

Respectfully submitted,

SELIM H. PEABODY, Regent.

The Board proceeded to take up the various recommendations contained in the Regent's report.

The question of certificates was referred to a special committee consisting of Trustees Bennett, McKay and McLean for report at the September meeting.

Adjourned to 9:30 p. m.

EVENING SESSION.

The Board assembled at 9:30 p. m.

Present as above.

Trustee McKay presented the following resolution, which was adopted:

Resolved, That a leave of absence be granted to Prof. Wm. McMurtrie for the summer vacation, provided, if the work in his department shall need his service, he will hold himself in readiness to perform such services as the Regent may direct.

On motion of Trustee Bennett, it was ordered that the sum of two and 50-100 dollars per term be charged each student taking instruction in the mechanical shops as an incidental fee for expense of power and material.

On motion of Trustee McLean, the Regent and Executive Committee were authorized to secure for the next year the services of an assistant instructor in the shops at a salary not to exceed $80 per month for 10 months.

The Farm Committee reported and recommended that the report on farms submitted by Professor Morrow be received and placed on file.

On motion of Trustee Cobb the following appropriations were made from State appropriations:

Buildings and grounds—
For repairs on roof of main building..... $250 00
For repairs on greenhouse..... 200 00
For repairs on boiler and heating apparatus in chemical building..... 355 00
For care of lawn, etc..... 150 00
For cleaning and minor repairs in main and chemical building..... 300 00

Books and publications—
For binding books and periodicals..... 125 00

Apparatus and materials—
For apparatus for instruction in steam testing..... 50 00
For steam indicator and fittings..... 100 00

The report of the Board of Direction of the Experiment Station was read and on motion was approved, and ordered to be printed in the minutes:

To the Trustees of the University of Illinois:

The Board of Direction of the Experiment Station begs leave to report as follows:

The work of the Station may be said to be fairly started. About fifty experiments are in progress in field culture, stock feeding and horticulture. The work of erecting a warehouse is well forwarded. Repairs in the chemical building are mostly completed, and the Secretary's office is in use. Purchases of apparatus and books, and of other needed material have been made.

The Board of Direction asks as to the fiscal year soon to close that authority may be granted to it to expend the unappropriated balance of the fifteen thousand dollars received or to be received from the United States Treasurer for the year ending June 30, 1888, and any balances which may be found to remain from sums already appropriated for that year, to be used for the Experiment Station for such purposes as the interests of the Station may require.

The Board of Direction of the Agricultural Experiment Station desires to undertake, with the approval of the Board of Trustees of the University, the following Experiments:

FIELD EXPERIMENTS.

Grasses and Clovers: Experiments to determine

1. The effect of cutting at different degrees of maturity on yield and on chemical composition.
2. The effect of the mode and of the degree of field drying upon chemical composition.

Oats: An experiment to determine the effect of harvesting at varying degrees of maturity upon yield and upon chemical composition.

Oats and Wheat: An experiment to determine the shrinkage after harvesting.

Wheat: Experiments in relation to

1. Comparison of varieties.
2. Methods of soil preparation.
3. Methods of seeding.
4. Effect of fertilizing.

The Board of Direction desires to carry on this last experiment both at the Station and at some other places in the State.

Corn: An experiment consisting of a study of the roots at different ages.

Soil: An experiment to determine the evaporation and the temperature.

FEEDING EXPERIMENTS.

Feeding Steers: An experiment to determine the relative value of new and old corn for autumn feeding on grass.

Feeding Pigs: An experiment to determine the relative value of new and old corn for early autumn feeding.

The Board of Direction reports that it has employed, under the authority of section 10 of the plan of organization, the following persons for the duties specified:

Miss Kate McIntyre as stenographer, at $40 per month.

Mr. Gustaf Dahlstrom as gardener, at $50 per month, and such needful workmen upon the experiments, and teams for the same as occasion has required.

The following statements are presented:

Exhibit A showing sums appropriated by the Trustees for specific purposes; sums expended or contracted for, and balances now appearing:

EXHIBIT A.

Accounts.	Appropriated	Expended.	Contracted for	Total.
Expenses of experiments exclusive of salaries	$1,590 00	$658 77	$745 51	$1,404 28
Buildings and repairs	3,000 00	117 38	2,882 62	3,000 00
Printing bulletins, records, etc	500 00	283 63	53 41	337 04
Tables, cases, apparatus, etc., in chemical laboratory	2,700 00	.....	2,700 00	2,700 00
Botanical apparatus	320 00	.....	320 00	320 00
Scales and tools	200 00	92 22	125 00	217 22
Type-writer	100 00	100 00	.....	100 00
Meteorological instruments	100 00	.....	100 00	100 00
Books and periodicals	3,000 00	.....	3,000 00	3,000 00
Incidental expenses, including furniture and expenses of Board of Direction	500 00	310 25	292 80	603 05
Salaries	2,175 00	650 00	875 00	1,525 00
	$14,185 00	$2,212 25	$11,094 34	$13,306 59

Exhibit B. List of warrants paid, with vouchers therefor, Nos. 1 to 73, except No. 1[illegible]

Exhibit C. Estimates for the quarter which will end Sept. 30, 1888.

EXHIBIT C—ESTIMATES FOR THE QUARTER ENDING SEPT. 30, 1888.

Books and periodicals	$75 00
Buildings and repairs, including building a silo	275 00
Bulletins	125 00
Expenses of Board of Direction	100 00
Incidental expenses	50 00
Printing, stationery and postage	75 00
Salaries	2,050 00
Tools	50 00
Wages and teams	850 00
Wheat culture away from University farm	100 00
Total	$3,750 00

Respectfully submitted for the Board of Direction of the Agricultural Experiment Station,

S. H. PEABODY, *President.*

W. L. PILLSBURY, *Secretary.*

On motion of Trustee McKay the recommendations of the Board of Direction of the Experiment Station for further experiments were adopted, and the Board was authorized to proceed with them.

On motion of Trustee McLean it was ordered that authority be given to the Executive Committee of the Board of Direction of the Experiment Station to expend the unappropriated balance of the $15,000 received, or to be received, from the U. S. Treasury for the year ending June 30, 1888, and any balances, which may be found to remain from sums already appropriated for the use of the Station for that year, to be used for the Experiment Station, for such purposes as the interests of the Station may require.

On motion of Trustee McLean the requests and estimates made by the Board of Direction of the Experiment Station for the quarter ending September 30, 1888, as found in exhibit C, were granted.

On motion of Trustee McLean it was ordered that when the Board adjourns, it adjourn to meet in Chicago at the Grand Pacific Hotel at 10 o'clock a. m. Tuesday, June 26, 1888.

The Auditing Committee submitted the following report, which was received and approved:

To the Trustees of the University of Illinois:

Your Auditing Committee report that they have examined the vouchers of the Experiment Station from No. 1 to No. 73, both inclusive, except No. 14 not presented, and find the same to be correct.

F. M. McKAY,
GEO. C. EISENMAYER, } *Committee.*

On motion of Trustee McKay the Board adjourned.

S. M. MILLARD, *President.*

E. SNYDER, *Secretary.*

ADJOURNED MEETING, CHICAGO, JUNE 26, 1888.

The Board met in Chicago at the Grand Pacific Hotel, June 26, 1888, at 10 a. m., pursuant to adjournment.

Present, Messrs. Bennett, Cobb, Eisenmayer, McKay, McLean, Millard, Pullen and Shawhan,

Absent, Governor Oglesby, Dr. Edwards, Messrs. Dysart and Clemens.

Mr. McLean was appointed Secretary *pro tempore.*

The Executive Committee reported the appointment of W. L. Pillsbury as secretary of the Experiment Station, under the following proceedings:

To the Board of Trustees of the University of Illinois:

Meeting of the Executive Committee of the Board of Trustees of the University of Illinois, held this second day of May, A. D. 1888, pursuant to a call by the chairman of the Committee.

The chairman of the Committee presented a request from the Executive Committee of the Board of Direction of the Agricultural Experiment Station of the University of Illinois, as follows:

The Executive Committee of the Board of Direction of the Agricultural Experiment Station of the University of Illinois, having duly considered the matter, unanimously recommends that Mr. W. L. Pillsbury, of Springfield, Illinois, be appointed Secretary of the Experiment Station for the year ending April 1, 1889, and hereby requests the Board of Trustees of the University to make such appointment and fix the amount of salary to be paid for the service which the person so appointed shall render.

Respectfully submitted,

SELIM H. PEABODY,
E. E. CHESTER,
EMORY COBB, } *Ex. Com. of Board of Direction.*

Upon reading said report it was moved that the following resolutions be adopted:

WHEREAS, The Executive Committee of the Board of Direction of the Agricultural Experiment Station of the University of Illinois, has recommended the appointment of W. L. Pillsbury, of Springfield, Illinois, to be Secretary of said Experiment Station for the year ending April 1, 1889;

Therefore resolved, By this Committee, that the said W. L. Pillsbury be, and is hereby appointed to the office of Secretary of said Experiment Station, such appointment to date from the 19th day of April, 1888, to continue until the 1st day of April, 1889, and that his salary be fixed at the rate of two thousand dollars per annum, and the same to commence on the 19th day of April, 1888.

Resolved, That on and after the 1st day of July, 1888, the said W. L. Pillsbury shall perform such work as may be assigned to him by the Trustees of the University of Illinois, as Secretary of the Board of Trustees of the University.

Resolved, That the sum of one thousand dollars be appropriated from the Agricultural Experiment Station fund, to be used in the payment of said salary, such payment to be made monthly.

S. M. MILLARD,
EMORY COBB,
CHAS. BENNETT, } *Ex. Com. of Board of Trustees.*

On motion of Mr. Eisenmayer the report of the Executive Committee was approved.

The Board then proceeded to elect W. L. Pillsbury as Recording Secretary and Corresponding Secretary, to serve as such until the next annual meeting.

The Regent presented an account of Hon. J. O. Cunningham, of Urbana, for legal services on sundry occasions. Whereupon, on motion of Mr. McLean, the bill was approved, and thirty dollars was appropriated from current funds for its payment.

On motion of Mr. Cobb, one hundred and fifty dollars was appriated from current funds for payment of Board expenses.

On motion of Mr. Cobb, the Regent was authorized to expend four hundred dollars for advertising.

On motion, the Board adjourned until 2 p. m.

AFTERNOON SESSION.

Board met at 2 p. m. Present as in the morning, except Mr. McKay.

After full consideration, on motion of Mr. McLean, the following list of professors and instructors was appointed at the salaries named, to serve for the collegiate year beginning Sept. 1, 1888:

Name.	Department.	Payment on Account of—				
		U. of I.	Exp't Station.	State Laborat'y	Wages.	Total.
T. J. Burrill	Botany and Horticulture	$1,333⅓	$666⅔	$400		$2,400
S W. Shattuck	Maths. and Bus. Agent	2,000			$300	2,300
E. Snyder	Modern Language	2,000				2,000
J. C. Pickard	English Language	2,000				2,000
N. C. Ricker	Architecture	2,000				2,000
J. D. Crawford	Hist. and Anc. Language	2,000				2,000
G. E. Morrow	Agriculture	1,333⅓	666⅔		House	2,250
P. Roos	Drawing	1,800				1,800
I. O. Baker	Civil Engineering	2,000				2,000
———	Chemistry	2,000		[St. Ent.		2,000
S. A. Forbes	Zoölogy and Entomology	1,000		2,000		3,000
T. B. Comstock	Mining Engineering	1,800				1,800
J. H. Brownlee	Rhetoric and Oratory	1,800				1,800
C. W. Rolfe	Geology	1,500				1,500
D. McIntosh	Veterinary Science	1,800				1,800
N. Butler, Jr	Latin	1,600				1,600
A. T. Woods	Mechanical Engineering	2,000				2,000
A. N. Talbot	Eng. and Math. Asst	1,400				1,400
W. H. Garman	Zoölogical Assistant	1,000		200		1,200
E. A. Kimball	Iron Work	1,000			500	1,500
G. W. Parker	Wood Work	580			500	1,080
———	Modern Language Asistant	600				600
Geo. W. Myers	Instructor Mathematics	500				500
———	Chemical Assistant	900				900
G. B. McHugh	Chemical Assistant	500				500
Essie Dana	Assistant in Drawing	250				250
———	Two Ass'ts Phys. Lab	75				75
Maud Kimball	Music				150	150
A. B. Baker	Janitor				840	840

On motion of Mr. Cobb, the account of the Regent for traveling expenses was allowed, and ordered paid from current funds; amount, $66.30.

On motion, the Board adjourned.

S. M. Millard, *President.*

Alex. McLean, *Secretary pro tempore.*

List of Warrants for the Fiscal Year Ending August 31, 1888.

No.	Date.	To Whom	For What.	Amount.
	1887.			
1	Sept, 30....	S. H. Peabody	Salary, September, 1887	$333 33
2	" 30....	T. J. Burrill	" "	166 66
3	" 30....	S. W. Shattuck	" "	166 66
4	" 30....	E. Snyder	" "	166 66
5	" 30....	J. C. Pickard	" "	166 66
6	" 30....	N. C. Ricker	" "	166 66
7	" 30....	J. D. Crawford	" "	166 66
8	" 30....	G. E. Morrow	" "	166 66
9	" 30....	P. Roos	" "	150 00
10	" 30....	I. O. Baker	" "	166 66
11	" 30....	W. McMurtrie	" "	166 66
12	" 30....	S. A. Forbes	" "	96 66
13	" 30....	T. B. Comstock	" "	150 00
14	" 30....	J. H. Brownlee	" "	150 00
15	" 30....	C. W. Rolfe	" "	125 00
16	" 30....	D. McIntosh	" "	150 00
17	" 30....	N. Butler	" "	133 33
18	" 30....	A. N. Talbot	" "	116 66
19	" 30 ...	A. T. Woods	" "	166 66
20	" 30....	W. H. Garman	" "	100 00
21	" 30....	E. A. Kimball	" "	125 00
22	" 30....	G. W. Parker	" "	90 00
23	" 30....	T. F. Hunt	" "	80 00
24	" 30....	G. W. McCluer	" "	60 00
25	" 30....	C. E. Eggert	" "	60 00
26	" 30....	A. W. Palmer	" "	90 00
27	" 30....	E. R. Boyer	" "	60 00
28	" 30....	A. B. Baker	" "	70 00
29	" 30....	C. M. Weed	" "	66 66
30	" 30...	C. A. Hart	" "	50 00
31	" 30....	M. Snyder	" "	32 64
32	" 30....	M. B. Waite	" "	41 66
33	" 30....	S. A. Forbes	Publication of bulletins	225 00
34	" 30....	R. Ridgway	Illustrations of zoölogical reports	25 00
35	" 30....	Justus Roe & Sons	Steel tape and repairs	4 97
36	" 30....	W. Comstock	Books and drawings	22 50
37	" 30....	Rogers, Brown & Co	Iron	23 50
38	" 30....	T. A. Reichardt & Co	Chemicals	105 19
39	" 30....	J. W. Queen & Co	Voltometer	29 65
40	" 30....	Jones & Laughlins	Iron	28 54
41	" 30....	J. Wollensack	Locks and keys	20 55
42	" 30....	Pantagraph Stat. Co	Binding	96 97
43	" 30....	L. Beckman	Tape	5 25
44	" 30....	B. Tatariau	Salary, September, 1887	40 00
45	" 30....	G. Peabody	" "	13 25
46	" 30....	Abendroth & Roots M'f'g Co	Tubes and gaskets	152 80
47	" 30....	P. Roos	Object models	6 72
48	" 30....	C. Bennett	Expense board meeting	18 50
49	" 30....	G. C. Eisenmayer	" " "	17 50
50	" 30....	F. McKay	" " "	15 20
51	Oct. 15....	J. Tierney	Work, September, 1887	56 81
52	" 15....	J. P. Stewart	" " "	18 75
53	" 15....	Agricultural department	Expense, " "	240 58
54	" 15....	Lindsey & Davis	Sand and gravel	7 68
55	" 15....	R. Birkholz	Painting and glazing	17 40
56	" 15....	Horticultural department	Expense, September, 1887	37 99
57	" 15....	Fuller & Fuller	Glass and flasks	27 09
58	" 15....	J. D. Carmody	Fire hose and washers	13 00
59	" 15....	Union Telephone Co	Rent of instrument and repairs	20 00
60	" 15....	W. McMurtrie	Telegrams	5 13
61	" 15....	A. J. Stoneburner	Repairing and cleaning boilers	30 25
62	" 15....	F. D. Baker	Assistant in instruction in Mech. shop	9 09
63	" 15....	Stearns & Co	1 bbl. stucco	2 00
64	" 15....	G. E. Marshal & Co	Record	4 50

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
65	Oct. 15....	Stock Journal Co	Advertising	$14 25
66	" 15....	G. F. Cram	"	25 00
67	" 15....	J. M. W. Jones Printing Co	Erasers, etc	3 00
68	" 15....	Hectograph M'f'g Co	Filling forms	3 00
69	" 15....	Union Water Supply Co	Quarter ending October 1, 1887	100 00
70	" 15....	S. A. Forbes	Expense Lab. Nat. Hist	700 00
71	" 15....	T. F. Hunt	Expense for State Fair exhibition	28 90
72	" 15....	J. Hansen	Work on fence	11 00
73	" 15....	S. H. Garrison	Repairs on chimneys	2 23
74	" 15....	A. C. McClurg	Books and stationery	56 09
75	" 15....	Students' pay roll	Labor, September, 1887	100 74
76	Oct. 31....	S. H. Peabody	Salary, October, 1887	333 33
77	" 31....	T. J. Burrill	" "	166 66
78	" 31....	S. W. Shattuck	" "	166 66
79	" 31....	E. Snyder	" "	166 66
80	" 31....	J. C. Pickard	" "	166 66
81	" 31....	N. C. Ricker	" "	166 66
82	" 31....	J. D. Crawford	" "	166 66
83	" 31....	G. E. Morrow	" "	166 66
84	" 31....	P. Roos	" "	150 00
85	" 31....	I. O. Baker	" "	166 66
86	" 31....	W. McMurtrie	" "	166 66
87	" 31....	S. A. Forbes	" "	70 00
88	" 31....	T. B. Comstock	" "	150 00
89	" 31....	J. H. Brownlee	" "	150 00
90	" 31....	C. W. Rolfe	" "	125 00
91	" 31....	D. McIntosh	" "	150 00
92	" 31....	N. Butler	" "	133 33
93	" 31....	A. N. Talbot	" "	116 66
94	" 31....	A. T. Woods	" "	166 66
95	" 31....	W. H. Garman	" "	100 00
96	" 31....	E. A. Kimball	" "	125 00
97	" 31....	G. W. Parker	" "	90 00
98	" 31....	T. F. Hunt	" "	80 00
99	" 31....	G. W. McCluer	" "	60 00
100	" 31....	A. W. Palmer	" "	90 00
101	" 31....	C. E. Eggert	" "	60 00
102	" 31....	E. R. Boyer	" "	60 00
103	" 31....	B. Tatarian	" "	40 00
104	" 31 ...	Essie Dana	" "	25 00
105	" 31....	A. B. Baker	" "	70 00
106	" 31....	C. M. Weed	" "	66 66
107	" 31....	C. A. Hart	" "	50 00
108	" 31....	M. J. Snyder	" "	50 00
109	" 31....	M. B. Waite	" "	41 66
110	" 31....	A. J. Stoneburner	" "	40 00
111	Nov. 15....	G. Peabody	" "	13 25
112	" 15....	F. D. Baker	" "	20 00
113	" 15....	Agricultural department	Expenses, October, 1887	332 49
114	" 15....	Horticultural department	" " "	3 54
115	" 15....	John Tierney	Work, " "	52 54
116	" 15....	Ill. Cent. R. R	Freight, " "	46 32
117	" 15....	I., B. & W. R. R	" " "	19 51
118	" 15....	Western Union Tel. Co	Messages	5 05
119	" 15....	Ill. State Journal	Subscription 6 months	6 50
120	" 15....	S. M. Hart	Work in laboratory	5 20
121	" 15....	R. Birkholz	Painting and glazing	17 00
122	" 15....	Ed. Carman	Work on grounds	4 37
123	" 15....	Pay roll of men	Labor, October, 1887	20 18
124	" 15....	J. P. Stewart	Work	13 62
125	" 15....	Students' pay roll	Labor, October, 1887	118 69
126	" 30....	S. H. Peabody	Salary, November, 1887	333 33
127	" 30....	T. J. Burrill	" "	166 66
128	" 30....	S. W. Shattuck	" "	166 66
129	" 30....	E. Snyder	" "	166 66
130	" 30....	J. C. Pickard	" "	166 66
131	" 30....	N. C. Ricker	" "	166 66
132	" 30....	J. D. Crawford	" "	166 66
133	" 30....	G. E. Morrow	" "	166 66
134	" 30....	I. O. Baker	" "	166 66
135	" 30..	P. Roos	" "	150 00
136	" 30....	W. McMurtrie	" "	166 66
137	" 30....	S. A. Forbes	" "	83 33
138	" 30....	T. B. Comstock	" "	150 00
139	" 30....	J. H. Brownlee	" "	150 00
140	" 30....	C. W. Rolfe	" "	125 00
141	" 30....	D. McIntosh	" "	150 00
142	" 30....	N. Butler	" "	133 33

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
143	Nov. 30....	A. N. Talbot	Salary, November 1887	$116 66
144	" 30....	A. T. Woods	" "	166 66
145	" 30....	W. H. Garman	" "	100 00
146	" 30....	E. A. Kimball	" "	125 00
147	" 30....	G. W. Parker	" "	90 00
148	" 30....	T. F. Hunt	" "	80 00
149	" 30....	G. W. McCluer	" "	60 00
150	" 30....	A. W. Palmer	" "	80 00
151	" 30....	C. Eggert	" "	60 00
152	" 30....	E. R. Boyer	" "	60 00
153	" 30....	B. Tatarian	" "	40 00
154	" 30....	E. Dana	" "	25 00
155	" 30....	A. B. Baker	" "	70 00
156	" 30....	C. M. Weed	" "	66 66
157	" 30....	C. A. Hart	" "	50 00
158	" 30....	M. J. Snyder	" "	50 00
159	" 30....	M. B. Waite	" "	41 66
160	" 30....	A. J. Stoneburner	" "	40 00
161	" 30....	S. W. Shattuck	Salary business agent 3 months	75 00
162	" 30....	F. D. Baker	Salary, November, 1887	20 00
163	" 30....	T. J. Burrill	Assistant in Lab. Nat. Hist	100 00
164	" 30....	F. G. Sager	Chain	11 20
165	" 30....	E. Sargent & Co	Apparatus	2 17
166	" 30....	Kueffel & Esser	"	10 60
167	" 30....	Eng. News Publishing Co	Books, etc	4 08
168	" 30....	Schools of Mines quarterly	Subscription	1 50
169	" 30....	Amer. Phil. Society	Transactions 1886	2 00
170	" 30....	C. S. Moorehouse	Sundries	3 08
171	" 30....	Larrabee & North	Screws, etc	34 95
172	" 30....	D. A. Stewart & Co	Machine oil	18 00
173	" 30....	Lyon & Healy	Band music	7 98
174	" 30....	Goodyear Rubber Co	Tubing	8 62
175	" 30....	Chas Bennett	Board expense	11 00
176	" 30....	L. Bush	Salary from Oct. 15 to Nov. 30	30 00
177	" 30....	J. S. Terrell	Janitor work in laboratory	6 90
178	" 30....	Nellie Bardwell	Work in laboratory	5 50
179	" 30....	J. S. Terrill	" "	5 33
180	" 30....	T. B. Comstock	Expenses	11 66
181	" 30....	J. S. Terrill	Work on cabinets	20 85
182	" 30....	Nettie Ayers	" "	13 62
183	" 30....	Lilly M. Hart	Work in laboratory	10 60
184	" 30....	A. T. Woods	Petty expenses	1 60
185	" 30....	George F. Kimball	Two plate glass, circle top	2 64
186	" 30....	Orr & Lockett	Door checks	16 00
187	" 30....	R. Birkholz	Glazing and painting	9 60
188	" 30....	F. Finder	Drayage	2 25
189	" 30....	Wabash, St. L. & P. Ry	Freights	8 99
190	" 30....	I. C. R. R	"	109 95
191	" 30....	American Express Co	Charges	6 90
192	" 30....	U. S. Express Co	"	4 10
193	" 30....	Pay-roll of women	Cleaning building	16 00
194	" 30....	Pay-roll of workmen	Work on grounds	19 50
195	" 30....	Agricultural department	Expense, November, 1887	299 50
196	" 30....	Horticulture	" "	10 50
197	" 30....	John Tierney	Work in shops	50 7
198	" 30....	Grace Peabody	Salary November and copying records	21 47
199	" 30....	John P. Stewart	Work on grounds	6 82
200	" 30....	Thos. Wright & Sons	Castings	61 56
201	" 30....	A. J. Funkhouser	Advertising	5 00
202	" 30....	M. S. Maloney	Salary fall term	84 00
203	" 30....	C. W. Briggs	Salary band leader	15 00
204	" 30	Enterprise Coal Co	Five cars coal	40 00
205	" 30....	J. A. Fay & Co	Files	8 30
206	" 30....	C. J. Sabin	Wheelbarrow and coal	13 00
207	" 30....	C. & U. Gas Co	Lights	63 00
208	" 30....	Educational Supply Co	Rubber tubing	3 17
209	" 30....	Zeli, Schwabacher & Co	Alcohol	23 75
210	" 30....	Fuller & Fuller Co	Glass and chemicals	35 82
211	" 30....	Western Electric Co	Apparatus	12 32
212	" 30....	J. Bishop & Co	Crucibles	30 21
213	" 30....	Friedl & Miller	Tuning piano	5 50
214	" 30....	R. T. Whelpley	Hose and reel	449 48
215	" 30....	R. S. Wilber	Hauling	107 25
216	" 30....	H. Swannell	Paints and chemicals	42 01
217	" 30....	Trevett & Green	Hardware	38 16
218	" 30....	T. E. Price & Bro	Paints, etc	34 37
219	" 30....	E. Henry	Soap, brooms, etc	26 15
220	" 30....	Champaign County Herald	Printing	7 00

List of Warrants— Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
221	Nov. 30....	A. C. McClurg & Co	Stationery	$11 94
222	" 30....	Crane Bros. Mfg. Co	Pipe and fittings	16 47
223	" 30....	J. W. Queen & Co	Apparatus	389 53
224	" 30....	J. W. Butler Paper Co	Paper	10 63
225	" 30....	Fauth & Co	One level bubbie	20 55
226	" 30....	Bausch & Lomb Optical Co	Objectives	67 50
227	" 30....	Subscription News Co	Periodicals	279 75
228	" 30....	C. Schoenhof	Books	22 98
229	" 30....	Estes & Lauriat	Books	10 25
230	" 30....	C. F. Adams	Specimens for cabinet	164 17
231	" 30....	Champaign County Gazette	Printing	45 75
232	" 30....	G. D. Julien	Microscopic slides	16 00
233	" 30....	Yale & Towne Mfg. Co	Repairing locks and keys	13 70
234	" 30....	A. Richardt & Co	Apparatus and Chemicals	167 25
235	" 30....	Jones & Laughlins	Bar iron and steel	17 64
236	" 30....	Lapham & Walls	Cement	6 15
237	" 30....	Hubbard & Son	Plumbing	8 75
238	" 30....	J. B. Clow & Co	Pipe and fittings	30 82
239	" 30....	Besore & Bro	Lumber	88 36
240	" 30....	E. N. McAllister	Postage, etc., 3 months	55 00
241	" 30....	S. W. Shattuck	Petty expense 3 months	51 89
242	" 30....	Agricultural department	Work ou grounds	23 85
243	" 30....	" "	Work for horticultural department	18 38
244	" 30....	Horticultural department	Work on farm	7 63
245	" 30....	Mechanical department	Labor and material	104 43
246	" 30....	" "	" "	70 59
247	" 30....	Architectural department	" "	291 88
248	" 30....	" "	" "	63 99
249	" 30....	G. C. Willis	Towels, etc	1 97
250	" 30....	Students' pay roll	Labor pay roll November, 1887	164 54
251	Dec. 31....	S. H. Peabody	Salary, December, 1887	333 33
252	" 31....	T. J. Burrill	" "	166 66
253	" 31....	S. W. Shattuck	" "	166 66
254	" 31....	E. Snyder	" "	166 66
255	" 31....	J. C. Pickard	" "	166 66
256	" 31....	N. C. Ricker	" "	166 66
257	" 31....	J. D. Crawford	" "	166 66
258	" 31....	G. E. Morrow	" "	166 66
259	" 31....	P. Roos	" "	150 00
260	" 31....	I. O. Baker	" "	166 66
261	" 31....	W. McMurtrie	" "	166 66
262	" 31....	S. A. Forbes	" "	83 33
263	" 31....	T. B. Comstock	" "	150 00
264	" 31....	J. H. Brownlee	" "	150 00
265	" 31....	C. W. Rolfe	" "	125 00
266	" 31....	D. McIntosh	" "	150 00
267	" 31....	N. Butler, jr	" "	133 33
268	" 31....	A. N. Talbot	" "	116 66
269	" 31....	A. T. Woods	" "	166 66
270	" 31....	W. H. Garman	" "	100 00
271	" 31....	E. A. Kimball	" "	125 00
272	" 31....	G. W. Parker	" "	90 00
273	" 31....	T. F. Hunt	" "	80 00
274	" 31....	G. W. McCluer	" "	60 00
275	" 31....	A. W. Palmer	" "	100 00
276	" 31....	C. Eggert	" "	60 00
277	" 31....	E. R. Boyer	" "	60 00
278	" 31....	B. Tatarian	" "	40 00
279	" 31....	Essie Dana	" "	25 00
280	" 31....	A. B. Baker	" "	70 00
281	" 31....	C. M. Weed	" "	66 66
282	" 31....	C. A. Hart	" "	50 00
283	" 31....	M. J. Snyder	" "	50 00
284	" 31....	M. B. Waite	" "	41 66
285	" 31....	F. D. Baker	" "	20 00
286	" 31....	L. Bush	" "	20 00
287	" 31....	A. J. Stoneburner	" "	65 00
288	" 31....	S. M. Millard	Expense to Board meeting	24 56
289	" 31....	A. McLean	" "	36 20
290	" 31....	E. Cobb	" "	7 50
291	" 31....	C. Bennett	" "	5 00
292	" 31....	G. C. Eisenmayer	" "	46 50
293	" 31....	F. M. McKay	" "	14 25
294	" 31....	B. Pullen	" "	3 00
295	" 31....	S. H. Peabody	Traveling expenses	86 99
296	" 31....	C. W Rolfe	Expenses in specimens	15 00
297	" 31....	S. H. Peabody	Expenses of Experiment Station	15 00
298	" 31....	Sutton Brick Co	Five hundred brick	5 00

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
299	Dec. 31....	Ayres & Willson	Two bolts	$1 00
300	" 31....	E. N. McAllister	Postage	17 00
301	" 31....	Cham. Co. Gazette	Printing	60 40
302	" 31....	J. Taylor	Work	2 50
303	" 31....	F. P. Elliott & Co	Wrappers	5 00
304	" 31....	Champaign & Urbana Gas Co	Gas, Nov., 1887	54 00
305	" 31....	H. C. Kariher	Brooms	3 00
306	" 31....	Jones & Laughlins	Iron	10 65
307	" 31....	Brown & Co	Books	5 50
308	" 31....	S. A. Forbes	Expenses N. H. Laboratory	950 00
	1888.			
309	Jan. 16....	T. J. Burrill	Salary as N. H. Lab. Assistant	100 00
310	" 16....	S. Hart	Work in N. H. Laboratory	14 65
311	" 16....	N. C. Ricker	Periodicals	5 00
312	" 16...	Illinois Central Railroad	Freights	219 85
313	" 16....	E. H. Renner & Bro	Coal	34 95
314	" 16....	R. Birkholz	Glazing and painting	25 80
315	" 16....	J. P. Stewart	Labor on grounds	18 34
316	" 16....	G. Peabody	Salary, Jan., 1888	13 75
317	" 16....	W. H. Stoneburner	Night firing	8 00
318	" 16....	E. N. McAllister	Postage	11 00
319	" 16....	R. L. Polk & Co	Illinois Directory, 1887	25 00
320	" 16....	J. Tierney	Work in Architectural shop	43 20
321	" 16....	Agricultural Department	Expense, Dec., 1887	192 90
322	" 16....	Horticultural Department	" "	3 59
323	" 16....	Central Union Telephone Co...	Instrument, 1 quarter	15 00
324	" 16....	G. E. Morrow	Traveling expenses	12 00
325	" 16....	Students' pay roll	Labor, Dec., 1887	127 20
326	" 31....	S. H. Peabody	Salary, January, 1888	333 33
327	" 31....	T. J. Burrill	" "	166 66
328	" 31....	S. W. Shattuck	" "	166 66
329	" 31....	E. Snyder	" "	166 66
330	" 31....	J. C. Pickard	" "	166 66
331	" 31....	N. C. Ricker	" "	166 66
332	" 31....	J. D. Crawford	" "	166 66
333	" 31....	G. E. Morrow	" "	166 66
334	" 31....	P. Roos	" "	150 00
335	" 31....	I. O. Baker	" "	166 66
336	" 31....	W. McMurtrie	" "	166 66
337	" 31....	S. A. Forbes	" "	83 33
338	" 31....	T. B. Comstock	" "	150 00
339	" 31....	J. H. Brownlee	" "	150 00
340	" 31....	C. W. Rolfe	" "	125 00
341	" 31....	D. McIntosh	" "	150 00
342	" 31	N. Butler, jr	" "	133 33
343	" 31....	A. N. Talbott	" "	116 66
344	" 31...	A. T. Woods	" "	166 66
345	" 31....	W. H. Garman	" "	100 00
346	" 31....	E. A. Kimball	" "	125 00
347	" 31....	G. W. Parker	" "	90 00
348	" 31....	T. F. Hunt	" "	80 00
349	" 31	G. W. McCluer	" "	60 00
350	" 31....	A. W. Palmer	" "	90 00
351	" 31....	C. Eggert	" "	60 00
352	" 31	E. R. Boyer	" "	60 00
353	" 31....	B. Tatarian	" "	40 00
354	" 31 ..	Essie Dana	" "	25 00
355	" 31....	A. B. Baker	" "	70 00
356	" 31....	C. M. Weed	" "	66 66
357	" 31....	C. A. Hart	" "	50 00
358	" 31....	Mary J. Snyder	" "	50 00
359	" 31....	M. B. Waite	" "	41 66
360	" 31....	L. Bush	" "	20 00
361	" 31....	F. D. Baker	" "	20 00
362	" 31....	A. J. Stoneburner	" "	67 00
363	" 31....	F. P. Rush	Coal	63 05
364	" 31....	Enterprise Coal Co	"	75 88
365	" 31....	Champaign Gas Co	Gas, Dec., 1887	70 00
366	" 31....	Fraser & Chalmers	Mining machinery	920 00
367	" 31....	Bausch & Lomb Opt. Co	Apparatus	13 20
368	" 31....	James W. Queen & Co	"	382 00
369	" 31....	Subscription News	Periodicals	16 15
370	" 31....	Giles Lithographic Co	Illustration for report of the Ill. Zoölogy	270 00
371	" 31....	J. Hamilton & Co	Lumber	323 33
372	" 31....	William Sim	Testaments for chapel	8 00
373	" 31. ..	Union Water Supply Co	Water for one quarter	100 00
374	" 31....	Abendroth & Root Mf'g. Co	Gaskets	43 50
375	" 31....	J. W. Bunn	Premiums on bonds	644 40

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1888.			
376	Feb. 15....	Grape Creek Coal Co	Coal	$21 15
377	" 15....	Illinois Central R. R.	Freights	189 20
378	" 15....	J. P. Stewart	Work	7 10
379	" 15....	Champaign Times	Printing	8 00
380	" 15....	J. Bacon	Coal	11 05
381	" 15....	E. Bevis	Blue printing	13 20
382	" 15....	J. Tierney	Work in shop	46 24
383	" 15....	Henry Siegmund	Mason work on chimney	2 00
384	" 15....	R. Birkholz	Glazing and painting	8 00
385	" 15....	Agricultural department	Expenses, January, 1888	380 05
386	" 15....	Horticultural "	" "	5 30
387	" 15....	Grace Peabody	Salary, "	13 87
388	" 15....	W. H. Stoneburner	Night firing	35 00
389	" 15....	Townsend MacCoun	Map	2 50
390	" 15....	A. C. McClurg & Co	Books	2 22
391	" 15....	Carl Schoenof	Books	8 89
392	" 15....	Nucamp & Baker	Tools	6 00
393	" 15....	J. S. Terrill	Work in laboratory and cabinets	17 18
394	" 15....	Lilly M. Hart	Work in cabinets	13 20
395	" 15....	F. Alfred Reichardt & Co	Chemicals	2 70
396	" 15....	Educational Supply Co	Apparatus	12 48
397	" 15....	G. C. Willis	Toweling	3 50
398	" 15....	Western Electric Co	Wire and fittings	5 18
399	" 15....	S. H. Peabody	Expenses on committee Agr. Ex. Station	15 00
400	" 15....	Students' pay roll	Labor, January, 1888	141 35
401	" 29....	S. H. Peabody	Salary, February, 1888	333 33
402	" 29....	T. J. Burrill	" "	166 66
403	" 29....	S. W. Shattuck	" "	166 66
404	" 29....	E. Snyder	" "	166 66
405	" 29....	J. C. Pickard	" "	166 66
406	" 29....	N. C. Ricker	" "	166 66
407	" 29....	J. D. Crawford	" "	166 66
408	" 29....	G. E. Morrow	" "	166 66
409	" 29....	P. Roos	" "	150 00
410	" 29....	I. O. Baker	" "	166 66
411	" 29....	W. McMurtrie	" "	166 66
412	" 29....	S. A. Forbes	" "	83 33
413	" 29....	T. B. Comstock	" "	150 00
414	" 29....	J. H. Brownlee	" "	150 00
415	" 29....	C. W. Rolfe	" "	125 00
416	" 29....	D. McIntosh	" "	150 00
417	" 29....	N. Butler, Jr	" "	133 33
418	" 29....	A. N. Talbot	" "	116 66
419	" 29....	A. T. Woods	" "	166 66
420	" 29....	W. H. Garman	" "	100 00
421	" 29....	E. A. Ximball	" "	125 00
422	" 29....	G. W. Parker	" "	90 00
423	" 29....	T. F. Hunt	" "	80 00
424	" 29....	G. W. McCluer	" "	60 00
425	" 29....	A. W. Palmer	" "	90 00
426	" 29....	C. E. Eggert	" "	60 00
427	" 29....	E. R. Boyer	" "	60 00
428	" 29....	B. Tatarian	" "	40 00
429	" 29....	E. Dana	" "	25 00
430	" 29....	A. B. Baker	" "	70 00
431	" 29....	C. M. Weed	" "	66 66
432	" 29....	C. A. Hart	" "	50 00
433	" 29....	Mary J. Snyder	" "	50 00
434	" 29....	M. B. Waite	" "	41 66
435	" 29....	L. Bush	" "	20 00
436	" 29....	F. D. Baker	" "	20 00
437	" 29....	A. J. Stoneburner	" "	65 00
438	" 29....	S. W. Shattuck	" Business Agent, three months	75 00
439	" 29....	Isaac Fielding	Postage	30 00
440	" 29....	Heller & Toy	Hauling	3 50
441	" 29....	Thos. Wright & Son	Castings	6 56
442	" 29....	M. B. Waite	Rubber type	4 01
443	" 29....	A. C. Armstrong & Son	Periodicals	6 00
444	" 29....	Lilly M. Hart	Work in cabinets	8 75
445	" 29....	Caroline McElroy	Washing towels	3 60
446	" 29....	American Express Co	Charges	7 65
447	" 20....	United States Express Co	"	4 95
448	" 29....	I., B. & W. R. R.	Freights	3 06
449	" 29....	Illinois Central R. R.	"	234 30
450	" 29....	Wabash & Western R. R	"	44 88
451	Mar. 31....	Pay roll of women	Cleaning and washing	16 80
452	" 31....	Thos. E. Price & Bro	Paints, etc	50 12

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1888.			
453	Mar. 31...	Lapham & Walls	Coal	$81 17
454	" 31...	Champaign & Urbana Gas Co.	Gas to March 1, 1888	102 00
455	" 31...	Odin Coal Co	Coal	77 86
456	" 31...	F. P. Rush & Co	"	4 10
457	" 31...	Enterprise Coal Co	"	204 50
458	" 31...	R. S. Wilbur	Hauling	104 25
459	" 31...	Champaign County Gazette	Printing	49 05
460	" 31...	Illini	Advertising	35 00
461	" 31...	Champaign County Herald	Printing	3 50
462	" 31...	Hamilton & Co	Balance of lumber account	2 00
463	" 31...	Fuller & Fuller	Glass, etc	8 87
464	" 31...	Besore & Bro	Lumber, etc	80 46
465	" 31...	D. H. Lloyde & Son	Stationery	6 75
466	" 31...	Goodyear Rubber Co	Tubing	1 38
467	" 31...	Western Electric Co	Connectors	6 75
468	" 31...	L. V. Manspeaker	Sundries	5 95
469	" 31...	Lyon & Healy	Repairing bass drum, etc	8 50
470	" 31...	Barbee Wire & Iron Works	Guards and frame	17 50
471	" 31...	Chalmers-Spence Co	Asbestos pipe covering	90 38
472	" 31...	Popular Science News	Subscription	2 00
473	" 31...	A. C. McClurg & Co	Books	10 25
474	" 31...	Robinson & Burr	Blossburg coal casting	14 74
475	" 31...	Trevett Bros	Hardware	6 79
476	" 31...	Crane Bros. M'f'g, Co	Pipe and fittings	46 73
477	" 31...	P. Bevis	Blue printing	3 00
478	" 31...	Trevett & Green	Hardware	59 96
479	" 31...	Horticultural department	Expenses, February, 1888	8 67
480	" 31...	Agricultural "	" "	247 68
481	" 31...	J. Tierney	Work in architectural shop	45 00
482	" 31...	Grace Peabody	Work in Regent's office	13 25
483	" 31...	W. H. Stoneburner	Night firing	15 00
484	" 31...	C. H. Evans & Co	Advertising	2 00
485	" 31...	Rudolph Birkholz	Painting and glazing	2 20
486	" 31...	Pay roll of workmen	Work on grounds	8 43
487	" 31...	J. S. Terrill	Work on cabinets	8 37
488	" 31...	Anna E. Maloney	Music fees collected	36 00
489	" 31...	Students' labor pay roll	February, 1888	132 28
490	" 31...	S. W. Shattuck	Petty expenses, 3 months	18 30
491	" 31...	Credit Mechanical department	Work for other departments	46 27
492	" 31...	" " "	Work and material	89 60
493	" 31...	" architectural "	Work for other departments	140 75
494	" 31...	" " "	Work and material	331 38
495	" 31...	Bausch & Lomb Optical Co	Microscopic fixtures	4 31
496	" 31...	T. J. Burrill	Sundry expenses, Botanical Lab'y	6 00
497	" 31...	L. Eger	Geological specimens	112 87
498	" 31...	Carl Schoenhof	Books	5 18
499	" 31...	E. H. Sargent	Weights	6 25
500	" 31...	Union Coal Co	Coal	93 50
501	" 31...	S. H. Peabody	Salary, March, 1888	333 33
502	" 31...	T. J. Burrill	" "	166 66
503	" 31...	S. W. Shattuck	" "	166 66
504	" 31...	E. Snyder	" "	166 66
505	" 31...	J. C. Pickard	" "	166 66
506	" 31...	N. C. Ricker	" "	166 66
507	" 31...	J. D. Crawford	" "	166 66
508	" 31...	G. E. Morrow	" "	166 66
509	" 31...	P. Roos	" "	150 00
510	" 31...	I. O. Baker	" "	166 66
511	" 31...	W. McMurtrie	" "	166 66
512	" 31...	S. A. Forbes	" "	83 33
513	" 31...	T. B. Comstock	" "	150 00
514	" 31...	J. H. Brownlee	" "	150 00
515	" 31...	C. W. Rolfe	" "	125 00
516	" 31...	D. McIntosh	" "	150 00
517	" 31...	N. Butler	" "	133 33
518	" 31...	A. N. Talbot	" "	116 66
519	" 31...	A. T. Woods	" "	166 66
520	" 31...	W. H. Garman	" "	100 00
521	" 31...	E. A. Kimball	" "	125 00
522	" 31...	G. W. Parker	" "	90 00
523	" 31...	T. F. Hunt	" "	80 00
524	" 31...	G. W. McCluer	" "	60 00
525	" 31...	A. W. Palmer	" "	90 00
526	" 31...	C. E. Eggert	" "	60 00
527	" 31...	E. R. Boyer	" "	60 00
528	" 31...	B. Tatarian	" "	40 00
529	" 31...	E. Dana	" "	25 00
530	" 31...	A. B. Baker	" "	70 00

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1888.			
531	Mar. 31....	C. M. Weed.....	Salary, March, 1888.....	$66 66
532	" 31....	C. A. Hart.....	" "	50 00
533	" 31....	M. J. Snyder.....	" "	50 00
534	" 31....	M. B. Waite.....	" "	41 66
535	" 31 ...	T. J. Burrill.....	Sal. assistant in Nat. Hist. Lab.....	100 00
536	" 31....	L. Bush.....	Salary, March, 1888.....	20 00
537	" 31....	F. D. Baker.....	" "	20 00
538	" 31....	A. E. Maloney.....	" winter term 1887 and 1888.....	50 00
539	" 31....	C. W. Briggs.....	" band leader.....	15 00
540	" 31....	A. J. Stoneburner.....	" March, 1888.....	65 00
541	" 31....	S. M. Millard	Expense to Board meeting.....	15 00
542	" 31....	C. Bennett.....	" " "	4 00
543	" 31....	A. McLean.....	" " "	26 35
544	" 31....	G. Eisenmayer.....	" " "	20 00
545	" 31....	F. M. McKay.....	" " "	16 70
546	" 31....	B. Pullen.....	" " "	4 25
547	" 31 ...	S. H. Peabody.....	Traveling expenses.....	55 81
548	" 31....	J. S. Pickard.	Expenses to anniversary exercises.....	25 00
549	" 31....	C. H. Pennypacker.....	Minerals.....	42 00
550	" 31....	W. W. Kimball & Co.....	Balance on piano.....	162 51
551	Apr. 15....	W. H. Clemens.....	Expenses to meeting.....	30 00
552	" 15 ...	Charles Bennett	" "	17 32
553	" 15....	Grace Peabody.....	Salary, March.....	15 38
554	" 15....	N. H. Stoneburner.....	Night firing	6 88
555	" 15....	Union Coal Co.....	Coal.....	16 50
556	" 15....	Illinois Central Railroad.....	Freight.....	98 85
557	" 15....	Central Union Telephone Co...	Instrnment to June 30.....	15 00
558	" 15....	J. P Stewart.....	Work on grounds.....	9 20
559	" 15....	R. Birkholz.....	Painting and glazing.....	9 40
560	" 15....	J. A. Morrow.....	Firing in shop.....	10 98
561	" 15....	John Tierney.....	Work in architecural shop.....	38 81
562	" 15....	Agricultural department	Expenses, March, 1888.....	243 23
563	" 15....	Horticultural "	" "	13 13
564	" 15....	J. Wilske.....	Mason work.....	39 60
565	" 15....	J. S. Terrill.....	Work in zoölogical lab. and cabinets...	10 00
566	" 15....	Lilly M. Hart.....	Work in cabinets.....	7 65
567	" 15....	Mary Howe	Monnting geological specimens.....	9 61
568	" 15....	Nellie M. Bardwell.....	Drawing for zoölogical labaratory.....	10 90
569	" 15....	Charles Scribner & Sons.....	Books	22 00
570	" 15....	The Century Co,.....	"	4 00
571	" 15....	G. P. Putnam's Sons	"	367 86
572	" 15....	Keuffel & Esser.....	Thatcher's Calculator.....	30 00
573	" 15....	S. A. Forbes.....	Laboratory of Natnral History expenses	450 00
574	" 15....	Pay roll of workmen.....	Work on buildings, etc.....	49 64
575	" 15....	Students' pay roll.....	March, 1888.....	133 68
576	" 30....	S. H. Peabody.....	Salary, April, 1888.....	333 33
577	" 30....	T. J. Burrill.....	" "	166 66
578	" 30....	S. W. Shattuck.....	" "	166 66
579	" 30....	E. Snyder.....	" "	166 66
580	" 30....	J. C. Pickard.....	" "	166 66
581	" 30....	N. C. Ricker.....	" "	166 66
582	" 30....	J. D. Crawford.....	" "	166 66
583	" 30...	G. E. Morrow.....	" "	166 66
584	" 30....	P. Roos.....	" "	150 00
585	April 30....	I. O. Baker.....	" "	166 66
586	" 30....	W. McMurtrie.....	" "	166 66
587	" 30....	S. A. Forbes	" "	83 33
588	" 30....	T. B. Comstock	" "	150 00
589	" 30....	J. H. Brownlee	" "	150 00
590	" 30....	C. W. Rolfe.....	" "	125 00
591	" 30....	D. McIntosh.....	" "	150 00
592	" 30....	N. Butler, Jr.....	" "	133 33
593	" 30....	A. N. Talbot.....	" "	116 66
594	" 30....	A. T. Woods.....	" "	166 66
595	" 30....	W. H. Garman.....	" "	100 00
596	" 30....	E. A. Kimball.....	" "	125 00
597	" 30....	G. W. Parker.....	" "	90 00
598	" 30....	A. W. Palmer.....	" "	90 00
599	" 30....	C. E. Eggert.	" "	60 00
600	" 30....	E. R. Boyer	" "	60 00
601	" 30....	B. Tatarian.....	" "	40 00
602	" 30....	E. Dana.....	" "	25 00
603	" 30....	A. B. Baker.....	" "	70 00
604	" 30....	C. A. Hart.....	" "	50 00
605	" 30....	Mary J. Snyder.....	" "	50 00
606	" 30....	M. B. Waite	" "	41 66
607	" 30....	A. J. Stoneburner.....	" "	40 00
608	May 15....	J. H. Samnels.....	Assistant in physical laboratory.....	10 75

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1888.			
609	May 15....	Grace Peabody	Services in Regent's office	13 50
610	" 15....	J. A. Morrow	Firing in shop	23 12
611	" 15....	Nellie Bardwell	Drawing	9 50
612	" 15....	J S. Terrill	Work in laboratory	10 70
613	" 15....	Mary Howe	" "	15 39
614	" 15....	Lilly M. Hart	" in cabinets	3 45
615	" 15....	C. J. Sabin	Grass seed	6 00
616	" 15....	Dean & Co	Fire-proof safe	150 00
617	" 15....	R. Birkholz	Glazing and painting	13 40
618	" 15....	Agricultural department	Expenses, April, 1888	252 37
619	" 15....	Horticultnral "	" "	22 24
620	" 15....	J. F. Tufts	Work	12 00
621	" 15....	Isaac Fielding	Postage	40 00
622	" 15....	Illinois Central Railroad	Freight	74 63
623	" 15....	Pay roll of workmen	Laboratory, April, 1888	51 62
624	" 15....	Pay roll of workmen	" " "	59 05
625	" 15....	Student's pay roll	Labor for April, 1888	126 82
626	" 31....	S. H. Peabody	Salary, May, 1888	333 33
627	" 31....	T. J. Burrill	" "	166 66
628	" 31....	S. W. Shattuck	" "	166 66
629	" 31....	E. Snyder	" "	166 66
630	" 31....	J. C. Pickard	" "	166 66
631	" 31....	N. C. Ricker	" "	166 66
632	" 31....	J. D. Crawford	" "	166 66
633	" 31....	G. E. Morrow	" "	166 66
634	" 31....	P. Roos	" "	150 00
635	" 31....	I. O. Baker	" "	166 66
636	" 31....	W. McMartrie	" "	166 66
637	" 31....	S. A. Forbes	" "	83 33
638	" 31....	T. B. Comstock	" "	150 00
639	" 31....	J. H. Brownlee	" "	150 00
640	" 31....	C. W. Rolfe	" "	125 00
641	" 31....	D. McIntosh	" "	150 00
642	" 31....	N. Butler, Jr	" "	133 33
643	" 31....	A. N. Talbot	" "	116 66
644	" 31....	A. T. Woods	" "	166 66
645	" 31....	W. H. Garman	" "	100 00
646	" 31....	E. A. Kimball	" "	125 00
647	" 31....	G. W. Parker	" "	90 00
648	" 31....	A. W. Palmer	" "	90 00
649	" 31....	C. E. Eggert	" "	60 00
650	" 31....	E. R. Boyer	" "	60 00
651	" 31....	B. Tatarian	" "	40 00
652	" 31....	Essie Dana	" "	25 00
653	" 31....	A. B. Baker	" "	70 00
654	" 31....	C. A. Hart	" "	50 00
655	" 31....	Mary J. Snyder	" "	50 00
656	" 31....	M. B. Waite	" "	41 66
657	" 31....	A. J. Stoneburner	" "	40 00
658	" 31....	Anna E. Maloney	Salary and music fees	72 00
659	" 31....	C. W. Briggs	" as band leader	15 00
660	" 31....	J. V. E. Schaefer	Services in physical laboratory	37 50
661	" 31....	George Greaves	" " " "	26 25
662	" 31....	S. W. Shattuck	Salary Business Agent, three months	75 00
663	" 31....	Grace Peabody	" May, 1888	14 00
664	" 31....	Illinois Central R. R	Freight, May, 1888	45 05
665	" 31....	Pay roll of workmen	Labor, May, 1888	44 87
666	" 31....	Pay roll of women	" "	22 90
667	" 31....	Isaac Fielding	Postage, 3 months	15 00
668	" 31....	J. P. Stewart	Work on grounds	11 40
669	" 31....	J. A. Morrow	Firing, May, 1888	20 92
670	" 31....	G. H. Sheets	Work in architectural shops	58 50
671	" 31....	John Tierney	" " "	59 62
672	" 31....	Rndolph Birkholz	Painting and glazing	76 60
673	" 31....	Horticultural department	Expenses, May, 1888	1 92
674	" 31....	Agricultural "	" "	129 06
675	" 31....	Students' pay roll	Labor, May, 1888	112 11
676	" 31....	Mary Howe	Work in Natural History Laboratory	17 37
677	" 31....	Nellie M. Bardwell	" " " "	11 00
678	June 15....	J. S. Terrill	" " " "	11 55
679	" 15....	Lily M. Hart	" " " "	14 55
680	" 15....	S. H. Peabody	Expenses	5 65
681	" 15....	Lieut. W. T. May	"	5 20
682	" 15....	Walker & Mnlliken	Moulding hooks	1 40
683	" 15....	A. T. Woods	Expenses in laboratory	1 25
684	" 15....	T. B. Comstock	" "	2 25
685	" 15....	A. J. Stoneburner	Services as police	3 00
686	" 15....	P. Vance	Cleaning well	2 00

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1887.			
687	June 15....	John Bez	13 hours labor	1 62
688	" 15....	Western Union Tel Co	Telegrams	4 15
689	" 15....	U. S. Express Co	Charges	3 83
690	" 15....	American Express Co	"	8 25
691	" 15....	E. E. Ellison	Advertising	5 00
692	" 15....	P. Bevis	Blue printing	10 70
693	" 15....	G. P. Putnam's Sons	Books	226 77
694	" 15	Johns Hopkins University	Publications	5 00
695	" 15....	U. S. Patent office	Binding	31 20
696	" 15....	Subscription News Co	Periodicals	14 20
697	" 15...	D. Appleton & Co	Book	6 00
698	" 15...	Carl Schoenhof	Books	5 25
699	" 15....	Publishers Weekly	Book	1 00
700	" 15....	D. H. Lloyde & Son	Books and stationery	9 00
701	" 15....	John W. Bunn	Taxes, University lands, 1887	1,667 16
702	" 15....	Western Bank Note Engr. Co	Diplomas and certificates	131 25
703	" 15....	Brown & Sharpe M'f'g. Co	Gear cutters	27 22
704	" 15....	Champaign Connty Gazette	Printing	61 98
705	" 15....	J. A. Fay & Co	Belts and pulleys	23 34
706	" 15....	Sutton Brick and Tile Co	Brick	47 00
707	" 15....	Crane Bros. M'f'g Co	Fittings	8 96
708	" 15....	Enterprise Coal Co	Coal	144 00
709	" 15....	Orr & Lockett	Glue	2 00
710	" 15....	Fuller & Fuller Co	Chemicals	12 50
711	" 15....	A. C. McClnrg & Co	Stationery	64 03
712	" 15....	The Illini	Advertising	17 00
713	" 15....	C. & U. Gas Co	Gas to Jnne 1, 1888	144 00
714	" 15....	Stearnes & Co	1 barrel stucco	4 00
715	" 15....	Friedl Miller	Tnning pianos	10 50
716	" 15....	Marshall Field & Co	Cloth	12 81
717	" 15....	Union Water Supply Co	Water rate to Jnly 1, 1888	200 00
718	" 15....	Champaign Times	Printing	9 50
719	" 15....	E. O. Vaile	Advertising	10 00
720	" 15....	Fruit Growers Jonrnal	"	5 00
721	" 15....	Illinois Society of Engineers	"	6 00
722	" 15....	Hornstein Bros	Catalogues, 1888	315 88
723	" 15....	Donnelley & Sons	Cnts	4 50
724	" 15....	F. P. Elliott & Co	Paper	5 10
725	" 15....	A. P. Cunningham	Sundries	3 50
726	" 15....	R. S. Wilber	Haniing	145 40
727	" 15....	Trevett & Green	Hardware	67 64
728	" 15....	H. Swannell	Chemicals, paints, etc	29 16
729	" 15....	Oscar Miller	Plumbing	17 50
730	" 15....	J. Hamilton & Co	Cement and sand	11 41
731	" 15....	Robinson & Bnrr	Forgings and castings	21 96
732	" 15....	Besore & Bro	Lnmber, etc	260 06
733	" 15....	Garwood & Pepper	9½ pwts. gold	5 03
734	" 15....	Wm. McMurtrie	Chemical balance	25 00
735	" 15....	S. M. Millard	Expenses to Board meeting	21 50
736	" 15....	Alexander McLean	" " "	38 08
737	" 15....	G. C. Eisenmayer	" " "	47 25
738	" 15....	Chas. Bennett	" " "	7 68
739	" 15....	G. R. Shawhan	" " "	10 91
740	" 15....	B. Pullen	" " "	15 25
741	" 15....	W. C. Ritchie & Co	Cartons with trays	18 00
742	" 15....	Gustav E. Stechert	Books	124 55
743	" 15....	Champaign County Gazette	Portfolios	18 90
744	" 15....	N. C. Ricker	Material for architectural department	59 25
745	" 15....	J. W. Butler Paper Co	8-ply mtg. board	11 25
746	" 15....	Caroline McElroy	Washing	3 08
747	" 15....	Mary Howe	Work in museum	15 12
748	" 15....	S. A. Forbes	Material for cabinets	188 54
749	" 15....	Architectnral department	Labor and materials	342 21
750	" 15....	Mechanical "	" "	12 11
751	" 30....	S. H. Peabody	Salary, June 1888	333 33
752	" 30....	T. J. Burrill	" "	166 66
753	" 30....	S. W. Shattuck	" "	166 66
754	" 30....	E. Snyder	" "	166 66
755	" 30....	J. C. Pickard	" "	166 66
756	" 30....	N. C. Ricker	" "	166 66
757	" 30....	J. D. Crawford	" "	166 66
758	" 30....	G. E. Morrow	" "	166 66
759	" 30....	P. Roos	" "	150 00
760	" 30....	I. O. Baker	" "	166 66
761	" 30....	W. McMurtrie	" "	166 66
762	" 30....	S. A. Forbes	" "	83 33
763	" 30....	T. B. Comstock	" "	150 00
764	" 30....	J. H. Brownlee	" "	150 00

List of Warrants—Continued.

No.	Date.	To Whom.	For Whom.	Amount.
	1888.			
765	June 30....	C. W. Rolfe	Salary, June, 1888	125 00
766	" 30....	D. McIntosh	" "	150 00
767	" 30....	N. Butler	" "	133 33
768	" 30....	A. N. Talbot	" "	116 66
769	" 30....	A. T. Woods	" "	166 66
770	" 30....	W. H. Garman	" "	100 00
771	" 30....	E. A. Kimball	" "	125 00
772	" 30	G. W. Parker	" "	90 00
773	" 30....	A. W. Palmer	" "	90 00
774	" 30....	C. E. Eggert	" "	60 00
775	" 30....	E. R. Boyer	" "	60 00
776	" 30....	B. Tatarian	" "	20 00
777	" 30....	Essie Dana	" "	25 00
778	" 30....	A. B. Baker	" "	70 00
779	" 30....	C. A. Hart	" "	50 00
780	" 30....	Mary J. Snyder	" "	50 00
781	" 30....	M. B. Waite	" "	41 66
782	" 30....	John Marten	" "	53 76
783	" 30....	T. J. Burrill	For botanical assistance	100 00
784	" 30....	Illinois Central Railroad Co...	Freight charges	6 85
785	" 30....	A. N. Talbot	Lettering diplomas	14 00
786	" 30....	F. K Robeson & Bro	Ribbon	2 50
787	" 30....	A. J. Stoneburner	Salary ½ June, 1888	20 00
788	" 30....	H. Chester	Carriage hire	10 00
789	" 30....	Imperial quartette	Services at commencement	65 40
790	July 31....	E. P. Niles	Entertaining guests	4 00
791	" 31....	C. U. Telephone Co	Rent of instrument	15 00
792	" 31....	Grace Peabody	Services in Regent's office	12 70
793	" 31....	Agricultural department	Expense, June, 1888	495 15
794	" 31....	Horticultural "	" "	25 67
795	" 31....	Isaac Fielding	Postage, etc	29 00
796	" 31....	F. A. Shaw	Labor	19 00
797	" 31 ...	S. A. Shaw	"	23 50
798	" 31...	Pay roll of workmen	Labor, June, 1888	251 01
799	" 31....	" " women	" "	27 23
800	" 31....	" " students	" "	160 32
801	" 31....	S. H. Peabody	Salary, July, 1887	333 33
802	" 31....	T. J. Burrill	" "	166 66
803	" 31....	S. W. Shattuck	" "	166 66
804	" 31....	E. Snyder	" "	166 66
805	" 31....	J. C. Pickard	" "	166 66
806	" 31....	N. C. Ricker	" "	166 66
807	" 31....	J. D. Crawford	" "	166 66
808	" 31....	G. E. Morrow	" "	166 66
809	" 31....	P. Roos	" "	150 00
810	" 31....	I. O. Baker	" "	166 66
811	" 31....	W. McMurtrie	" "	166 66
812	" 31....	S. A. Forbes	" "	83 33
813	" 31....	T. B. Comstock	" "	150 00
814	" 31....	J. H. Brownlee	" "	150 00
815	" 31....	C. W. Rolfe	" "	125 00
816	" 31....	D. McIntosh	" "	150 00
817	" 31....	N. Butler Jr	" "	133 33
818	" 31....	A. N. Talbot	" "	116 66
819	" 31....	A. T. Woods	" "	166 66
820	" 31....	E. A. Kimball	" "	125 00
821	" 31....	G. W. Parker	" "	90 00
822	" 31....	A. B. Baker	" "	70 00
823	" 31....	W. H. Garman	" "	100 00
824	" 31....	C. A. Hart	" "	50 00
825	" 31....	M. J. Snyder	" "	50 00
826	" 31....	J. Marten	" "	66 66
827	" 31....	S. A. Forbes	Expenses State Laboratory Nat. His....	575 00
828	" 31....	J. O. Cunningham	Attorney's fees	30 00
829	" 31....	S. H. Peabody	Expenses	66 30
830	" 31....	Duncan McLennan	Police services	6 00
831	" 31....	A. J. Stoneburner	Labor and police duty	2 62
832	" 31....	M. W. Matthews	Printing	10 00
833	" 31....	Geo. P. Brown	Advertising	16 50
834	" 31....	A. C. McClurg & Co	Stationery and books	17 49
835	" 31....	Claude D. Myers	Envelopes	3 50
836	" 31....	A. J. Nicolet	Labor in office	1 80
837	" 31....	R. Birkholz	" and glass setting	3 30
838	" 31....	J. P. Stewart	"	2 40
839	" 31....	Wabash Western Ry	Freight charges	2 32
840	" 31....	Fuller & Fuller Co.	Glass	28 38

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amonnt.
	1888.			
841	July 31....	Grace Peabody.	Services in Regent's office	$11 00
842	" 31....	S. W. Shattnck	Petty expenses three months	31 42
843	" 31....	J. S. Terrill	Work in laboratory, Augnst, 1888	22 65
844	" 31....	Geo. P. Clinton	" " "	31 42
845	" 31....	S. W. Shattuck	Expenses of agr. dep't. July, 1888	400 16
846	" 31....	S. W. Shattuck	Expenses of hort. dep't. Jnly, 1888	43 28
847	" 31....	Illinois Central Railroad	Freight charges	130 50
848	" 31....	Pay roll of women	Labor, July-August 10, 1888	194 50
849	" 31....	Pay roll of workmen	" July, 1888	220 39
850	" 31....	Pay roll of students	" " "	173 77
851	Aug. 31....	S. H. Peabody	Salary, August, 1888	333 33
852	" 31....	T. J. Burrill	" "	166 66
853	" 31....	S. W. Shattuck	" "	166 66
854	" 31....	E. Snyder	" "	166 66
855	" 31....	J. C. Pickard,	" "	166 66
856	" 31....	N. C. Ricker	" "	166 66
857	" 31....	J. D. Crawford	" "	166 66
858	" 31....	G. E. Morrow	" "	166 66
859	" 31....	P. Roos	" "	150 00
860	" 31....	I. O. Baker	" "	166 66
861	" 31....	W. McMurtrie	" "	166 66
862	" 31....	S. A. Forbes	" "	83 33
863	" 31....	T. B. Comstock	" "	150 00
864	" 31....	J. H. Brownlee	" "	150 00
865	" 31....	C. W. Rolfe	" "	125 00
866	" 31....	D. McIntosh	" "	150 00
867	" 31....	N. Bntler, Jr.	" "	133 33
868	" 31....	A. N. Talbot	" "	116 66
869	" 31....	A. T. Woods	" "	166 66
870	" 31....	E. A. Kimball	" "	125 00
871	" 31....	G. W. Parker	" "	90 00
872	" 31....	A. B. Baker	" "	70 00
873	" 31....	W. H. Garman	" "	100 00
874	" 31 ...	C. A. Hart	" "	50 00
875	" 31....	M. J. Snyder	" "	50 00
876	" 31....	John Marten	" "	66 66
877	" 31....	S. W. Shattuck	" Business Agent, three months	75 00
878	" 31....	W. T. Pratt	Roof repairs	6 02
879	" 31....	Isaac Fielding	Postage	30 00
880	" 31....	Claude & Myers	Manilla wrapping	5 25
881	" 31....	F. A. Reichardt & Co	Combustion tubing	10 50
882	" 31....	A. P. Cunningham	Blue vitriol, etc	1 50
883	" 31....	G. C. Willis	Muslin	1 13
884	" 31....	Orr & Lockett	Glue	2 00
885	" 31....	Pay roll of men	Labor, August, 1888	194 95
886	" 31....	Pay roll of women	" "	2 00
887	" 31....	Students' pay roll	" "	112 42
888	" 31....	J. M. W. Jones Printing Co	Advertising	12 50
889	" 31....	J. S. Terrill	Work in laboratory	19 65
890	" 31....	F. M. McKay	Board expenses	16 50
891	" 31....	C. J. Sabin	Sewer pipe	3 00
892	" 31....	F. Finder	Drayage	3 50
893	" 31....	Illinois Central R. R. Co	Freight charges	78 70
894	" 31....	American Express Co	Express charges	3 50
895	" 31....	Horticultural department	Expense, August, 1888	12 43
896	" 31....	Agricultural department	" " "	134 87
897	" 31....	Mechanical department	Labor, material, etc	105 59
898	" 31....	Mechanical department	" " "	99 12
899	" 31....	Architectural department	" " "	64 86
900	" 31....	Architectural department	" " "	41 45
901	" 31....	Fuller & Fuller Co.	Hard oil finish, etc	11 65
902	" 31....	Enterprise Coal Co	Coal	97 75
903	" 31....	Champaign & Urbana Gas Co	Gas, June, 1888	20 00
904	" 31....	R. S. Wilber	Drayage	48 25
905	" 31....	The Century Co	Advertising	22 50
906	" 31....	Lord & Thomas	"	192 50
907	" 31....	A. C. McClurg & Co	Stationery	5 17
908	" 31....	A. H. Andrews & Co.	Seat castings	6 00
909	" 31....	G. P. Putnam's Sons.	Books	22 25
910	" 31....	Acad. of Nat. Science, Phila	"	2 50
911	" 31....	Gustav E. Stechert.	"	29 90
912	" 31....	Crane Bros. Manufacturing Co.	Iron pipe and fittings	67 98
913	" 31....	Henry Trevett	Brass butts, etc	51 38
914	" 31....	Hubbard & Son	Tin roofing	147 80
915	" 31....	Enterprise Coal Co	Coal	34 00
916	" 31....	E. Henry	Lead, oil, etc	60 13

List of Warrants—Continued.

No.	Date.	To Whom.	For What.	Amount.
	1888.			
917	Aug. 31....	O. I. & W R'y Co	Freight charges.	1 88
918	" 31....	Champaign County Gazette.....	Programmes, etc.....	25 60
919	" 31....	Maltby & Wallace	Repairs and fittings.....	5 25
920	" 31....	Robinson & Burr.....	" " "	25 49
921	" 31....	Fraser & Chalmers.....	Pulleys, shaftings, etc.....	273 65
922	" 31....	Pantagraph Stationery Co.....	Binding.....	115 60
923	" 31....	Isaac Fielding	Postage.....	5 00
924	" 31....	S. W. Shattuck	Petty expenses, three months.....	23 32
925	" 31....	E. H. Renner & Bro.....	Carriages.....	4 00

Financial Statement of the University of Illinois [Not Including State Laboratory of Natural History,] For the Year Ending August 31, 1888.

RECEIPTS, SEPTEMBER 1, 1887—AUGUST 31, 1888.		
Balance		$22,392 39
From State Appropriations—		
For taxes on lands in Minnesota and Nebraska	$1,667 16	
For buildings and grounds	2,000 00	
For laboratories	1,500 00	
For mechanical shops	1,500 00	
For books and publications	1,500 00	
For specimens for cabinets	1,000 00	
For current expenses of instruction	16,000 00	
For mining engineering	2,000 00	
		27,167 16
From other sources—		
Interest	$24,655 72	
Rents	805 88	
Fees of University students	8,420 25	
Fees of preparatory students	1,597 50	
Gross receipts of business departments	9,390 82	
Miscellaneous	674 69	
Agricultural experiment station	500 00	
Incidentals	14 21	46,059 07
		$95,619 12
EXPENDITURES, SEPTEMBER 1, 1887—AUGUST 31, 1888.		
From State Appropriations—		
Taxes on lands in Minnesota and Nebraska	$1,667 16	
Buildings and grounds	1,504 14	
Laboratories	697 68	
Mechanical shops	1,711 31	
Books and publications	1,488 69	
Cabinets	1,000 00	
Current expenses of instruction	16,503 34	
Metallurgical laboratory	1,662 25	
Apparatus and material	1,462 60	
Fire walls and ventilation	238 28	
		$27,935 45
From other funds—		
Expenses of Board of Trustees	$502 00	
Salaries for instruction	24,154 28	
Salaries for services	2,749 06	
Buildings and grounds	224 73	
Fuel and lights	2,453 02	
Stationery, printing and postage	1,402 28	
Preparatory department	1,529 97	
Gross expenses of business departments	8,649 07	
Water supply	400 00	
Fire apparatus	495 29	
Boiler repairs	197 25	
Premium on bonds	644 40	
Miscellaneous	694 40	
Incidentals	436 71	
		44,532 46
Balance August 31, 1888		23,151 21
		$95,619 12

Financial Statement of the Illinois State Laboratory of Natural History for the Fiscal Year Ending June 30, 1888.

RECEIPTS.		
For field, office and incidental expenses	$1,000 00	
Improvement of library	1,000 00	
Pay of assistants	3,000 00	
Publications of bulletins	300 00	
Illustration of entomological report	500 00	
EXPENDITURES.		
For field, office and incidental expenses		$1,147 06
Improvement of library		890 78
Pay of assistants		2,962 76
Publications of bulletins		328 48
Balance		470 92
	$5,800 00	$5,800 00

UNIVERSITY REPORTS.

Historical Addresses and Scientific Papers.

DEPARTMENT OF INSTRUCTION.

SELIM H. PEABODY, PH. D., LL. D., REGENT.

To the Trustees of the University of Illinois:

GENTLEMEN.—I beg leave to present the following as the customary annual review of the work of the University of Illinois, in its educational aspect, supplemented by a series of special reports from the professors in charge of their various departments. In both the respects named, the condition of affairs is healthful and the outlook promising. The membership for the year will be nearly as large as has ever been reported, with a larger proportion of University students and a correspondingly less number of preparatory students.

The completion of the twentieth year since the inauguration of the Illinois Industrial University makes the following statistics worthy to be recorded:

	Men.	Women.	Total.
The whole number of students matriculated has been	1818	406	2,224
Whole number graduated	403	107	510

The number who entered the preparatory department has been 1,232, of whom 437 afterwards matriculated. The total number of persons who have studied at the University (2224+799) is 3023.

THE COLLEGE OF AGRICULTURE

continues its work under the immediate care of Professors Morrow, Burrill and McIntosh, aided by assistant Hunt, and by the whole corps of scientific instructors of the University. As heretofore, the largest part of the agricultural students come for the shorter, or farmer's course. The increased demand for trained agricultural scientists, in the newly organized experiment stations, and for instructors in agricultural schools will, it is believed, stimulate a larger number of young men to take the longer and more thorough agricultural full course. A careful examination of the reports of

the agricultural schools of the country has disclosed the fact that the popular, and so-called typical schools of agriculture, are those whose courses of study contain the smallest proportion of agricultural science, and relatively the larger proportion of other matters.

The University has very liberally aided the extensive course of Farmers' institutes which the State Board of Agriculture has conducted within the State. Since the opening of the new year, Professor Morrow has attended twenty-eight of these meetings and has sent papers to three others. Professor Forbes has attended nearly as many. Professors Burrill, McIntosh, McMurtrie, the Regent, and Messrs. Hunt and Weed have also served on this line, and it is within the truth to say that at least the time of two persons has been given to this work since the present term began. It is reported that this service is increasing the public interest in the University, and its college of agriculture. The evidence of this is earnestly looked for in increased numbers here in the near future. So much absence of Professor Morrow could not have been permitted but for the good service rendered by assistant T. F. Hunt, who is proving an excellent man in both the class room and the field. The bulletins describing his work during the past year, indicate practical ability of a high order, and skill in devising and performing agricultural experiments. Dr. McIntosh's veterinary instruction, and especially his clinical work, is attracting much attention. The development of a full course of veterinary medicine is a subject which may demand careful consideration at an early day.

The organization of the Experiment Station and its influence upon the management and uses of the college farms will be considered in another place.

THE COLLEGE OF ENGINEERING

has absorbed the largest proportion of the accessions of the present year. Both the mechanical shops are filled nearly to their extreme capacity, while for the higher mechanical classes there are neither sufficient tools, nor the room to place them. I once before reported to you that in this department we needed more tools or more instructors. Now we need both. Extra teaching force has been required this year, and provision will be needed for its permanent employment. Should a proportionate increase be made in the number of applicants next season, recourse must be had to the legislature for additional facilities, and more room for their instruction. The first step may be the removal of the boiler to a suitable house to be made for it in the yard, thus furnishing room and light for more machines. In such case a larger boiler will be required and one of different design. It should be noted that the present boiler has been in use sixteen years, and that it is entirely inadequate to the duty now required of it.

But the relief which the removal of the boiler will give will be scanty and temporary. The ideal thing to do would be to build new shops, in a different part of the University grounds, better lighted, better arranged, and so designed that they could be easily extended without disturbing the general plan. It was a mistake to put the shops so far away from the main building, causing so much time to be wasted in travel to and fro. An alternative plan, and one not without merit, would be to secure the construction of a new drill hall upon the ground, separated from the shops, and to fill the upper story of the present shops with machinery. This may be deemed the more feasible plan. It could easily be so modified as to afford a more convenient place for commencement exercises than we now possess.

The school of mining engineering is gradually making its way. Another year will probably see all its classes in operation. The arrangement of the metallurgical laboratory is going forward, and the machinery getting into place. When the boiler house in the rear of the main building was designed, it was intended that the heating boiler under the chemical building should be removed thither, and that all the heat for both buildings should be generated at one point. The appropriation for this purpose was so cut down as to prevent this plan from being fully carried into effect, and the design has not since been resumed. I have always been of the opinion that economy in fire service would result from such a change. Now it appears that if the boiler could be removed the room which it occupies would be particularly desirable for the construction of model furnaces for the reduction of ores, etc., purposes of great importance in the metallurgical courses. Full investigation of this subject, with proper estimates, will be presented in my next report.

The testing laboratory is now in working order, and the first class, under Assistant Professor Talbot, is receiving instruction in its operation.

The work of the

COLLEGE OF ENGINEERS

remains under the immediate direction of Professors Shattuck, Ricker, Baker, Comstock, and Woods, assisted by Professor Talbot, and instructors Kimball and Parker. Full details will be found in their several reports.

IN THE COLLEGE OF NATURAL SCIENCE

the only change during the year has been the opening of the electrical laboratory, and the instruction of a class in electrical measurements. There is more iron in the room than we could wish, and absolute determinations are not possible; yet it answers the purpose of instruction fairly well. One or more brick piers must be put in before the fall term begins.

The botanical work goes forward with its wonted regularity and success. The zoölogical department has been brought fully up to that of its kindred science, and is gathering growing interest. The physiological work will derive fresh impetus from the new manikin.

The work of this College is directed by Professors Burrill, Forbes, McMurtrie and Rolfe, aided by assistants Palmer, Tatarian, and Garman. The physics and electricity are taught by Professor Comstock. I trust that by the time when his services are all demanded by the work in mining engineering, the University may be able to give the whole time of an instructor to physics in its varied departments. No subject in the University courses presents a larger or more important field of labor. Some person should give it his whole strength.

THE COLLEGE OF LITERATURE AND SCIENCE

commands the service of Professors Pickard, Crawford, Snyder, Butler, and Brownlee, and assistant Eggert. No important changes have occurred in this department during the last year. Professor Brownlee's work goes steadily forward, and is bearing good fruit. The current series of orations delivered two or three times a week, by the members of the senior class in the chapel is excellently done and well received. I trust that the Junior Exhibition of this day will have been found to present a marked improvement upon any of its predecessors, beginning a new and improved order of things.

As has been before noted, the constant progress which during the last few years has been made upon the technical side of the University has given an impression that the literary departments were being neglected, or, at least, were not so well advanced as the others. We trust that the facts are not such, and that the public impression, if it exists, may be corrected. The work of Professor Butler in Latin, of Professor Crawford in Greek, of Professor Snyder in modern languages, of Professor Shattuck in mathematics, all of this is up to the first standards, and the collateral scientific work enjoys the best efforts of the same men who are giving strength to the technical schools. But, out of all comes a complete answer to the old objection, so constantly harped upon, that the University was being diverted from its proper purposes to become a "mere" classical college.

THE ART CLASSES

under Professor Roos maintain their deserved popularity. His room is always a busy hive. The effect upon all forms of industrial art and design is salutary, and there is no department of the University which does not gather some benefit from this work. Besides this, the forms of mathematical drawing and projections are taught thoroughly by Professor Talbot, while their applications

in all the engineering courses are constant throughout. Professor Ricker's work in architecture, which occupies a dual relation to art and to engineering, continues a healthy and progressive development. The students in this department have never been so numerous, while those that have graduated are practicing their profession with credit and success. Professor Ricker has been relieved somewhat by Professor Talbot, but there is constant need for a competent assistant in this department.

THE MILITARY DEPARTMENT

is in good hands. Lieutenant Hoppin shows himself an officer of discretion, tact, and force. We are fortunate in this detail from the regular army.

THE PREPARATORY CLASS

has been taught by Mr. Boyer, and by Professors Rolfe, Butler and Brownlee, and Mr. Eggert. There are reasons for wishing that another year of preparatory work could be provided. For the older students who need such instruction, the one year serves a very fair purpose, and the time is all they can afford. They get broken into our way of work, and become accustomed to our methods of instruction, and they make ultimately the very best students we have. For the younger boys the case is different. The time is too short. The work is too hard. They get discouraged, drop out, and in some cases are probably prevented from acquiring the larger education that they ought to receive. It would not be easy to harmonize the two elements. The course is really intended to provide for the older class of students named, for whom there is no adequate provision elsewhere. The younger should not come here, but should find in the abundant and excellent high schools of the State arrangements much better suited to their needs than any which the University can give. A longer preparatory course could not be properly administered without a separate building, on the academic plan, with a full and separate corps of teachers. This, again, would bring the institution into a position of competition with the other agencies which the public funds now support, and would be foreign from its original and normal purpose.

THE ACCREDITED SCHOOLS.

More interest is developing in this relationship than I have before seen. Many applications are coming in from schools whose officers desire them placed upon the list. Since the opening of this term the following named schools have been inspected and approved: Waverly, Pekin, Rock Island, Moline, Freeport, Rockford, Watseka, Lincoln, Jerseyville; and others are yet to be visited. Reports of progress have been asked from all those now on the list, and the answers have been received and tabulated. A

full report showing the relative condition of things, while there is not room for it here, would be a valuable contribution to the educational statistics of the State. The whole number of schools now accredited by the University is forty-five. Twenty-two of these I have personally inspected. Nine others have been declined. It is probable that, owing to the change of teachers, and other vicissitudes, some of those now on the list should be dropped.

In this connection I desire to renew my request that leave be given to have a properly illuminated certificate prepared, and a copy sent to each accredited school, on condition that it be suitably and permanently displayed. I am convinced that no funds set apart for advertising the University can be more profitably used than in this way, nor is there any way in which the accredited schools can be kept so well in touch with our work.

I desire to note the gratification with which I have heard the warm expressions of sympathy and good will which have lately been multiplied from the leading teachers and county superintendents of the State. Our University is daily coming to be recognized as the State University of Illinois. The men referred to feel more fully than they have before felt, a personal interest in our welfare, and a personal pride in our success. In many cases where I have visited schools public addresses have been delivered, at the request of the teachers or school officers, the statement being, tell us about the University. I have also endeavored to respond to all calls of county superintendents for such aid as I could give in their occasional institutes.

I have received assurances from a considerable number of the county superintendents that they would hold the examinations for selection of honorary scholars in June next. These examinations will serve not only this purpose, but give to any who desire an opportunity to pass the regular entrance examinations in the immediate vicinity of their own homes.

In closing this portion of my report I have to add only this: The growth of this University will depend upon the degree in which it becomes rooted in the sympathy and confidence of the people of this State, that will result from wise planning and faithful execution of plans; that involves earnest, and faithful, and devoted work, at the University, and abroad in the State. The work is going forward, and as surely as God hath ordained that harvest shall follow seed time, so surely will this work win its reward.

COLLEGE OF AGRICULTURE.

Report by George E. Morrow, A. M., Professor of Agriculture.

Dr. S. H. Peabody, *Regent:*

Dear Sir:—The instruction to the classes in agriculture during the past year, or for several years past, has been mainly by lectures, these illustrated by free use of the farms and their buildings, machinery, crops, live stock, etc., and of the specimens, models, casts and pictures in the museums and class room, and the books in the large agricultural library. In each class some use is made of one or more text books, but even more reliance is placed on directing the reading of the students on the topics discussed and requiring written summaries of the facts or opinions thus learned. Informal oral discussions in class are encouraged.

More importance is attached to presenting principles, with a sufficient number of facts to illustrate these, familiarizing the student with available sources of information and with methods of using these, than to teaching arbitrary rules of practice.

The classes have received instruction from the assistant in agriculture, Mr. T. F. Hunt, during my somewhat frequent absences caused by attending Farmers' Institutes or agricultural meetings. He has followed the same methods as my own in general, and with gratifying success in maintaining interest.

Elements of Agriculture.—This study pursued at the opening of the freshman year is designed to give an outline of the leading principles to be studied in other technical studies of the course, and to point out some of the ways in which the scientific studies may be made most helpful. An effort is made to impress the student with the importance of agriculture as a study, and with the wide range of knowledge directly applicable to its practice. The soil in its composition and management; the leading farm crops, their composition and adaptation as foods; effects on the soil; principles of fertilization; principles of feeding; these and like topics are treated of, partly for the sake of giving information of direct value and partly to awaken interest and to point out the sources from which instruction in fuller measure is to be gained.

Agricultural Engineering and Architecture.—In this study methods of determining the area of land are discussed and practiced. The number, size and arrangement of the divisions of the farm, the laying out, construction and repair of farm and public roads, the comparative advantage of different kinds of fences and the best methods of constructing these, receive attention. Especial prominence is given to land drainage. It is expected that each student, even without previous knowledge of the subject, will be prepared to lay out fairly well a system of drainage for a farm, determine the fall, and either do or superintend the work. Planning and arrangement of farm buildings of all classes so as to secure at smallest expenditure the largest degree of convenience and practical utility, is made the subject of careful study, plans being required from each student. The implements and machinery of the farm are described with reference to their intelligent choice and proper care and use. The place which implements and machines hold in our agriculture, historical sketches of their development, the points to be considered in deciding whether the purchase of any one implement will be wise, and suggestions as to choice between different kinds for the same purpose, receive attention. For the classes a good number of books, instruments and other apparatus primarily designed for the use of students in the engineering courses are of great help. Even a single term's instruction in shop practice in wood work is found to be of great value.

Animal Husbandry.—In this study it is designed to aid the student in gaining an accurate, although necessarily an elementary knowledge of the relations of stock breeding and management to American farming, of the principles of breeding, feeding and management of each class, and of the characteristics, adaptation and history of each of the most important breeds of horses, cattle, sheep and swine. The real and fictitious value of pedigree; the place for pure-bred stock; practical methods of feeding and management, with reference to the production of the highest quality, and also modes adapted to production at moderate cost; methods of "judging" animals; methods of disposing of animals and their products are some of the points to which especial attention is given. The University farms are well supplied with animals of different breeds and ages. The farms of breeders in the vicinity are also visited and the stock inspected.

Rural Economy, general farm management, is taught in the winter term. The peculiarities of the agriculture of this country, and especially of Illinois, the chief sources of profit, comparative merits of different systems of farming, best rotation of crops, methods of producing the leading crops, with discussion of the advantages of some special crops, as well as methods of sale, etc., are carefully gone over.

The History of Agriculture is taught during the first half of the spring term. While attention is given to the agriculture of other lands, chief attention is given to its development in our own country and to the causes of success and partial failure.

Rural Law, or the application of some general principles of law to the business of the farmer, and a consideration of the statutes of the State which have special reference to agriculture, receive attention during the latter half of this term.

REPORT BY DONALD MCINTOSH, D. V. S., PROFESSOR OF VETERINARY SCIENCE.

S. H. PEABODY, LL. D., *Regent University of Illinois:*

SIR—I have the honor to submit to you the following report of the veterinary department of the college of agriculture:

The anatomy and physiology of the domestic animals are taught during the fall term by lectures and demonstrations on Dr. Auzoux' model of the horse, constructed on the same plan as a manikin, and the skeletons of the domestic animals.

We have also dissected both the horse and ox, giving particular attention to the internal organs, especially the organs of digestion, noting the difference between them in the horse and ox.

Veterinary science, which embraces the practice of veterinary medicine, surgery, sanitary science, and obstetrics, is taught during the winter and spring terms, and illustrated by morbid anatomy and clinics.

We have been experimenting on fibrous enlargements, or tumors, with good success. Our mode of operating is to make with the knife an opening into the centre of the tumor from one to two inches deep, according to the size of the enlargement, and large enough to admit the little finger. After bleeding has stopped, we insert into the bottom of the wound two or three grains of bi-chloride of mercury, rolled up in a small piece of tissue paper, allowing it to remain for three days, when we clean out the puncture with a little water. When dry we insert another plug in the same way and so on until the lump entirely disappears. This will occur in about the fourth or fifth week.

The bi-chloride of mercury causes a slough to form around the puncture, and also stimulates absorption through the whole tumor. In this way we reduce the tumor completely without causing any blemish or leaving any residue.

This method does away with the old plan of setons, or blisters, or the use of the knife, which usually leave a blemish.

Our clinic has furnished us with six old standing cases of fistula, all of which we have cured by my new method. This is taught to my students in detail, also the proper mixtures to use at the various stages of the disease.

Veterinary *materia medica*, which in the extended sense of the term, treats of every agent and material, used for the cure of disease, or injury, or the preservation of health among the domestic animals, is taught during the winter term, by lectures illustrated by specimens of all the drugs used in veterinary practice, also by giving the names of diseases which they are supposed to cure, with *formulas* of the best combinations of medicines to be used in certain diseases, as well as the best modes of administering medicines, the circumstances which modify their actions, and the writing out of prescriptions. Our clinics have become very popular and are very well attended. The farmers of the surrounding country, and the owners of stock in both Champaign and Urbana, seem to appreciate highly the advantages of our free Wednesday's clinic. This has been of signal benefit to the class, and we have had a great variety of cases to operate on and prescribe for. The class is also taught to determine the age of the horse by his teeth; the use of veterinary instruments; the best method of casting horses for operations, and the difference between the pulse in health and sickness. They perform operations according to my directions on horses and cattle.

I am glad to be able to say that the interest in the work of this department is increasing, as is shown by the increase in the number of those taking the course, and the earnestness exhibited by the young men under my instructions.

Allow me in closing to express thanks to you, sir, personally, for the interest you have been pleased to show in the work of this department.

COLLEGE OF ENGINEERING.

REPORT BY N. CLIFFORD RICKER, M. ARCH., PROFESSOR OF ARCHITECTURE.

S. H. PEABODY, LL. D., *Regent*:

DEAR SIR—I herewith transmit to you my yearly report on the present condition of the school of architecture under my charge, the studies pursued, methods employed, improvements made and contemplated, with some considerations relating to the work of the blue printing laboratory.

1. *The Course of Study.*—The present course of study for architectural students will first be briefly reviewed, noting changes and improvements made since my last published report.

The instruction in mathematics, projection drawing, descriptive geometry, free hand drawing, mechanics, resistance of materials, physics, history of civilization, constitutional history and political economy, is identical with that imparted in these branches to students in the other schools of the college of engineering. French is studied for but a single year, chemistry for one term, and a term of water color sketching is added, as well as a term of sanitary construction, about half this last term being devoted to the practical use of the engineering instruments, nowhere else provided in the architectural course.

The shop practice is under the charge of Mr. Parker, who has become a very successful teacher, and has materially raised the standard of attainment by improvements in tools and appliances, and by the introduction of more effective and pleasing designs, especially in ornamental work.

A large amount of work has also been done for the University in the architectural shops during the past two years, consisting of repairs, carpentry for the improvements in ventilation, cases and tables for the laboratories, etc. This work has been materially aided by the use of the new wood-working machines.

From the limited time available for the classes in shop practice, not exceeding about 350 hours for the three terms, or not quite one and one-half working months, it is considered most profitable

to restrict the instruction to carpentry, joinery, turning, cabinet-making, stairs, veneering, inlaying, metal and stone work. A tolerable knowledge of the tools and processes of these trades is more valuable than the results of a wider range of practice with inferior attainment. The architect does require a knowledge of bricklaying, plumbing, steam-fitting, painting, etc., but must acquire this by observation after leaving the University, as the length of the course of study cannot well be extended, or studies even more essential be excluded.

The study of graphic statics has been improved by the use of a text-book published since my last report. After considering the resultants and moments of forces, centers of gravity and moments of inertia of figures, with the moments and shears acting on beams, the principal time is devoted to the study and design of roof trusses of various types. A large number of practical problems are solved as an application of this study. The application of graphic statics to the arch, vault and dome should also be taught, but this subject of the stability of arched structures is rather abstruse for the freshman class, and it has not yet been found possible to add this to the work already prescribed for this term.

The elements of construction occupies two terms, comprising architectural constructions in wood, stone, brick, iron and steel. The materials are first studied, then the special forms of joints and connections used for each material and trade; lastly, the structural forms and purposes for which they are employed in building construction. Original designs are made for floors, ceilings and roofs, windows and doors, stairs, foundations, cut stone work, brick work, iron girders, columns, and fire-proof floors. It may eventually become possible to extend the scope of this study so as to embrace other important branches of building construction, which are almost equally essential to the architect, and should be taught if possible.

During the last summer vacation, the lectures on wood construction were thoroughly revised and entirely rewritten, and are now in very satisfactory form. Those on stone, brick, metal construction, and foundations, have also been mostly revised and rewritten during the present term.

Architectural drawing comprises the methods employed by architects for recording and expressing their structural ideas. A student without previous practice is required to make complete copies of sets of drawings for two different buildings, usually selected from Tuthill's Architectural Drawing as the most convenient source. These drawings are finished in the manner customary in good offices, so as to fit the student for becoming a draughtsman in an architect's office, the usual avenue to the profession. If the student has some acquaintance with drawing, he is further instructed in shading drawings in ink, sepia and in etching, or is required to make a set of working drawings from a sketch perspective and

plans selected from the architectural periodicals. Students are encouraged to improve these originals by suitable changes, so that advanced students often obtain good practice in original design in this study.

The history of architecture is taught by lectures, no suitable text-books existing in English, excepting at a price usually beyond the means of students. Instruction is imparted by daily recitations on blue-print lectures, by verbal explanations of interesting points, using the collection of illustrations, and by requiring students to make tracings of details of the principal styles. The collection of engravings and plates made during the past two years is found to be of great service to this class, and the lectures furnish the student with the classification and characteristics of the styles, descriptions of buildings, etc., properly arranged.

A different mode of instruction would probably be more beneficial to the abler students. Use the best attainable text-book, enforcing carefnl study of this by daily recitations; instead of tracings of details, require each student to make out his classification and synopsis of the leading peculiarities of each style on a proper form of blank, these blanks then forming a condensed classification or manual of the various styles, and being retained by the student. But it has not yet been found possible to carry out this plan, as there is now no suitable text-book in English covering the entire ground, and I have not yet found time to make a condensed translation of a good foreign work, several of which are available in German. There would also necessarily be considerable difficulty and expense in placing such a translation in the hands of students, after it was completed. I have therefore used blue-print lectures, postponing this improvement until the more urgent requirements of other classes are satisfied.

During the present term, the first volume of these lectures has been revised and rewritten, obtaining much better copies than was possible with the former negatives, and giving the lectures an improved form.

The esthetics of architecture comprises the laws of the production of beautiful and harmonious results in architecture and their applications. My translation of Redtenbacher's Architektonik is still used as a text-book, being the work best suited to the purpose that I have found. But the most valuable part of this study is the making of fifteen to twenty designs for various decorative purposes, which really makes this a term of designing, fully appreciated by the student.

Architectural perspective was taught as a part of the regular course of study for the first time this year. Professor Ware's Modern Perspective was used as a text-book, and several problems were worked out by each student, mostly original designs, producing very satisfactory results. This study is most essential, as architects advertising for draughtsmen now almost invariably require a knowledge of perspective and of details of construction as their chief qualifications.

Architectural designing nominally occupies but two terms, though designing is actually taught under other names in other studies. The first term is devoted to the production of numerous designs for simple problems, each taking about a week. The second term is occupied in making a complete design for an important building, such as a city residence, office building, etc. I have not followed the usual academic system of requiring the student to use the architectural orders and limiting him to the renaissance style, for, after all, the object of the study is to cultivate his taste and power of designing, which I conceive is more properly done by using the forms and styles that he will afterwards be required to use in practice.

The student in the builder's course usually makes a set of working drawings for a wooden cottage.

In heating and ventilation, my translation of Planat's Manual is used as a text-book, and many numerical problems are solved. Most of the time is necessarily devoted to general principles and the establishment of formula for the fuels, flow of air in openings and ducts, losses by resistances, heating by fire-places, stoves, furnaces, hot water and steam, and also natural and mechanical ventilation. But little time is left for the study of the constructive details of the multifarious forms of heating apparatus now used in this country.

Estimates, agreements and specifications are taken up in the last term of the course, instruction being given by lectures, the study of examples, and by original work. About half the term is devoted to estimates. A portion of the time might perhaps be profitably transferred to the study of superintendence, using Professor Clark's work as a text-book.

2. *Improvements in Course of Study.*—Since my last published report, the course of study has been improved as follows:

1. Use of a text-book in graphic statics instead of blue-print lectures.

2. Revision and rewriting of lectures on elements of construction.

3. Revision and rewriting of lectures on history of architecture, vol. 1.

4. Addition of architectural perspective to the course of study.

5. A constant pressure has been exerted to cause each successive class to produce more and better work than the preceding classes, and this has been measurably successful. Perhaps I may have been too strenuous on this point, but such pressure is necessary and beneficial to most students in leading them to produce the maximum quantity and quality of work.

3. *Proposed Improvements in Course of Study.*—In regard to improvements which might be made in the course of study, I desire to present the following suggestions:

It does not seem possible to introduce any additional technical studies, no matter how urgently required, unless an assistant is provided, and the receptive powers and study time of the students can also be increased. Hence, the most that can be done to improve the course under present circumstances, is to improve the methods of instruction by selecting the most valuable points in each branch, impressing these by repeated applications, requiring as much original work and thinking as possible, to make the student alert and self-reliant.

Imparting instruction by ordinary lectures, as customary in German universities and elsewhere, relying on the taking of notes by the students, is practically useless here, except as a means of arousing the enthusiasm of the student, and of subjecting him to the personal influence and direction of the instructor. No other results are ever permanent, and very few students ever learn how to take proper notes, or afterwards make any use of such notes. As a matter of fact, I believe that German and English university students depend far more on private reading or work with a private tutor than on the lectures of the professors, both as a means of acquiring knowledge and of passing the specified examinations. Besides, innumerable facts and principles must be imparted to the student during the limited time of his studies, and he must have some compendium, which he can thoroughly memorize in the intervals of his work in the classes. I have, therefore, found some form of text-book absolutely necessary, whether this be in print or in the form of blue-print lectures, which really form a text-book. Verbal explanations and extemporaneous lectures add to this all the advantages of the common lecture system without its disadvantages.

With the approval of the proper authorities, I desire to make the following improvements as soon as it may be found practicable to do so:

1. To extend elements of construction to include all the more important building trades, and kinds of work.

2. To add the study of arched structures to graphic statics.

3. To use a text-book in history of architecture, requiring synopses or briefs of each style instead of tracings of details.

4. To enlarge the cabinet of engravings, photographs and other illustrations for the use of classes in history of architecture and in designing, as rapidly as possible with the means at my disposal.

5. In architectural drawing, to substitute for the present method of instruction one based on a system similar to the Russian system found so successful in the classes in shop practice, requiring each student to execute a certain series of separate plates instead of copying complete sets of drawings for buildings. This method will be novel, will be more difficult, and not every student will be able to do the work satisfactorily, and the graduates may perhaps

not be as valuable at first as ordinary office draughtsmen, but they will be much superior in the end. It will give a wider range of methods and practice, producing more accomplished draughtsmen. It will also make the study more interesting, and will further obstruct the present tendency of students to try to make up this study outside the classes, during vacation, etc. I consider this improvement to be the one now most urgently required, and propose to prepare a series of plates during the next summer vacation, so that the new system may be introduced with the beginning of the next University year.

4. *The Blue-Printing Laboratory.*—It is probable and is to be hoped that the professors in charge of the various schools of the college of engineering will eventually publish text-books for use in their technical classes. But this requires time, and for present use some mode of reproduction of the lectures is absolutely necessary, so as to save the time of the student and provide time for recitations and practical applications. I have carefully considered every process that has come to my knowledge, and have tried many, finding that all are hampered by special difficulties. The processes may be arranged in three general classes.

1. Printing from types or stereotype plates. This would be quite expensive, and each professor would be obliged to have it done at his own cost, recovering the outlay by selling copies to students, which would introduce financial relations between instructors and students, objectionable in many ways readily obvious, and would also require the use of a very considerable capital.

2. Processes making numerous copies of a single stencil, all made at one time. Less expensive; copies are not usually very legible or durable, and the type-writer can not be used for making stencils in most processes. Additional copies require a new stencil. A professor would still have to pay the cost of making the copies and sell them to students.

3. Processes making copies at any time from the stencil. The stencils or negatives are furnished by the instructor, and are copied in a special laboratory where students purchase them, thus removing the chief objections to processes of the preceding classes. But three processes of this kind are probably available for our purpose:

a. The Gallic-acid-iron process, which produces a positive print, requires an excellent quality of paper, is very slow in printing, so that copies are more costly than blue-prints, though easier for the eyes. These copies could not be sold to students at the present price of blue-prints.

b. The blue-print process, which is the simplest of all that I have tried, though probably more expensive than some belonging to class 2, but more free from objections. Manuscript stencils print best, but type-written are most easily read. This process

appears best suited to present conditions, and better results can be obtained by using better paper, perhaps without increasing the cost to the student.

c. Making a black type-written copy of each page, then photographing this on a film or paper negative, which is then used as a stencil, printing copies by the blue process. Theoretically good, but would not work when it was tried a few years since, though it may be possible now with improved sensitive films. This would cost at least 20 cents per page for the materials alone.

After the preparation of the lectures, copying them to make the printing stencils requires a considerable outlay of time or money, usually of both. Some professors hire copyists. I have made my own stencils, but have paid at least $250 for type-writers, ribbons and paper, no part of which will be returned to me, and pay the same price for my copies of the lectures that my students pay. The investment has been a good one, as a matter of personal convenience, and as enabling my classes to do more and better work. Yet it might seem that the time of a professor might be more profitably spent on other work, and that this cost of copying the lectures for the reproducing process should be paid by the students benefited thereby, by slightly increasing the price of blue-prints, placing the copying under charge of the blue-print department, making it as uniform as possible.

REPORT BY SAMUEL W. SHATTUCK, A. M., C. E., PROFESSOR OF MATHEMATICS.

S. H. PEABODY, LL. D., *Regent University of Illinois.*

SIR—I have the honor to make herewith the following report upon the work of the mathematical department of the University for the two years ending February 29, 1888. The work may be classed under three heads:

(1.) That of the preparatory year.

(2.) That taken by students in the college of literature and science, etc.

(3.) That in the college of engineering.

(1.) In the preparatory year algebra is taught in the fall and winter terms, and geometry in the winter and spring terms. Mr. S. W. Stratton and Mr. E. R. Boyer have taught these classes to my satisfaction and that of the students. I may add, that a longer time might be given to these studies with advantage in respect to the after mathematical work of the student.

(2.) In the past year the study of calculus has been required in the chemical course, and in that of ancient languages. The

change was recommended in my last report. The fall term is occupied with the study of trigonometry, the winter term with that of conic sections and analytical geometry.

(3.) The students of the college of engineering have one term of trigonometry, two of analytical geometry, two of calculus, and two of descriptive geometry. I add below the statement of Professor Talbot in respect to the last named subject. He also teaches in this course the trigonometry and analytical geometry of the first year. I teach the advanced algreba of this year and the studies of the second year. The object aimed at in the course is to enable the student to meet the requirements of his engineering studies. In the calculus class, in addition to the usual applications to geometrical concepts, the following ones in mechanics are among those made:

A body falling freely near the earth's surface.

Motion of a body down an inclined plane.

A body falling from a distance toward the earth; velocity of fall; limit of a possible velocity; time of fall.

General formulas for the coördinates of the centre of gravity of any mass.

Centre of gravity of a homogeneous body.

Centre of gravity of a plane area.

Centre of gravity of a solid of revolution.

Centre of gravity of an arc, of a surface of revolution, etc.

Properties of Guldin, examples, etc.

I believe that the teaching in the whole department has been of a high order, equal, I may say, to that given in other institutions of like character.

Descriptive Geometry. First Term.—The text-book work consists of problems in orthographic projection, relating to the right line and plane, among which are the following:

Find the intersection of two planes.

Find the point in which a given right line pierces a given plane.

Draw through a given point a right line perpendicular to a given plane, and find the distance of the point from the plane.

Project a given right line on a plane.

Pass a plane perpendicular to a given right line.

Find the angle which a given right line makes with a given plane.

Besides the recitation, eight hours a week are employed in drawing required applications of these problems. Sections of prisms, cones, cylinders and other solids, intersections of surfaces and of different solids, developement of surfaces, and other problems necessary to construction drawing are included in this. The work

requires originality and ability to apply knowledge, and developes accuracy, comprehension of objects when represented by drawings, and ingenuity and skill in drawing.

Second Term.—The following is an outline of the work:

Projection of curves.

Generation and classification of surfaces.

Problems relating to tangents and normals to lines and surfaces, of tangent planes to single curved, warped, and double curved surfaces.

Generation and properties of the helix, helicoid, hyperbolic paraboloid, hyperboloid of revolution of one nappe, cone, cylinder, ellipsoid of revolution, and problems relating thereto.

Intersection of surfaces by planes and curved surfaces.

Developement of single curved surfaces.

In spherical projection, the orthographic, stereographic, globular, cylindrical and conic projections are treated. In shades and shadows, the recitation and drawing illustrate the methods of finding the shadow of different forms of surfaces on other surfaces, and the position of the line of shade. The elementary principles of perspective and the methods of constructing the perspective of objects are given.

In addition to the recitation, several hours of drawing a week is required, which is devoted to the construction of many of these problems and their applications.

REPORT BY IRA O. BAKER, C. E., PROFESSOR OF CIVIL ENGINEERING.

S. H. PEABODY, PH. D., LL. D., *Regent:*

DEAR SIR—In compliance with your request, I submit this report in behalf of the school of civil engineering. The studies here referred to are those in which the instruction is given by the writer.

The special civil engineering studies commence with land surveying in the fall term of the sophomore year, in which the class solve numerous problems in the field with the chain, compass, and plane-table, and study the principles of, and the more important legal questions which arise in connection with, the United States public land surveys. A text-book forms the main basis of the instruction. The time of recitation is two hours daily. The winter term is a continuation of essentially the same kind of practice with the transit, level, and stadia. The students are supplied with manuscript lectures, copied by the blue-print process, which practically become a text-book and form the basis of the instruction.

The time of recitation is two hours daily. The first object which it is sought to attain in these subjects, is to train the student in habits of accuracy; and, second, to instruct him in the relative precision of different processes, instruments, and methods. In the spring term the same students pursue the subject of topography, in which the principal aim is to instruct in the methods of conducting topographic surveys and to give practice in representing the results of such surveys in neat and intelligible maps. For the drawings connected with subject there are one or two in different text-books; but in the method of performing the field-work there is not even a poor text-book or manual. In the drawing we use plates furnished to us for that purpose by the United States Coast Survey and by the Mississippi River Commission, which make admirable "copies." The instruction as to methods of surveying is given by lectures, assigned reading and practice in the field. The time of recitation is two hours daily.

In the fall term of the junior year the students take up railroad engineering, considering the mathematical theory of curves, the principles of economic location, the method of conducting a survey for a railroad including all the estimates, staking out, calculations, etc., necessary for construction, and, as far as the time available will allow, the principles and methods of maintenance and operation. A text-book, a volume of blue-print lectures, oral lectures, and indicated reading in the library constitute the means of instruction. The time of recitation is two hours daily. Preliminary surveys are made of at least two routes, which are compared as to cost of construction and operation, and then a location survey is made and all the steps, both in the field and in the office, preparatory to commencing construction are taken up in order.

In the fall term of the senior year the subject of practical astronomy and geodesy is studied, in which the main object is the training of the student in habits of extreme accuracy. A text-book on astronomy, a volume of blue-print lectures on geodesy, and monographs in the United States Coast Survey reports, are the principal sources of instruction. The students use the alt-azimuth instrument, astronomical transit, and sextant, and practically determine time, azimuth and latitude by the several processes.

The results accomplished in the preceding subjects, all of those involving field practice, are considered to be entirely satisfactory both in the art and in the science involved. We have a fairly good equipment of instruments, which are extensively used by the students in the solution of problems; each problem is carefully designed to teach some definite principle, and each approximates closely to the conditions of actual practice. The results, both disciplinary and practical, obtained in this line of work afford a striking illustration of the advantage of a "fellowship between theory and practice." The details of the methods used and ends attained were referred to at some length in my report of two years ago, and probably do not need to be repeated here.

In the fall and winter terms of the junior year, civil engineering students pursue analytical mechanics and resistance of materials in common with other engineering students. These studies are in the immediate charge of Assistant Professor Talbot. The time of recitation is one hour daily. The instruction is wholly by text-books.

In the spring term the students of all courses pursue descriptive astronomy, a text-book being the basis of the instruction; during clear weather the telescope is in constant use. The instruction is given by Mr. Boyer.

In the winter and spring terms, the civil engineering students study bridges, in the first term giving attention to the calculation of strains, in the second to proportioning of parts and to designing. In the first term instruction is given by blue-print lectures, in the methods of determining the strains in the parts of the ordinary forms of bridge trusses due to the weight of the structure and the moving load, and also those due to the action of the wind. The student solves a number of problems.

In the spring term the main object is to instruct the student in the principles of economy of design, and to give him some idea of the market forms and qualities of the materials he is to use, and of the limitations imposed upon the design by the requirements and customs of the processes of manufacture. Each student makes a complete design of a standard form of bridge truss, works out all the strains, and designs each detail. There is absolutely no text-book on this subject, or even any part of it. The instruction is individual, aided by a small collection of actual sections, eye-bars, etc., and by a large collection of actual working drawings from several of the best bridge works in the country.

The change made last year by extending the time of daily recitation of the second term of bridges, proved very satisfactory. It not only gave an opportunity to do considerable more work in bridges but also gave the student practice in expressing his ideas in graphical language. Although the instruction is given under the nominal head of bridges, the principles have a far wider application.

Blue-Print Lectures.—One of the serious difficulties which meets the instructor in technical subjects is the lack of suitable text-books. Higher technical education is comparatively new, and naturally there is a dearth of good text-books. The professor is under the necessity of supplying this need. In some subjects this may be done by lectures, of which the student takes notes, and by indicated supplemental reading. The method is fairly successful only with mature students; and experience shows that it is not at all suited to our students and the class of subjects dealt with in the college of engineering. For several years the professors of this college have tried to meet this difficulty by writing out their lectures, and placing a copy in the hands of a student, ap-

pointed for the purpose by the Faculty, who prints copies by a photographic process to the order of the members of the class; these blue-print manuscript lectures thus become a text-book.

During the calendar year, 1887, applications were received, as shown by letters on file, for 5 rodmen, 10 draughtsmen, 6 instrument men, 2 engineers and 1 surveyor; total 24. This is one of the evidences of the character of the work done at this University. We had but five men available with which to meet these demands. This is not mentioned here to claim the credit for the writer, for the subjects which he teaches are but a small part of the course, but because he is the one to whom such facts first become known.

CIVIL ENGINEERING SOCIETY.

About five years ago the students, of their own motion, organized a society for the discussion of topics relating to civil engineering, which has since held meetings monthly during school time. The topics discussed have been wisely selected, and the papers carefully prepared. The writer believes that experience shows that the help and support which the society has had from yourself and from the Board of Trustees was wisely bestowed. A year ago the society published, in a neat pamphlet of nearly 100 pages, some of the papers read at its meetings; the volume was very favorably received by the press and by engineers. Arrangements are in progress for a similar publication this year. Although the society has had the cordial support and attendance of the professor and assistant professor of the department, the students have had the direction of the affairs of the society, and deserve the credit of its success.

REPORT BY THEODORE B. COMSTOCK, SC. D., PROFESSOR OF MINING ENGINEERING.

DR. S. H. PEABODY, *Regent:*

SIR:—I have the honor to submit my third annual report concerning the work, condition and prospects of the school of mining engineering, together with a statement of operations in the departments of physics and mineralogy, which have been under my charge since September, 1885.

Mining Engineering.—In June, 1887, one student was graduated from the new course in mining engineering, which he had regularly pursued for two years. Another was graduated by certificate, who had taken selected subjects from the course during several terms. The graduate in course is now engaged in practical mining of coal in a good position.

This year there is no student of this course from the senior clsss, but the junior and sophomore classes are represented, and

several freshmen have expressed their intentions to adopt the regular course. There have always been applications from students outside of this school for admission to the classes.

There being no suitable text books, and the lecture system alone having but limited application in my work, the methods of instruction by means of blue-print notes has been largely adopted.

Our course of study is very near that of the leading mining schools, as is shown by the comparison given in Professor Richards's tables recently published.* A full statement of our aims and methods read before the American Institute of Mining Engineers† has elicited so much favorable comment that I feel warranted in saying that but little is needed to adjust our curriculum to the wants of such as will seek training in this school.

What we have already accomplished has been done at much disadvantage, owing to the lack of appliances such as are in use elsewhere, but this difficulty is now largely overcome by the special grant from the legislature at its last session. The fitting up of the new laboratory in the basement of the chemical building is going on, and all the funds available this year will soon be expended. The selection and adjustment of the machinery purchased have been made with reference to that portion of the appropriation which will be available after next July (1888). Thus far we have obtained from Messrs. Fraser & Chalmers, of Chicago, one Dodge crusher, one set Cornish rolls, the necessary sizing screens, jigs, separator and slime table for complete dressing of a variety of ores of silver, lead, copper, zinc, etc.; besides a set of apparatus for chlorination and leaching for gold and silver ores. With this machinery we can handle consignments of from 300 pounds to several tons of raw material, and thereby illustrate a considerable range of metallurgical methods. The additions proposed when the remainder of the appropriation shall become due, are of such a character as will afford us many new facilities, and I trust that we shall then be able to undertake work of benefit directly to the inhabitants of Illinois. There is no class as yet prepared to work in this laboratory, but there will be use for it next year. We shall be able to make some trial runs before the June meeting of the Board of Trustees, at which time some proposition with reference to a possible means of sustaining this department by public work may be forthcoming.

There are now fifteen mining schools in the United States, ours being the thirteenth in order of establishment. Prof. Richards places us among the ten "leading schools." Only five of these in 1886 exceeded the number of students now pursuing the course in mining engineering here.

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*Transactions American Institute Mining Engineers, vol. xv., 1887, p. 406. President's address, Bethlehem, Pa., meeting, May, 1886.

†Transaction, vol. xv., p. 589. Paper read at St. Louis meeting, October, 1886, by Theo. B. Comstock.

I would respectfully renew my recommendation of last year that some small instruments be added to the equipment for mine surveying. This subject is broader and more important than is generally understood, and much attention is drawn to it in this and other coal-yielding states. The methods and appliances are distinctively characteristic of our profession. As taught here, the subject includes above ground and underground surveys for various purposes of mining and exploration, the laying off of mineral claims by transit, solar compass, etc., as required by the United States mining laws; also tunnel surveys for location, alignment, grade, etc., with a variety of other applications, such as the determination by survey and calculation of the probable continuation of faulted beds, the selection of favorable points of attack, the location of drainage tunnels and the surveys required in placer mining. Eventually we should have the necessary instruments (or rather attachments) for making such surveys as are demanded in prospecting for iron ore and special minerals, including some simple solar attachment to the transit; but there is more immediate need of two plummet lamps for surveying dark passages, a current meter for studying the movement of air through passages, and an aneroid barometer. These can be purchased at a cost of $75. A small expenditure, say $25, under my direction could very advantageously be made for illustrative material in the study of tools, explosives, etc., under the heads of *mining attack and timbering.*

A matter of much concern to this department is the cost of making excursions with the classes to the mines and works in the State, which have all most generously responded to our requests for courtesies, or have extended invitations without solicitation. The expense of such trips is a considerable burden, for which at present there is no provision, and without some means of reducing the bills, this very important adjunct to instruction will probably have to be abandoned, as it has been this year.

Physics.—There is little change in this department, so far as relates to the instruction of the two classes in physics proper. We are accomplishing all that is possible in the time allotted to this subject. If there be anything to report, it is a tendency to condense and systematize the work, which comes of personal experience with the students and the apparatus. Our work is not in all respects what I could desire, but little more can be expected while the department is carried along with another which is constantly demanding increased attention. The customary weekly illustrated lecture has been continued with voluntary attendance of the students. Perhaps this has been somewhat more effective than last year in the winter term, because I have had less than the usual routine work in mining engineering. The students are diligent and the senior assistants are doing good service.

A new feature this year has been a volunteer class in electrical measurements, working in the new electrical laboratory in the basement of the main building. The plans for fitting up this room were but partially carried out, owing to insufficient appropriation of funds, but we have been able to do much better work than was ever possible in the physical laboratory above.

The new apparatus is very satisfactory, and with the plans which have been made for this class another year, but little remains to give efficiency to the instruction except what the experience of this year will enable us readily to remedy.

A subject of prime importance in the course in mining engineering is metallurgy. This branch, as understood by mining engineers, and as taught in mining schools, has not heretofore had a place in this institution. Dr. McMurtrie has very kindly extended his own work so as to provide instruction for the mining students in this subject.

Believing it to be to the advantage of all that the physical department be placed as soon as possible in the care of one who can devote his whole energy to that work, I trust that the complete reorganization outlined here, or some similar adjustment, may be deemed possible at an early date.

Report by Arthur T. Woods, Professor of Mechanical Engineering.

S. H. Peabody, Ph. D., LL. D., *Regent.*

Dear Sir: I have the honor to submit the following report of the work done in and the condition of the department of mechanical engineering of this University.

The course of study remains substantially as developed under your direct charge while you were the head of this department. Technical instruction begins with the shop practice of the freshman year, which occupies two hours per day throughout the school year. The object of this work is to familiarize the student with the various tools and, by a carefully devised series of practice pieces, to give him the opportunity to acquire skill in handling them. Beginning in the pattern shop, exercises with the simpler carpenter's tools are followed by practice in wood turning and elementary pattern making. In the blacksmith shop, the forging of iron is practiced by drawing out, upsetting, bending, welding, making rings to size, etc. In the machine shop, a series of pieces of engine lathe work on iron, such as plain turning, taper turning, boring and screw cutting is followed by hand turning in iron and brass, and work with the planer, shaper and other machine tools; while at the vice-bench, extensive practice is given in filing and chipping cast and wrought iron. Both mechanical and civil

engineering students receive instruction in this elementary shop practice. During the present year the combined class has been so large that although it has been taught, as heretofore, in two divisions, the employment of an assistant instructor was made necessary.

The sophomore class of mechanical engineering students has worked in the shops nine hours per week during two terms. Beginning with the present year, this exercise will be continued through the third term. After several weeks in the foundry and blacksmith shop occupied in moulding, melting iron and casting, and in the forging and tempering of cutting tools for metals such as cold chisels, drills, and lathe tools, the class begins the actual construction of machines. This work, to which the remainder of the year is given, consists of making the patterns, moulding, casting, finishing, fitting and erecting some machine of which the shop is in need. During the past year three hand lathes have furnished practice for this class. These are now nearly finished, together with the countershifting, pulleys and hangers, and will be in operation by the end of the present term. Mr. E. A. Kimball continues to give the instruction in the shops.

In connection with this machine construction four hours per week during two terms are given to machine drawing and elementary designing. The student has learned the use of drawing instruments, and the principles of projection while studying projection drawing and descriptive geometry in the freshman year. He is therefore prepared to take up in the sophomore year the preparation of drawings of machines. The class first makes a working drawing to scale of some piece of machinery, such as a connecting rod, the general design of the piece being shown by a roughly executed blackboard sketch with written dimensions. After completing this drawing, the students are detailed to make sketches and take dimensions of parts of the machines in the shops from which they make working drawings. The remainder of the time given to this subject is occupied by working out the details, as far as their knowledge will permit, of some machine to be built in the shops. The object in this, as in all subsequent work in the drafting room, is to teach the student to think for himself as he works; to be systematic, to devise the simplest and most economical forms for patterns, casting and finishing, and to make not mere pictures, but clear and finished working drawings, which can be readily followed in the shop, and which shall be carefully marked with dimensions in the proper places to facilitate construction. All drawings are made, as far as practicable, of a uniform size. Drawings for practice are made on Whatman's cold pressed paper. Detail drawings of machines to be built are made in pencil on white paper and traced. Blue-prints for shop use are made from the tracings, which are preserved in the drafting room.

In the third term of the sophomore year, the subject of materials of engineering is taken up. This consists of descriptions of the various materials used by the constructing engineer, the methods

used in their manufacture or preparation, their characteristic qualities which make them valuable, the uses to which they are specially adapted, the forms in which they are found in the market, and their relative cost. A comparatively large proportion of the time is devoted to the discussion of the practical metallurgy, manufacture and physical properties of iron and steel, and proportionately less to the other metals used for structural purposes, alloys, timber, stones, cements, fuels, lubricants, belting and miscellaneous materials. This study is to a certain extent preparatory to, but in no way takes the place of, the subject of resistance of materials.

In the first term of the junior year, the study of the principles of mechanism occupies two hours each day. This includes the transmission and modification of motion irrespective of force, by link-work, belts and chains, gearing, cams, escapements, trains of mechanism, straight line motions, and epicyolic trains. One hour each day is given to the application of the principles taught by making drawings of rolling curves, spur and bevel gearing, cams, etc.

The subject of prime movers taught in the senior year comprises steam, air and gas engines, steam boilers, vertical and turbine water wheels, and wind wheels. The theory of each is analyzed and the proportions of parts, special uses and efficiency are thoroughly discussed. As a part of this study students work out many practical problems in detail, take indicator cards from engines in the neighborhood, and make such tests as the time will permit.

This study is followed by that of mill-work, which consists of the determination of the proper proportions of gearing, pulleys, belts, ropes, chains, shafting, and other parts of mill machinery which have not been previously discussed. The system of practical problems is continued in this as in other subjects.

Two hours a day are given to practice in designing during two terms of the senior year. A part of this time is devoted to valve motions for stationary steam engines, link motions and governors. The remainder is spent in designing a machine for some specific purpose, and in making the detailed working drawings necessary for its construction. This work is entirely practical, the object being to teach the student to apply the knowledge gained in the class room and shop, and at the same time to develope whatever inventive talent he possesses.

The class work in this school is concluded by the design and construction by the student of a model of some mechanical movement which becomes the property of the University, and has been regarded to a certain extent as a part of the required graduation thesis. While this work is valuable, it is thought that better results may be obtained by transferring the time thus spent in the shops to the sophomore year, making the shop work continuous during two years and substituting work upon machines for that upon models. The first students to be affected by this change are

the present sophomore class. When they reach the senior year it is proposed to introduce a new technical study which will consist of the consideration of several subjects of importance to the mechanical engineer, which have been but briefly touched upon owing to lack of time.

As already stated in this report, the freshman class which entered the shop last fall was so large that the employment of an assistant instructor became a necessity, although the class was taught in two divisions. By this means we can teach still larger classes satisfactorily, as the students can be distributed through the shops, some at the benches, others at the lathes, and so on; but with the sophomore class the case is very different. This class is engaged upon work which must be mostly done upon the machine tools, and it has required considerable planning to keep the students employed. A small increase in numbers will make this still more difficult. While the work of advanced instruction in the shop is thus embarrassed by the lack of tools, some changes in the arrangement of the building must be made before more tools can be added. Compared with modern manufacturing machine shops, our shop is crowded with tools, and when the three hand lathes now finishing are added, which can be done by some re-arrangement of machines, it will be completely filled. We need more engine lathes, a second and larger planer, another milling machine, and a small drill press, but we could not put any of these into operation in the room to which the machine shop is now confined. I think that the best plan for providing more space is that which you have suggested, viz.: the removal of the boiler from its present location and the addition of the space thus vacated to the machine shop. This would add about five hundred square feet to the shop floor space, and would greatly improve the form and lighting of the shop. The boiler should properly be placed in a separate boiler house and the coal shed immediately south of the shop building.

In this connection I would call attention to the condition of the shop boiler. It is a sectional or safety boiler, costing $1,000 when put in place in the fall of 1871, and has been in almost constant use since that time. It is not large enough to supply sufficient steam both for the engine and for heating the building in cold weather. It has been frequently repaired and although $120 were spent upon it last summer, an expenditure of about the same sum will probably be required next summer to put it into safe working condition. It is not worth removing and resetting, and I would therefore recommend that when the proposed re-arrangement can be made a new boiler of greater power and of simpler construction be purchased.

COLLEGE OF NATURAL SCIENCE.

REPORT BY THOMAS J. BURRILL, A. M., PH. D., PROFESSOR OF BOTANY AND HORTICULTURE.

S. H. PEABODY, LL. D., *Regent:*

I herewith hand you a concise account of the work done in my departments of the University for the year ending February 29, 1888. As usual the year has been a busy one, and it is believed substantial progress has been made. The most of my time has been occupied with class instruction and the routine duties connected with, and inseparable from, the several kinds of official work assigned to me. But something has also been done in original and other investigation, to which nearly all of the summer vacation was given. Special papers, largely based upon these researches, have been written for several State and National associations and published in their proceedings. Altogether the year has been prosperous and the work done equal to that of any one preceding.

Botany.—For entrance to the University, an examination is required upon Gray's "Lessons" or an equivalent, and upon the analysis of common flowering plants. Botany is not taught in the freshman year; but, beginning with the sophomore year, the students of agriculture, horticulture, natural history and chemistry, as well as those who elect the study from the course in English and modern languages take the science in course. Some students not taking any regular course are admitted to the class. The study (including the physiology of plants) extends through the year with five exercises each week.

The first work consists in the study, in the field and laboratory, of plants as species belonging to the more difficult orders of flowering plants, including Compositæ, Cyperaceæ, Gramineæ and the forest trees. Accompanying lectures are given upon systems of classification, geographical distribution, nomenclature and the economic uses of special groups. This is followed in the latter half of the term by the study of the microscopic anatomy of plants. For this purpose each student is furnished with a compound microscope, a section cutter and other apparatus, and at least six hours per week of laboratory work is required, alternating with lectures or recitations from text-book.

The winter term is devoted to what is called special morphology —the characteristics of groups of plants—beginning with the lowest and simplest, and taking in course all the great divisions of the vegetable kingdom, including what are commonly known as algæ, fungi, lichens, mosses, ferns, gymnosperms and angiosperms. Special attention is given to those of economic importance, and to those now demanding study on account of the injuries they cause. Among the latter are the bacteria and parasitic fungi. Constant use is made of the microscopes.

Vegetable physiology,—the study of the living plant in action,— occurs in the spring term. This subject is treated for the most part by the required reading of text and by lectures, the facilities and time for laboratory experiments not being sufficient for the purpose. But each student does follow through some series of observations or experiments and reports in writing the results.

Horticulture.—Instruction in the elements of horticulture is given in the winter term, five exercises per week. Lessons are recited from a text-book, together with an equal amount of instruction by lectures and practical illustrations. The most prominent topics are fruit growing and handling, gardening, forestry and special diseases of plants. Practice is had in pruning, in various methods of propagation, as root-grafting and propagation by cuttings (in the greenhouse). Examples are found and made use of in the tree plantations, vineyards, small fruit plantations, etc., upon the University grounds.

Landscape Gardening.—This is taught during the spring term by lectures and practical work. After a study of the materials, including grass, trees, flowers, substances used for walks, drives, fences and other architectural structures, the methods of designing and drawing plans are taken up and put into practice. Each student leaves at least one design made by himself for the treatment of either a real or imaginary well described lot, farm, park or garden.

Other horticultural subjects are named in the catalogue and are taught when there is a call for them. A special year of horticultural study may thus be taken.

Microscopy.—Students in the chemical and natural history courses have a special term's work and instruction in the theory and use of the compound microscope, and in the preparation and mounting of objects. Special attention is given to the construction of the instrument, the methods of testing the optical qualities, of measurements of magnifying power, and angle of apperture, etc. Students practice drawing with and without a camera lucida, and have a chance to learn something of micro-photography. A large part of the term's work is laboratory practice—two hours per day. Most students give much more than the required time to the study. Each leaves specimens of his work in the cabinet of the University.

Physiography.—During the autumn term members of the senior class in agriculture, chemistry, natural history and ancient languages take this study. The name is one of wide application. The subject as taught is intended to be a generalization of the natural sciences applied to the physical history of the earth and to the great facts concerning vegetable and animal life. An introduction to anthropology is also included. The books most nearly indicating the course are: Winchell's World Life, Wallace's Island Life, Tylor's Anthropology and Marsh's Man and Nature. Numerous works of reference are consulted by the students and written abstracts of certain ones are required.

Biology.—This term is used in the senior year of the course in natural history as one of general meaning, and students are allowed to select some special subject and make a careful and as exhaustive study as possible upon it. Those selecting botanical subjects receive instruction from me; and as much time and attention as practicable is given to them, though each one pursues his investigations quite independent of the regular class methods.

Besides the class-room work as above detailed, the general supervision of the field work in the horticultural department requires considerable time and thought, and the increasing number of inquiries by letter and otherwise upon topics legitimately connected with my work demands long hours of examinations and reports.

During the two years since the last published account, much work has been done under my direction upon the herbarium. The collections of a number of years had accumulated without arrangement or mounting. These are mostly prepared for the permanent cabinet, placed in new genus covers and are now in the cases. A considerable number of duplicates have been collected during the summer vacations and several exchanges have been made. A notable donation of European plants was received from Miss Augusta Butts, a graduate of the University. A valuable collection of grasses has been received from Dr. George Vasey, Botanist of the United States Department of Agriculture.

The collection of woods made for the New Orleans exposition is now in order in the agricultural and mechanical museum. This is a valuable and attractive addition to our botanical and economic collections.

An additional room has been refitted for the use of myself and students. This is specially devoted to microscopical investigations and to the "cultivation" of bacteria and kindred organisms. For the latter purpose a number of pieces of apparatus have been received from Germany, and others have been added by home manufacture. One of the renowned "appochromatic" objectives of Zeiss (Germany) and "compensating" eye-pieces have been added to the microscopical outfit of the laboratory. This new objective proves to be of special service in certain kinds of work. At first it did not seem to meet our high expectations, but further use has demonstrated its superiority in the features claimed by the manufacturers. Extra facilities have also been added for micro-photography.

REPORT BY WILLIAM MCMURTRIE, E. M. PH. D., PROFESSOR OF CHEMISTRY.

S. H. PEABODY, PH. D. LL. D., *Regent University of Illinois.*

DEAR SIR—The operation of the department under my charge, during the year just closed has been in every way satisfactory and gratifying. The students pursuing the course of chemistry, both regular and special, have numbered about the same as in previous years, and they have shown commendable interest and industry, both in the laboratories and in the class rooms. The several courses have been carried along according to the plans adopted for the previous year and have proven the wisdom of the provisions made for them. In the class in agricultural chemistry the text books used, Johnson's "How Crops Grow" and "How Crops Feed," excellent in their way and classical in many respects, have been discarded because they were published in advance of many of the developments in the science in the past decade, and because much of the material therein offered is furnished in the course of vegetable physiology in the department of natural history; and a course of lectures, intended to cover the standard principles as well as the later discoveries and advances, has been established. The general plan of work heretofore used has, however, been adhered to. The interest manifested by the class in the subject has been particularly gratifying.

I desire to renew my recommendation of last year with regard to the salaries of the assistants in the departments, and to testify to the efficiency of the present incumbents. The difficulties heretofore described still obtain, and the offers of increased compensation from other sources make it hard to secure and retain the services of young men of the standing and preparation the work necessarily requires. I would, therefore, respectfully urge upon yourself and the honorable Board of Trustees of the University the importance of careful consideration of this matter, and of making provision whereby the difficulties in question may be met and overcome.

I would recommend the usual appropriation of six hundred and fifty dollars ($650.00) to be expended in importation of supplies of apparatus and chemicals for the coming year.

REPORT BY STEPHEN A. FORBES, PH. D., PROFESSOR OF ENTOMOLOGY AND ZOOLOGY.

DR. S. H. PEABODY, *Regent.*

SIR—According to your request for a concise report of the work of my department, showing the changes made, the scope and extent of the subjects, the items made prominent, and the ends

sought to be obtained, I beg to offer the following as my report on the instruction work in zoölogy and entomology for the past year.

The work of instruction is divided between Assistant Professor Garman and myself in a way to give him personal charge of the students' laboratory, while I deliver the lectures and conduct the quizzes and examinations. Professor Garman has, however, entire charge during my absences from the University, working, of course, according to an outline prescribed in advance. He has given much of his time to the preparation of a series of mounted alcholic specimens of comparative anatomy, illustrating the University class work in zoölogy; to the mounting of a series of microscope slides prepared for a similar purpose, and to the preparation of students' guides to the anatomy of the typical forms dissected.

As the zoölogical course in the school of natural history has undergone important modifications since 1884, but now seems to have reached about the proper limit of its development, it may be well to give a general account of it as it now stands. Besides contributing an important element to a liberal scientific education, the course has been especially planned with a view to laying a foundation in biological work and study for a course in medicine, and to prepare for the teaching of zoölogy as a specialty, and for special work in zoölogy and general biology as a scientific career.

It now requires two hours' work a day for three terms, with an additional required term for those who elect a zoölogical subject under the head of biology; and two terms of elective zoölogy conditioned in the same way. It includes, therefore, two hours' work a day for a minimum of one year and a maximum of two.

The first and second terms are devoted to the zoölogy and embryology of invertebrates, and the third to vertebrates. The entire course covers the classification of animals, with much descriptive analytical work, together with their anatomy, histology, comparative physiology, and embryology.

A new text was introduced two years ago, and has been found well adapted to our course—Sedgwick's translation of Claus' *Lehrbuch der Zoologie*, in two volumes of nine hundred and sixty pages. This text is used in connection with a course of lectures, and is supplemented by numerous analytical synopses furnished the students in cyclostyle print. The lectures are illustrated by charts, diagrams, drawings, and anatomical and microscopical models and preparations. As our students are not commonly sufficiently skilled to take full and trustworthy notes of lectures, I have adopted the practice of furnishing in cyclostyle print a syllabus of every lecture; and each lecture and text-book lesson is followed by a quiz.

The laboratory work includes the careful dissection of a series of typical animals and the microscopical study of the embryos of selected types; and involves much practice in drawing and description.

The students are likewise exercised in the determination and description of species in the most important groups. A students' "laboratory guide" has been prepared by Professor Garman and myself. The special disciplinary results of the study are sought partly in such field and laboratory work as may serve to train the student to the skilled interrogation and interpretation of nature, and partly in a progressive complication of the subjects of study, made by requiring regularly elaborate comparisons between each group or subject studied and related or contrasted subjects preceding, these comparisons being so directed as to compel the student to arrange the facts of his knowledge in another order from that in which he has acquired them. It is hoped that zoölogy may, by such methods, be made a means of mental discipline not less efficient and valuable than the classical and mathematical studies, and of a sort not to be divided so readily from any other subject.

Our students now lack opportunity for practical field work and for the study of living animals, especially of the lower orders. This deficiency I hope to supply indirectly and in part by establishing upon the Illinois river or upon some of the Illinois lakes an *observing station* of the State Laboratory of Natural History, to be kept supplied during the summer months with every thing necessary for continuous and elaborate studies upon the structure and development of aquatic animals. This observing station I propose to open to such advanced students of the University as will devote some or all of their vacation to it.

No students were due in the biological work for this year, but those who reported to me last year spent their first term in work intended to bring their zoölogical course up to the grade of that now in operation, and the second term in special study preparatory to the graduating thesis. The first term in biology will hereafter be devoted by my students chiefly to laboratory histology and to practical work on the embryology of the chick and selected invertebrate forms, supplemented by a course of reading on these subjects and on the general principles of biology.

Concerning the work of the classes in entomology and in general zoölogy, I have nothing new to report at this time. Certain tentative changes have been introduced, but the work in neither class can be said to have reached its final form.

The course in general zoölogy, taken chiefly by the literary students, consists of one hour's work a day for a single term. It labors under the disadvantage of insufficient time for so extensive and elaborate a subject as modern zoölogy has become. Divided as this now is into several branches, each of which is as extensive and difficult as all zoölogy was not many years ago, it is not easy to select from such a wealth of material even a fairly sufficient outline for presentation in a single term. I meet the requirements of this general course as well as I can, by providing enough laboratory practice to give reality to the instruction; by giving in lectures the more important and interesting features of the com-

parative anatomy and the classification of animals, and by affording some opportunity for the determination and study of species in ornithology; and this is done with the hope of interesting the students to some extent in the observation of the animal life of their neighborhoods. Many of the principles of general biology are introduced and discussed from time to time in connection with those parts of the course best calculated to suggest and illustrate them. Quizzes and examinations are based largely on cyclostyle outlines of lectures and on the students' own notes of his laboratory work.

The entomological work labors under peculiar embarrassment from its position in the course. It is, in fact, one of the most difficult and complicated branches of zoölogy; but is now taught to students in their freshman year, before they have had any zoölogy whatever. I am satisfied that neither the natural history nor the agricultural students derive the benefit from this subject which they would receive if it came in the corresponding term of the sophomore year; but the difficulty of changing the position of a single study in a programme so complicated as ours makes me hesitate to ask that any change be made. It is proper, however, that I enter this plea, to be taken into account whenever circumstances may require the arrangement of studies to be recast.

At present I aim to give the students of entomology a knowledge of the general features of the anatomy, physiology, and classification of insects, chiefly by lectures; to give considerable practice in the collection, preservation and determination of specimens, and to make the class acquainted with the life history and economic relations of a moderate number of the species most important to agriculture and horticulture.

The University collection in entomology—largely increased in the last two years—has been removed to the students' laboratory, thoroughly overhauled, relabeled, and rearranged, and made a model collection for reference and imitation.

I am pleased to notice that with the increasing difficulty of our courses the average ability of the students in my classes, both general and special, has very decidedly improved. The spirit of the students is excellent, on the whole, and the results of the work are gratifying.

REPORT BY CHARLES W. ROLFE, M. S., PROFESSOR OF GEOLOGY.

DR. S. H. PEABODY, *Regent:*

DEAR SIR:—I herewith present my report as professor of geology and physiology for the year 1887–88:

During the first term a class composed mainly of sophomores from the colleges of agriculture, natural science and literature and science, was instructed in anatomy and physiology.

The members of this class came to the work with such general knowledge of the position and use of the various organs as is usually gained in an elementary course, and in addition about one-fourth the number had received a thorough training ln zoölogy.

The term covered a period of fourteen weeks. During this time an attempt was made to confine the attention of the class to such subjects as would be most useful in their after life. Hence, while reasonable time was given to skeletal anatomy and the special senses, the viscera, nervous system, and the problems of secretion, nutrition and energy were much more thoroughly studied.

The functions of the simple cell were made the central idea of the course. Each organ was looked upon as a collection of such cells, enclosed in and supported by a skeleton of connective tissue. The peculiar grouping of these cells, and the adaptation of their arrangement to the work to be performed, were carefully taught and fully illustrated by microscopic sections, while the modifications which the functions of the simple cell undergo in consequence of division of labor were thoroughly studied.

Martin's Human Body was the text used, but this was expanded and brought abreast of the times by lectures, readings from standard authors and study of the manikin, anatomical plates, alcoholics and fresh dissections.

The arrival of a complete manikin, made by Auzoux, of Paris, has added much to the apparatus for instruction.

Tho preparatory class, in two sections, used Cutter's Comprehensive Physiology as a text, and during the term did considerably more work than is usually accomplished by a beginning class.

The greatest need of the department just now is more room.

During the second term a class of juniors, most of whom were from the schools of agriculture, natural history, and mining, was instructed in geology.

As the forces which are now operating to produce changes in the earth's surface, and within its supercrust, are believed to be the same which have operated throughout geologic time, they having varied in intensity only, it is believed that an acquaintance with these forces, their ways of working, and the magnitude of the results which they are able to accomplish, is essential as a preparation for the study of geology proper.

In accordance with this, a considerable portion of the term was devoted to a study of these forces and their tool-marks, and a comparison by means of these marks of their present vigor with that which they showed in former times.

As a further preparation, a careful study was made of the principal rocks which enter into the supercrust, and each group was referred to the force or combination of forces which produced it. In this way the students were led so to connect the characteris-

tics of rocks with the forces which were in operation when they were formed, that their appearance alone would suggest much concerning their history.

These subjects, with a review of the means by which the geologist ascertains the relative ages of rocks, occupied two hours per day during the term.

In the third term, this class will devote the greater portion of its time to the evolution of the continent of North America. Each period will be studied with reference to the kinds of rocks deposited, and their distribution; the origin and distribution of its economic products, and the inferences to be drawn from these as to elevation, climate, oceanic currents, mountain making, and the succession of living forms.

In addition to this a daily exercise will be given in the identification of fossil forms, the interpretation of sections, the making of maps, or some kindred subjects.

This work will occupy two hours each day during the term. Dana's Manual is the text.

During the second term the senior class in mining engineering was given a course in economic geology. The instruction was entirely by readings and conversations, and embraced the origin, distribution, essential characteristics, and production of geological substances used as abrasives, pigments, fictile and structural materials, combustibles, ores, etc.

During the third term the seniors from the schools of English and modern languages, ancient languages, chemistry, and civil engineering, will be given a rapid review of the entire subject of geology.

The aim will be to put before the class, by means of lectures and selected readings from the text (Dana), the best established facts of geological science, without entering much into detail or argument. This will be supplemented by exercises designed to give some familiarity with the principal groups of rocks and of fossil forms. Two hours per day will be given to this class.

The apparatus for instruction in geology has been increased during the year by about eight hundred specimens of rocks and minerals, and a fine collection of fossil plants.

Lack of room is a serious embarassment to the work of this department.

The preparatory class in elements of botany is also taught during the third term, Gray's Manual and Lessons being the text.

COLLEGE OF LITERATURE AND SCIENCE.

REPORT BY EDWARD SNYDER, M. A., PROFESSOR OF MODERN LANGUAGES.

DR. S. H. PEABODY, *Regent:*

DEAR SIR: I have the honor respectfully to report that no changes have taken place in the department of modern languages, in plan or methods of instruction during the past two years.

The instruction extends over two years of German and two of French. There are six classes, of which I teach four, viz.: two divisions of the first year's German, one of second year's German, and one of second year's French. Mr. Carl E. Eggert teaches the first year's French in two divisions.

Grammar and syntax are thoroughly studied in both languages during the first and second terms of the first year; in the third, readers are used, and the grammar reviewed by means of analysis.

In German, the second year's class reads "Klemm's deutsche Literatur Geschichte" during the first term; Körner's "Zryni," Schiller's "Wilhelm Tell," or "Jungfrau von Orleans," Göthe's "Iphigenia auf Tauris," and Lessing's "Nathan der Weise," during the second and third terms. In the second year of French we read Pylodets "Literature francaise contemporaine" in the first term; during second and third, Corneille's "Cid," Moliere's "Misanthrope," Racine's "Athalie," and About's "Roi des Montagnes," or de Tocqueville's "Paris en Amerique," or equivalents.

Translations from English into German and French are required weekly in the third term of the first year, and all through the the second year. The language taught is used in the class room by teacher and pupils for criticism, corrections, and grammatical analysis, so far as possible during the second and third terms of the second year. Everything is done to bring the instruction up to the standard of linguistic drill aimed at in the study of the ancient languages. Of the three phases, so to speak, of language study, "reading, writing and speaking" the first, of course, receives most attention, to give the students the use of the language in the

pursuit of their special studies; and, by adequate and smooth English translations, to subserve the acquisition of readiness of expression in their own vernacular.

The weekly translations serve the purpose of synthetical work, growing in scope and length as the course progresses. One recitation every week is given to their correction and criticism.

As far as speaking, all is done that time allows, but at best only a fair beginning can be made.

REPORT BY JOSEPH C. PICKARD, M. A., PROFESSOR OF ENGLISH LANGUAGE AND LITERATURE.

S. H. PEABODY, LL. D., *Regent:*

I herewith present the biennial report of the department of English language and literature for the years 1886-7 and 1887-8—its work, its aims and methods.

The work of instruction in this department has been substantially the same as that detailed in my previous report for the academic year of 1885-6. But one change has been made in the order of studies; instruction in rhetoric, previously given in the spring term of the freshman year, is now given in the fall term of that year, and the study of American authors and that of British authors have been carried forward to the winter and spring terms. The change was made to meet the wants of students in other schools. It proves, however, to be to the advantage of my own pupils.

It is sought to secure for the pupils a fair acquaintance with the treasures of our literature; to awaken an eager desire for constant enrichment therefrom, as they shall have opportunities for acquisition in their post-graduate years; to make the course of instruction of some special service to those who may enter on literary or journalistic life; to cultivate a taste for that which is best in literature, and in these years of student life, to make sure of an acquaintance with the master minds of the English-speaking race, which must prove a formative power for good.

Text-book work is accompanied by lectures, more frequently given the last two years than before. Since Professor Brownlee entered on the labors of his professorship, he and myself have endeavored to work with mutual understanding, and to re-enforce each other's instruction. His work, I am glad to say, has been of much service to the students under my charge. It has made it possible for me to lay heavier burdens on my classes, burdens which classes in previous years were not qualified to bear. I ought to add that the students who entered this department at the beginning of this current year have proved unusually well qualified for their work.

The additional work required has been in the line of original research, of critical study, and in the writing of essays embodying the results of their reading, with criticism of the authors read. In some cases I have assigned themes suggested by class-room work, and the essays have been read and discussed in class. To one class was assigned the work of editing one of Bacon's essays. The experiment was fairly successful, and will be repeated with other classes.

It is to be hoped that coming years will bring us young men and young women thoroughly grounded in the elements of English, and with larger acquaintance with the Latin than possessed by the most of those who have hitherto come into the school of English and modern languages.. More efficient work could be done if in addition to a knowledge of United States history there were also required of candidates for admission to this department, a knowledge of at least the outlines of English history.

REPORT BY JAMES D. CRAWFORD, M. A., PROFESSOR OF HISTORY AND ANCIENT LANGUAGES.

DR. S. H. PEABODY, *Regent:*

SIR: I make herewith my report as professor of history and ancient languages.

As professor of history, I have had charge of the classes in general history, three terms, history of civilization, one term, and constitutional history, one term—making five terms of historical instruction in the year.

In ancient languages I have had charge of the classes in Greek, those in Latin being in charge of the professor of Latin.

The attempt is made in the course in history to give as full an outline as possible of the historical nations of the East and of Europe, connecting events philosophicaliy, showing how cause and effect, natural law, work in the lives of nations as of individuals, and that history is one continuous whole.

What has been gone over in the three terms of general history is gathered up in the term of history of civilization. The attempt is made also to show that civilization advances by instrumentalities, by individual effort, and that future advances can be made only in the same way, the responsibility resting on each person to aid this advance being emphasized for the class.

I have considered that the study of history should not only give information as to what has been done in the past but should have the practical result of making better citizens, better men and women. I have not attempted to gain this end by preaching abstract morality but through the lessons of history itself. The

classes in history have numbered from twenty-five to forty and I have found them, in the main, ready to do good, hard work, and to do it intelligently.

The classes in Greek have been small and have as a consequence lacked the enthusiasm of numbers. They have read during the past year from Homer, Xenophon, Thucydides and Sophocles.

The work of my classes as a whole during the year has been fairly satisfactory. In no cases have I found anything but the best of disposition and thorough good will.

REPORT BY JAMES H. BROWNLEE, A. M., PROFESSOR OF RHETORIC AND ORATORY.

S. H. PEABODY, LL. D., *Regent, University of Illinois:*

DEAR SIR: In compliance with your request, the following report for the year closing March 1, 1888, is submitted from the department of rhetoric and oratory:

Whatever a man's calling, he has need both to write and to speak well. Hence the objects which this department is endeavoring to accomplish are two, namely: first, to develop in each student of the University the ability to express his thoughts correctly and effectively *with the pen*; second, to develop in each the ability to convey his ideas naturally and impressively *with the voice.*

All students are required to pursue the course that has been adopted in order to obtain, if possible, these important ends. The work prescribed extends throughout the four years of student life, the first two years being given to practice in English composition, the last two being devoted to training in oratory. Each of the four classes is divided, for convenience in recitation, into sections of about twenty members, and each section meets the instructor one hour a week.

After this general statement of the aims, requirements, and divisions of the work of this chair, a more detailed explanation of the character and methods of the work may still be appropriate. In furnishing this, consideration shall be given first to the course in theme-writing, or composition.

The number of themes, or essays, required from a majority of the freshmen, is twelve. From those who study formal rhetoric one term of the year only eight are required. The number of essays required of the sophomores is also twelve. The classes have exercise in abstract, or *precis*, writing as well as practice in the various forms of composition, narration, description, exposition, argumentation, and persuasion. For some of the papers, the student chooses the subject; some times the topic is assigned him; and occasionally, its outline, or skeleton, also. The essays, after correction, are handed back to the students to be carefully re-

written and then returned for the final inspection of the instructor. And, so, as "revision is a new creation," a majority really prepare forty-eight themes each, varying in length from 1,500 to 2,000 words, while none write fewer than forty. It is believed that the amount of practice thus secured, provided it be intelligent, can scarcely fail to make the student as complete a master of the art of writing as he is capable of becoming in his youth.

The alliterative and worn saying, "Practice makes perfect," like most other proverbs, is only a half truth. Practice in any art or craft, if unreasoning and blind, so far from increasing skill, not unfrequently is positively injurious. Practice is the parent of dexterity only when it is enlightened: it "makes perfect" only when intelligent. Therefore, an effort is made to furnish such instruction in the rules and canons of good writing as is calculated to make all practice intelligent and improving. In the weekly meetings of the sections, the merits and faults of the essays previously corrected are pointed out and the rhetorical laws that have been violated or observed plainly set forth and illustrated. Thus, incongruity of figures, faults in the choice and in the disposition of words, errors in punctuation, etc., are talked over and corrected. In addition to this very practical and helpful criticism, two lectures are delivered before the entire class upon the first and the middle week of each term respectively. The topics thus treated, I need scarcely say, bear directly upon the work of the ensuing half term. For example, before assigning to a class the composition of a narrative, exposition, or argument, the qualities of a good narrative, or exposition, or argument, are considered and illustrated by readings. Appreciating, also, the truth, that the first step in the acquisition of an art is the close study of models worthy of imitation, some of the lectures concern the famous masters of English prose, whose works are commended to the student's attention and whose distinguishing excellencies are dwelt upon and made plain by extracts read from their writings.

Sufficient has been written, I trust, to convey a fair idea of the scope and methods of the theme-course in this University. It remains now for me to speak more in detail of the course in oratory.

As stated above, this extends over the last two years of the student's college career. Oratory, like the other arts, assumes its most engaging form when presented in the concrete. Hence, several orations of Mr. Webster are read aloud by the students with just pronunciation, phrasing and emphasis, and an analysis made both of the thought and the expression.

Since "in oratory all things succeed as they are delivered," during one year, the junior, the chief share of attention is devoted to that part of oratory, as wonder-working as fascinating, called delivery. A graduated series of exercises is employed calculated: (1) to increase the chest capacity of the student, thereby deepening his respiration; (2) to suppress the bad and develop the

good qualities of his voice, giving it purity, strength and flexibility; (3) to perfect his pronunciation, making it accurate and exact; (4) to give his action propriety, boldness and grace, and (5) to cultivate and refine his taste and imagination.

During the senior year, while elocution is not neglected, the greater share of attention is devoted to the other division of oratory, the subject-matter. The oratorical style of composition is analyzed and the characteristics distinguishing it from ordinary prose enumerated, the kinds of oratory, demonstrative, deliberative, judicial, and sacred, discriminated, the qualifications of an orator, physical, mental and moral, expounded, and the lives of the greatest orators of the world made the subject of consideration. In addition, each senior is required to write an original oration and, after making full preparation for its delivery under the professor's criticism, to pronounce it in chapel before the Faculty and students.

For this, as for the course in composition, provision is made for two lectures each term.

It is a pleasure to inform you before concluding that the quality of the work done during the year just closed has shown a decided improvement over that of the preceding year; and that, with few exceptions, the students have performed all duties required of them both cheerfully and intelligently. The increasing interest of the students in this department is not only an ample reward for all my anxiety and toil but is a hopeful indication of its greater efficiency in the future.

As I close, I desire, sir, to express my grateful sense of the generous sympathy you have shown in the work of this department and my appreciation of the wise counsel so often received from you.

Report by Rev. Nathaniel Butler, Jr., A. M., Professor of Latin.

Dr. S. H. Peabody, *Regent:*

Dear Sir—I have the honor to offer the following report of the work of the classes in Latin since September 1886, at which time I was placed in charge of that department of instruction.

The University of Illinois offers instruction in Latin to classes of four grades; namely, the preparatory, freshman, sophomore and junior classes. All of this instruction has been demanded during my connection with the department.

The course of study followed is that laid down in the catalogue. The preparatory class read selections from the orations of Cicero, and from the Æneid of Vergil. Along with this reading they have regular exercises in Latin prose composition, and there is constant

and careful drill on forms and constructions. Attention is also given to the study of Latin as the source of a large part of the vocabulary of our own language.

The freshmen read Cicero, "De Amicitia," Livy, and the Odes of Horace. Special attention is given, in daily translation, not only to a careful study of the thought and style of the author, but also to the mastery by the student of sentence construction and to the formation of a clear and simple English style of expression.

The sophomores read the satires of Horace, the Tusculan Disputations of Cicero, and the Germania and Agricola of Tacitus. The drill of the previous years is continued and a study is made of the formation of compound and derivative words, as illustrating the making and meaning of a very large proportion of English words.

The juniors read the satires of Juvenal, the Institutes of Quintilian, and the De Officiis of Cicero. In the winter term of 1888, Lucretius was read instead of Quintilian. The attempt is made to add to the drill previously undertaken, greater facility in turning Latin, at sight, into well made English. A brief survey is made of the history of Latin literature, and, so far as time will permit, of Roman life, morals, education, and politics. Throughout the course brief dialogues are read as well as other pieces not in the prescribed course, and students are encouraged to read histories and works of criticism bearing upon the times and authors which they study.

It is the aim of instruction in this department to make the study of Latin helpful to the student in three principal directions: as an instrument of training; as a means of improving the student's knowledge and use of English; and as a branch of knowledge. It is held that, in the education of men and women, training is no less important than information. It is believed that the study of Latin has a value as a branch of knowledge, but a far higher value as a means of discipline. The study of its almost perfect sentence-structure and of its systems of word building calls into constant use the student's power to observe closely and to discriminate carefully, forming in time the habit of accurate observation —the "scientific habit."

It is believed that a good English style, as well as clearness of thought, can be gained in no way better than by persistent effort on the part of the student to grasp fully the thought of a great author, and to clothe that thought in simple, correct, idiomatic English of his own making. This effort he must make with every sentence. It is not forgotten that there are more important things in life than the translation of a page of Latin, or, indeed, than determining a mineral or a plant, or solving a mathematical problem; but there are few things more important than the *habit* of *accuracy* in thought and expression, which may be formed in doing these things as they should be done. The study of Latin is thought

to offer peculiar advantages in this direction. Further, the fact that the English draws a very large proportion of its words from the Latin, and that the study of Latin words throws much light upon the formation and meaning of English words, gives the study additional value as bearing upon the student's knowledge and use of English.

The attempt is made to render this study valuable also as a branch of knowledge. By reading the great Roman authors the student is brought into intimate acquaintance with the thought and life of an age that has had a profound influence upon the life and thought of our own times. The collateral reading and discussion to which this leads is believed to be of service in enlarging the student's horizon and raising the tone of his thought.

In short, the attempt is made in this department to study Latin, not that the student may read the literature and learn to speak the Latin language—ends which, in themselves would not to-day justify the necessary means,—but that the study may assist in rendering his mind quick, sure, accurate in *all* its work; that it may increase his knowledge of English and his skill in its use; and that it may give him a high standard of taste in thought and expression, and a broader horizon of thought.

The attention of teachers is earnestly called to the need in this, as in every branch of study, that the work preparatory for college may be most carefully done. The extent to which the study of Latin in college can be made of real value to the student, depends greatly upon the thoroughness of his first year's work.

I am glad to report a very satisfactory degree of interest and diligence on the part of students in my classes in doing the work required of them. I am encouraged to believe that the ends explained above have, in some degree, been accomplished, and the study of Latin made to contribute to good work in other departments.

SCHOOL OF MILITARY SCIENCE.

REPORT BY CURTIS B. HOPPIN, FIRST LIEUTENANT 2D CAVALRY, U. S. A., PROFESSOR OF MILITARY SCIENCE AND TACTICS.

To the Regent, University of Illinois:

DEAR SIR: In compliance with verbal instructions from your office I respectfully submit the following report of the military department of the University now under my charge.

In accordance with orders from the Adjutant General, United States Army, I reported to you for duty Sept. 1, 1887, since which time I have been continuously under your orders.

At the beginning of the fall term four companies, A and B, old students, C and D, new students, averaging 60 men, were organized for chapel formations and drills.

During the fall term companies A and B were drilled Tuesdays and Thursdays in the school of the company, and in the ceremonies of guard mounting, inspection and dress parade; also in the posting and instructing of sentinels. The aim in these drills being to instruct the student as far as practicable in the actual duties of the soldier. Companies C and D drilled Mondays, Wednesdays and Fridays in the school of the soldier, including the setting up drills, marchings and the manual of arms. The drills from the 1st of November until the end of the fall term were short, owing to the fact that the hall is not lighted, for during the short days of that season it was impossible to see after 4:30 p. m., most of the time.

Drills for the winter term began February 6th, owing to cold weather previous to that time, and have been confined to the manual of arms and to the school of the platoon and company.

The aptitude of the American youth in matters military is well illustrated here, as I am sure it is in every school of the kind in the country, the great stumbling block being a lack of discipline which is hard to remedy. Theoretical instruction is given as follows:

Sophomore Class—Fall term, school of soldier and the company.

Winter term, skirmishes, school of the battalion and ceremonies.

Junior Class—Fall term, school of the battalion, skirmish drills, and ceremonies.

Winter term, review of field fortifications, field intrenchments, defense of buildings, hedges and all cover available; the general rules governing the selection of camps, bivouacs and also those governing marches; courts martial and many minor duties of army administration; the treatment of mobs and general modes of defense against the same. These latter subjects have been taught from text books and through informal lectures upon the different subjects. The length of time which could be devoted to each has necessitated a cursory treatment of each, but enough has been done to put the student on the right road, I hope, and enable him at least to study intelligently in future.

The necessity of rapid movement and hasty intrenchment of troops to meet the improvements in arms and ammunition has been impressed, rather than the deliberate, mechanical movement, which was possible at the time many of our books of instruction were published.

I respectfully recommend the following:

1. That a surgeon be employed, and paid, if possible, by the University to examine all students claiming to be diseased and wishing to be excused from drill. The method now in vogue necessarily puts much distasteful work upon the Regent which might very properly be delegated to a surgeon of known ability and character, removing, at the same time, the possibility of injustice in either direction.

2. That some means be provided for lighting the drill hall during the drill hour from November 1 to the end of the fall term. This I consider especially important for the new students as the time for their instruction is necessarily very short before they are admitted to the battalion.

I wish to extend my thanks to yourself and the members of the University Faculty for the consideration shown me in attempts to improve the discipline of the battalion under my charge.

SCHOOL OF ART AND DESIGN.

REPORT BY PETER ROOS, PROFESSOR OF INDUSTRIAL ART AND DESIGNING.

To the Regent and the Board of Trustees of the University of Illinois,

GENTLEMEN: With few exceptions, the students that enter the scientific courses of the University do so without any previous knowledge of drawing. This knowledge is as essential to the professional naturalist as to the mechanical or civil engineer. The University of Illinois was foremost in recognizing and providing art instruction, not alone for students in science, but also for those who have talent and taste for the study of drawing, designing, clay modeling, and painting. These well defined purposes, for which the school of art and design was established, have been the object of my earnest and pleasant endeavors during my connection with the University.

Free-hand drawing has, as you are aware, been required from the outset in the courses of architecture and civil and mechanical engineering. Two years ago additional demands upon the art department came from the school of mining engineering; and somewhat later the college of natural science awoke to the importance of having drawing a required study for two terms in the course of chemistry, and two terms and one optional term in the course of natural history. The art instruction required by the several schools is at present as follows:

FALL TERM.

School of chemistry	first term
School of natural history	first term
School of architecture	first term

WINTER TERM.

School of agriculture	first term
School of chemistry	second term
School of natural history	second term

SPRING TERM.

School of mechanical engineering	first term
School of mining engineering	first term
School of civil engineering	first term
School of architecture	second term
School of chemistry	third term
School of natural history	third term
School of modern languages	first term

The arrangement, as shown above, may in the future prove a hindrance to the progress of the art department instead of an aid as intended. No inconvenience has thus far been experienced, though better results could, doubtless, be attained if all students of the same grade were to receive their instruction in one term as in other departments.

With the approval of the Regent, a plan of instruction extending over three terms has been adopted whereby the students may acquire the use of materials and mediums and a primary knowledge of perspective, light and shade, color and designing. The instruction is by means of illustrated lectures, object lessons, and criticisms.

The duty assigned my assistant is to give individual attention to the minor needs of students while they are working out the problems. When a fair degree of aptness in the use of materials has been reached, the problems are varied according to the course the student has selected; for instance, natural history objects serve as motives for the students in the natural history course; while students in mechanical engineering find geometrical models and parts of machinery the most profitable subjects. In this connection, the use of a few simple machine models, such as could, perhaps, be spared from the shops, would be a desirable addition to the equipment of the department.

The classes in advanced drawing, designing, clay modeling and painting become larger each year. To most students art has a fascination. They consequently study not only to profit but also to enjoy. It is safe to believe that no parents grumble because their boys can show a plaster cast of a clever piece of their own handiwork or because their daughters bring back from college a few cheerful pictures showing their artistic training. It is not difficult to convince a man that it requires a cultivated brain and a trained hand to design and execute these relief panels, capitals, and medallions in common soft clay, and transform the same into a harder substance. It is accomplished by manual skill, but not by manual skill alone. So, too, in the still more attractive exercises in tempera and in oil colors, no one can hope to succeed without an educated eye nor to excel without a dexterous hand.

The refining influences that the mind derives from the study of art are now everywhere in our higher institutions recognized as indispensable to a liberal education. Says Schiller, in his poem addressed to artists:

> "The bee may teach thee an industrious care:
> The worm, in skill, thy master thou must own:
> With higher spirits, *wisdom* thou dost share
> But *Art*, O man, hast *thou* alone."

It is gratifying that we can point to so large a number of worthy specimens wrought by our students in clay, in chalk, and in colors; and it is a pleasant thought that the future of industrial and fine arts in this country has never been more hopeful than at present both from an educational and commercial standpoint. The people of the State of Illinois have indeed reason to be grateful to the Board of Trustees for the fostering care bestowed upon this department.

LIBRARY.

REPORT BY JAMES D. CRAWFORD, A. M., LIBRARIAN.

DR. S. H. PEABODY, *Regent:*

SIR: I have to report in regard to the library of the University as follows:

Since my last published report, dated March 1, 1886, there have been added to the library, one thousand two hundred amd ninety-eight volumes, not including the periodicals for 1887, which will add one hundred and fifty volumes more when they are bound. Of this number, seven hundred and twenty-four volumes were added in the year ending March 1, 1887, and five hundred and seventy-four volumes in the year ending March 1, 1888, making the total number of volumes in the library at the latter date seventeen thousand two hunnred and eighty-three.

In purchasing books for the library, the same plan has been followed as for some years past. The matter of purchase has been referred by the Trustees to a committee consisting of the Regent, Business Agent, and Librarian. This committee has apportioned, as equally as might be, the amount to be expended among the several departments. The State appropriation for the library has been fifteen hundred dollars a year, of which about five hundred dollars has been expended in the purchase of periodicals and in binding, the remaining thousand dollars being spent for books.

The professors in the several departments have been requested to prepare lists of books that they thought desirable for the library, and, as far as possible, these books have been purchased. The final list of books desired has been submitted to several dealers in books for prices, and the order has been given the two years past, as always before, to the lowest bidder. For the present year the books are furnished by G. P. Putnam's Sons. of New York. The year before they were furnished by A. C.

McClurg & Co., of Chicago. The difference in prices has ordinarily been quite small, but there has always been difference enough so that there could be no doubt who gave the best terms.

By obtaining from the different professors advice as to what is needed in their lines of teaching, a working library is obtained and kept up though the income of the library has never been sufficient for anything like what is desired and desirable.

I have at presen no recommendations to make.

STATE LABORATORY OF NATURAL HISTORY.

STEPHEN A. FORBES, PH. D., DIRECTOR.

DR. S. H. PEABODY, *Regent of the University:*

DEAR SIR: In accordance with the suggestion of the Committee on Publication, I have the honor to transmit herewith to the Trustees of the University, for publication in their biennial report, a statement of the operations of the State Laboratory of Natural History, under my direction, for the two years closing September 30, 1888—this being substantially a summary of the quarterly reports made to the Board at its regular meetings.

The work of the Laboratory is two-fold, relating on the one hand to the natural history survey of the St te (formally authorized and organized by the Legislature of 1884-85), and on the other to the State Entomologist's office (established in 1867), the working funds of which are all derived, under existing arrangements, from the Laboratory appropriations. As State Entomologist, I am directly responsible only to the Governor; but the entomological and the general zoölogical work going on under my charge are so intimately blended that I can not well report upon one without including the other; and as both are now supported by State appropriations administered by this Board, I have thought best to include both in this statement.

ORGANIZATION.

The working force of the Laboratory for the past two years has included a director, serving without salary*; a botanist, Professor T. J. Burrill; a botanical assistant, Mr. M. B. Waite; a zoölogical assistant, Professor W. H. Garman; two entomological assistants—one especially assigned to field work, Mr. C. M. Weed, succeeded by Mr. John Marten, and one to office entomology, Mr. C. A.

* The item of $2,000 per annum appropriated as salary of the Director of the Laboratory (Laws of Illinois, 35th General Assembly, p. 71, sec. 1) is not drawn or available so long as that officer is also State Entomologist (Laws of Illinois, 34th General Assembly, p. 24, sec. 4).

Hart; an amanuensis, Miss M. J. Snyder, and a janitor. Drawing and other miscellaneous assistance is variously provided for according to circumstances.

OPERATIONS OF THE LABORATORY.

Our operations may be conveniently reported under the heads, investigation, office work, publication, and general educational work.

The original investigations of the Laboratory now run along three general lines, never wholly distinct, but still usually distinguishable; those of general zoölogy, entomology, and cryptogamic botany.

GENERAL ZOÖLOGY.

Our researches in general zoölogy have been chiefly directed, during the past two years, to the aquatic animal life of the State, which we are studying systematically, both in detail and as a whole, working at the identification, description and illustration of the species; at their distribution, haunts, food, and habits; at their relations to each other where they are thrown together, as in the same lake or stream; at their relations to nature generally, as determined by climate, season, quantity and quality of water, and the like; and at their relations to man as affecting the maintenance and increase of the food supply derived or derivable from the waters of the State—aiming thus to present finally a picture of the aquatic life of Illinois, both plant and animal, in a form suited to attract the interest of the intelligent citizen, to instruct the student, and to contribute to the economic welfare of the State. Our work in this direction has lately come into close, and, I hope, mutually helpful relation to that of the State Fish Commission, as I shall show more fully when reporting upon the investigations of the present season.

Field work on our aquatic zoölogy has fallen chiefly to Professor Garman, Mr. Hart, and myself. In 1887 we thoroughly studied several of the smaller lakes of Northern Illinois, and one of us spent a fortnight on one of the larger lakes of Southern Wisconsin, making soundings, dredgings, and surface net collections for comparison with those from the smaller lakes of the same series in our own State.

Large collections illustrative of the food of fishes were also made at Quincy and Havana during the latter part of the summer by Professor Garman and myself, the material thus obtained enabling me to bring to a conclusion the general study of the subject, which I have had in hand since 1880.

Beginning in November, 1887, surface net collections have been made twice a week for the Laboratory from the waters of Lake Michigan, off Chicago (except when the ice prevented), to enable

us to follow the succession, development, and relative abundance, at different seasons, of the forms of animal life upon which we have found the young of the principal food fishes to be strictly dependent.

During the season of 1888 we have had extraordinary opportunities for aquatic work, afforded us by the State Fish Commission through its Secretary, Mr. S. P. Bartlett. Lack of time and assistance prevented my taking as much advantage as I would have been glad to do of the facilities generously placed at our disposal; but a good beginning was made in July, and the latter part of August on a more systematic and thorough going survey of the life of our waters than we have heretofore been able to undertake. Working from the wharf boat of the Commissioners as headquarters and usually accompanying their field parties, but with boat and assistants under his own control, Professor Garman made an especially careful examination of those waters from which young fishes were taken for distribution throughout the State, studying the plant and animal forms of such situations, noting the size, depth, condition and surroundings of the bodies of water visited, and collecting all information of every description which could aid us in the preparation of a full and exact account of the assemblage of forms and the system of life exhibited.

We learned from these studies enough to show the very remarkable and far-reaching differences occasioned here by differences with respect to the amount and period of the annual overflow, and to open up fully to us this inviting subject as affecting all the river systems of the State. A general report on this work, made with principal reference to its relations to the operations of the State Fish Commissioners, is now in course of preparation, and will be submitted to them when finished. A more detailed exhibit of the scientific results will be published in the Bulletin of the Laboratory.

I hope to have hereafter the funds and assistance to carry studies of this description steadily forward through all the working season, moving the field headquarters from place to place as circumstances may require.

Good progress has been made at the Laboratory in the study and description of all our recent aquatic collections.

Under the head of the general zoölogy of the past two years comes my own personal study of the food, feeding habits, and structures of several families of our fishes,—to which much time was given in the winter of 1887-88,—and the preparation of a general summary and discussion of the whole series of papers on this topic published by me since 1880.

Minor labors in the same general field are a study of the species of harvestmen (Phalangidæ) of Illinois by Mr. Weed; of the anatomy and histology of a remarkable new genus of earthworm by Professor

Garman; of the anatomy and histology of certain crustaceans of subterranean habit by myself; and of the leaf mites of the State by Professor Garman.

ENTOMOLOGY.

The entomological work of the past two years has been almost wholly economic in its objects; but, incidental to the study of insect injuries to agriculture, a considerable mass of information and material has been accumulated of more general entomological interest.

The purely economic work has been extraordinarily heavy and exacting, due especially to a wide-spread and very destructive outbreak of the chinch bug, now but just disappearing. We have kept the infested area, both in southern and northern Illinois, under inspection during the whole two years, making repeated visits to selected localities for comparative observations in the field. At Edgewood, in Effingham county, and at Tonti, in Marion county, we have conducted field experiments for the protection of wheat against chinch-bug injury, in the former instance with great success, in the latter with only partial results, owing to the winter-killing of the grain. At the Laboratory we have made numerous tests and experiments with insecticides.

During the summer and autumn of 1888, we have collected a very large amount of information from every part of the State concerning the effect on the chinch bug of different crops and combinations of crops, with especial reference to wheat culture; and have collated, tabulated and discussed this information, deriving from it important practical generalizations with respect to farm management during the progress of a chinch-bug uprising.

We have also diligently studied three forms of contagious disease to whose virulent activity in the southern part of the State is chiefly due the rapid disappearance of the larger part of the chinch-bug hosts infesting that region,—a difficult and laborious research which is still in progress.

Next to the chinch bug, the Hessian fly and the corn plant louse, have received the largest share of our attention. During both summers periodical sowings of wheat were made in southern Illinois on selected plots, from harvest to the usual seeding time in fall, to determine more precisely the summer history of the fly. Those of 188′ failed because of the extreme drouth,′ but those of 1888 confirmed the results of similar experiments made by us in 1886. Laboratory experiments with this insect are now in progress.

The corn plant louse we have studied by careful field observation and by continuous breeding experiments in the Laboratory, made especially during fall and spring. These experiments have determined the spring and winter history of the root louse; and others made by enclosing hills of corn in the field with large gauze-covered frames have thrown much light on the mid-summer

history and breeding habits of this species. We are now carrying this insect through the winter in the botanical conservatory under conditions to give us additional information concerning it. Colonies of the small brown ant, to whose ministrations these plant lice are especially indebted, have been artificially reared and regularly observed through the season to determine their life history and habits.

Several species of our cutworms have been bred by us for the first time—one, phenomenally destructive this year throughout the whole State, never before identified or noticed.

We have made, both years, studies of the web worms injuring corn and grass-lands with experiments for their destruction.

In the spring and early summer of 1888 we made many elaborate experiments with insecticides for the destruction of wireworms in corn.

In 1887 the life history and habits of an insect destructive to meadows—the larva of one of the crane-flies not before known as injurious—was ascertained by field and laboratory observations; studies were made of some of the insects most injurious to nursery stock; additional experiments were conducted for the control of injuries to fruits by the codling moth; the life history, species, and habits of a new plum borer were determined; considerable systematic and biological work was done on a large number of plant louse species; and an elaborate research was carried forward on the contagious diseases of the army worm, several species of cutworms, and the cabbage caterpillar.

In 1888 we also learned the habits, development, and history of a large snout beetle responsible for a frequent and extensive injury to corn not before understood, and discovered means of avoiding its ravages; and made elaborate studies, by the method of dissection, of the food and feeding habits of the snout beetles generally, throwing light, by this means, on the most serviceable measures for preventing their injuries to fruit.

BOTANICAL WORK.

Studies of the fungi of Illinois—principally those known as plant and animal parasites (the causes of disease)—have been carried continuously forward, chiefly, as heretofore, under the immediate charge of Professor T. J. Burrill. Large collections of plant parasites have been made during the past two years, chiefly by the botanical assistant Mr. Waite, in Edwards, Wabash, Ogle, Lake and Carroll counties; and work of this description has gone forward almost without intermission, in the neighborhood of the Laboratory.

An extremely destructive disease of broom-corn and sorghum, due to bacterial infection, has been thoroughly worked out and measures of avoiding its attack have been discovered; and a study

is well under way of a similar but more important disease of Indian corn found by us widely prevalent from Edwards to Kankakee counties.

Careful and elaborate studies are also in progress of the bacteria and other plant parasites which we have found to cause contagious diseases among insects—those of the chinch bug having been investigated with especial thoroughness.

OFFICE WORK.

The office assistants have been chiefly engaged on the correspondence, in the preparation of the manuscript for the entomological report, and for the bulletins published since 1886, in proof reading of these and of the volume on the ornithology of the State—the latter read twice because once destroyed by fire—in the cataloguing and indexing of new books and periodicals received, in the preparation of two elaborate bibliographies—one including all the entomological writings of our first two State Entomologists, Walsh and LeBaron, and the other covering the entire literature of the chinch bug—in making the numerous charts, diagrams, and drawings and in illustration of lectures, especially those to farmers' institutes, in collecting from nearly nine hundred township assessors the facts concerning chinch-bug injury to the principal farm crops, in abstracting from the assessors' reports for 1887 the estimates of acreage in each crop for all townships in the State, and in collating and tabulating this mass of information—a work which occupied the time of two assistants for many weeks of the current summer and autumn.

Under this head should also come the care of the entomological breeding room, by Mr. Hart, the preparation, determination and arrangement of the thousands of specimens collected, and the keeping of the voluminous records, catalogues and indexes of collections.

PUBLICATIONS.

Our regular publications run in four series, two from the Laboratory and two from the office of the State Entomologist—the former comprising the State Zoölogical Report and the bulletins of the State Laboratory of Natural History, and the latter the biennial entomological report and the bulletins of the entomological office.

During the past two years we have finished the printing of the first volume on the zoölogy of the State, containing 520 pages of text and 46 plates, devoted to the ornithology of Illinois, as far as the water birds. This is a reprint of the volume, the first edition having been all destroyed in the burning of the office of the State Printer last February.

As bulletins of the State Laboratory of Natural History, we have issued an article on one of the families of parasitic fungi of the State (Erysipheæ) by Professor T. J. Burrill and Mr. F. S. Earle (45 pages); two papers by myself on the food and feeding habits and structures of alimentation of the fishes of Illinois (105 pages); one by Professor W. H. Garman on the anatomy and histology of a new genus of earthworm (30 pages); one by Mr. C. W. Woodworth on the classification of one of the families of homopterous insects of the State (24 pages); and two papers on insect parasites by Mr. C. M. Weed (14 pages).

The entomological report for 1885-86 has been unpublished to the present time, caught in the general obstruction of the public printing growing out of the State printing controversy, but is understood to be now in press.

As bulletins of the entomological office, we have issued an elaborate report on the experiments of the years 1885-86 with arsenical poisons for the codling moth in the apple orchard; an article on the chinch-bug outbreak, with economic recommendations for its control; and an article on the life history of the Hessian fly, setting forth the results of our field experiments on the subject. We have also issued several entomological circulars not of any series.

Articles written at the Laboratory but published elsewhere include a paper on the present state of our knowledge concerning contagious insect diseases, prepared as a presidential address for the Entomological Club of Cambridge, Massachusetts, and published in "Psyche," the organ of the club; a paper on the food of the fishes of the Mississippi Valley, read at the 17th annual meeting of the American Fisheries Society in Detroit, Michigan, and published in their "Transactions" and also as a separate pamphlet; a paper on the relations of wheat culture to chinch-bug injury, read at the Cleveland meeting of the Society for the Promotion of Agricultural Science, and published in their "Proceedings;" four papers for the State Horticultural Society by myself and Mr. Weed, printed in the annual volume of the Society; three technical entomological articles by Mr. Weed and two by myself, printed in "Psyche" and in *Entomologica Americana;* and a considerable number of articles written for the agricultural papers in response to inquiries from their editors.

Here also should be mentioned an article by Professor Burrill giving the results of his study of the broom-corn disease already referred to, this paper being published in the Proceedings of the Society of American Microscopists for 1887.

GENERAL EDUCATIONAL WORK.

Among addresses made by the office force, but not regularly published, are seven prepared for farmers' institutes, and delivered twenty-six times in all; one on the chinch bug, delivered six times before county conventions called to adopt measures for joint action

against that insect pest; two on educational topics, before the State Teachers' Association and the Teachers' Association for Central Illinois; one before the Western Society of Naturalists; and one read to the Peoria Scientific Association and at the commencement exercises of the State University of Indiana.

RELATIONS TO THE AGRICULTURAL EXPERIMENT STATION.

The recent organization, at the University, of the State Agricultural Experiment Station has raised the question of the relations of the work thus instituted to that of the Natural History Laboratory and the State Entomologist's office, with the effect to bring about an adjustment of the two at their points of contact in cryptogamic botany and economic entomology. The purpose of the State Laboratory being essentially scientific and educational, its results are only incidentally economic; while the purposes of the Experiment Station are essentially economic, and its scientific work must naturally be regulated with close reference to practical results. In cryptogamic botany, for example, the Laboratory is engaged in a general survey of the State intended to give us the species, the classification, and the life histories of all our flowerless plants, whether economically important or not, and the relations of these to agriculture will come in as a purely secondary matter; while in Experiment Station work, on the other hand, little attention will probably be paid to any species except those having economic relations. All practical botanists are agreed, however, that the economic species and those of no economic importance are so intimately related in classification, habit, and life history, that a full and exhaustive knowledge of the whole subject is very helpful and often indispensable for the solution of merely economic problems. The more, in short, the State Laboratory is able to do in technical and biological botany, the easier and more fruitful will be the economic work of the botanical department of the Station. The former should, in fact, supply a broad and strong foundation on which the latter may build elaborately.

As much of the work in the two directions requires substantially the same facilities, methods, skill, and knowledge, the two may be easily combined in a way to economize labor and expense and to increase results, the only requisite being a common scheme of subdivision and adjustment of subjects of research, and a proper arrangement with respect to assistance, separate and conjoint, in the two departments.

Substantially the same may be said of the entomological work except that here the State has provided fairly well, for many years, for both scientific and economic entomology. The line of division and coöperation naturally suggested is that of the practical application, in the field, of economic results obtained in the office. This is so essential a part of our economic work that I have felt compelled to take it up, and have conducted in southern Illinois several field experiments relating to insect injuries to wheat. But

this field experimentation does not properly belong to entomology; it is very expensive in time and money; and I shall be glad to be wholly relieved from it. On the other hand, I have undertaken to determine insects referred to me as of economic interest by those engaged in the Experiment Station work; to study their life histories; and to make office experiments with respect to them, as far as our resources will permit, reporting results for such verification in the field as may seem to be required.

NEEDS OF THE WORK.

For the future we need especially an entomological laboratory, that we may conduct our experimental work on a larger scale and under conditions completely under our control, The necessity we are now under for traveling 150 miles every time we wish to make an observation on the Hessian fly or the chinch bug because we cannot arrange breeding frames large enough to contain a sufficient number of these insects and their food, and our failure after four years' work to make out some of the indispensable points in the life history and habits of the corn plant louse, because we have no sufficient means of keeping these species under observation without exposing our specimens to conditions so unnatural that they soon perish, are illustrations of the disadvantages under which we work. To supply this lack I shall have to ask from the legislature an appropriation of $1,000 for the erection and furnishing of a suitable building for the breeding of insects, the rearing of their food plants, and other experimental work of this description. Otherwise the appropriations now required need not vary materially from those made at the last session of the legislature.

AGRICULTURAL EXPERIMENT STATION.

SELIM H. PEABODY, PH. D., LL. D., PRESIDENT OF BOARD OF DIRECTORS.

To the Regent of the University:

I have the honor to submit the following report of the establishment of the Agricultural Experiment Station of the University of Illinois, and of its transactions to August 31, 1888.

It will be remembered that the endowment granted by Congress to the several States under the provisions of the act of July 2, 1862, commonly known as the "Agricultural College Act," was emphatically the Endowment of Instruction. The duty of the institutions which should be founded upon its bounty was to teach. Only indirectly is research even referred to in this law. In naming the subjects in which instruction should be given, the law makes the mechanic arts equally prominent with agriculture, while it includes "other scientific and classical studies." The University of Illinois, during the twenty years of its existence, has never failed to give to agricultural and mechanical instruction the full prominence which the organic law designed and required.

It is now more than five years since a movement was made to secure from Congress authority to establish and maintain in the several States a series of Agricultural Experiment Stations. The duty of the Stations springing from this movement is to be investigation, and that in fields relating to the various departments of agricultural industry. The endowment is the Endowment of Research.

The act which provides for the establishment of experiment stations, commonly called the "Hatch Act," was approved March 2, 1887. It is as follows:

An act to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto.

Be it enacted by the Senate and the House of Representatives of the United States of America in Congress assembled, That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural

science, there shall be established, under direction of the college or colleges or agricultural department of colleges in each State or Territory established, or which may hereafter be established, in accordance with the provisions of an act approved July second, eighteen hundred and sixty-two, entitled "An act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and mechanic arts," or any of the supplements to said act, a department to be known and designated as an "agricultural experiment station:" *Provided*, That any State or Territory in which two such colleges have been or may be so established the appropriation hereinafter made to such State or Territory shall be equally divided between such colleges, unless the legislature of such State or Territory shall otherwise direct.

Sec. 2. That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and waters; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States or Territories.

Sec. 3. That in order to secure, as far as practicable, uniformity of methods and results in the work of said stations, it shall be the duty of the United States Commissioner of Agriculture to furnish forms, as far as practicable, for the tabulation of results of investigations or experiments; to indicate, from time to time, such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purposes of this act. It shall be the duty of each of said stations, annually, on or before the first day of February, to make to the Governor of the State or Territory in which it is located a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said stations, to the said Commissioner of Agriculture, and to the Secretary of the Treasury of the United States.

Sec. 4. That bulletins or reports of progress shall be published at said stations at least once in three months, one copy of which shall be sent to each newspaper in the States or Territories in which they are respectively located, and to such individuals actually engaged in farming as may request the same, and as far as the means of the station will permit. Such bulletins or reports and the annual reports of said stations shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster-General may from time to time prescribe.

Sec. 5. That for the purpose of paying the necessary expenses of conducting investigations and experiments and printing and distributing the results as hereinbefore prescribed, the sum of fifteen thousand dollars per annum is hereby appropriated to each State, to be specially provided for by Congress in the appropriations from year to year, and to each Territory entitled under the provisions of section eight of this act, out of any money in the treasury proceeding from the sale of public lands, to be paid in equal quarterly payments, on the first day of January, April, July and October in each year, to the treasurer or other officer duly appointed by the governing boards of said colleges to receive the same, the first payment to be made on the first day of October, eighteen hundred and eighty-seven. *Provided, however*, That out of the first annual appropriation so received by any station an amount not exceeding one-fifth may be expended in the erection, enlargement or repair of a building or buildings necessary for carrying on the work of such station; and thereafter an amount not exceeding five per centum of such annual appropriation may be so expended.

Sec. 6. That whenever it shall appear to the Secretary of the Treasury from the annual statement of receipts and expenditures of any of said stations that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding annual appropriation to such station, in order that the amount of money appropriated to any station shall not exceed the amount actually and necessarily required for its maintenance and support.

Sec. 7. That nothing in this act shall be construed to impair or modify the legal relation existing between any of the said colleges and the government of the States or Territories in which they are respectively located.

Sec. 8. That in States having colleges entitled under this section to the benefits of this act and having also agricultural experiment stations established by law separate from said colleges, such States shall be authorized to apply such benefits to experiments at stations so established by such States; and in case any State shall have established under the provisions of said act of July second aforesaid, an agricultural department or experimental station, in connection with any university, college or institution not distinctively an agricultural college or school, and such State shall have established or shall hereafter establish a separate agricultural college or school, which shall have connected therewith an experimental farm or station, the legislature of such State may apply in whole or in part the appropriation by this act made, to such separate agricultural college or school, and no legislature shall by contract express or implied disable itself from so doing.

Sec. 9. That the grants of money authorized by this act are made subject to the legislative assent of the several States and Territories to the purpose of said grants: *Provided*, That payments of such installments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of its legislature meeting next after the passage of this act shall be made upon the assent of the Governor thereof duly certified to the Secretary of the Treasury.

Sec. 10. Nothing in this act shall be held or construed as binding the United States to continue any payments from the treasury to any or all the States or institutions mentioned in this act, but Congress may at any time amend, suspend or repeal any or all the provisions of this act.

Approved March 2, 1887.

It will be observed that with few exceptions, made to meet unusual conditions, none of which exist in Illinois, the act provides that the stations shall be established at the colleges already existing as the offspring of the act of 1862. It will be further observed that the stations are not to be separate institutions, but integral parts—departments of the colleges, and this for the evidently good reason, that thus the stations may come at once, and without large and expensive outlay, to enjoy such parts of the endowments which the colleges already possess, as shall be of great service in carrying forward this enterprise of research. The experiment station of the University of Illinois steps at once into the use of property in lands and buildings, including offices, laboratories, barns, stables, etc., which could not be otherwise procured now for less than $50,000, and which have cost the University in the past more than that sum. Similar conditions exist at most of the agricultural colleges in the country.

As a department of the University the Station must come under the general management and control which governs the University. The house may not be divided. But as a department existing under a different law, and especially as supported by a different fund, all accounts and expenses must be scrupulously kept distinct. Neither may be permitted to encroach upon the funds of the other. If the servants of the Station teach, the University must pay for the instruction; if the servants of the University work for the Station, it must pay for their services. The line of demarkation may be drawn easily and clearly just there. Instruction is the business of the University; investigation, in all lines pertaining to agriculture, is the work of the Station.

Soon after the passage of .the act of Congress the "legislative assent," required by section nine of the act, was given by the General Assembly of the State of Illinois by the passage of the following joint resolution:

WHEREAS, The Congress of the United States has passed an act approved by the President March 2, 1887, entitled "An act to establish Agricultural Experimeut Stations in connection with the colleges established in the several States under the provisions of an act approved July 2, 1862, and of the acts supplementary thereto;" and

WHEREAS, It is provided in section nine of the act aforesaid "that the grants of moneys authorized by this act, are made subject to the legislative assent of the several States and Territories to the purposes of said grants," therefore, be it

Resolved by the Senate. the House of Representatives concurring herein, That the assent of the General Assembly of the State of Illinois be and is hereby given to the purposes of the grants made in said act, and that the Trustees of the University of Illinois be and they are hereby authorized and empowered to organize and conduct an Agricultural Experiment Station in connection with the Agricultural College of said University of Illinois, in accordance with the terms and conditions expressed in the act of Congress aforesaid.

All preliminaries having been adjusted, it seemed that the next movement should be organization. This, however, was arrested by a decision from the Comptroller of the United States Treasury, in which it was very properly held that the Hatch act made of itself no appropriation of money, but that a specific appropriation should have been made by Congress to carry the provisions of the Hatch act into effect. This had been overlooked. The Trustees of the University of Illinois, being strictly enjoined by their

charter, could not enter upon any expenditure of money for any purpose, unless the necessary money had already been provided for such use.

Accordingly the subject rested until the present Congress, by act of February, 1888, made a special appropriation of $15,000 to be expended, if used at all, before the first of July, 1888.

This second act is in one particular more liberal than the first, since it provides that money shall be paid, not out of the proceeds of the sales of the public lands, which might be insufficient, but "out of any money in the treasury not otherwise appropriated."

ORGANIZATION.

Although an enforced delay in organization had occurred, the authorities of the University had not been idle. Much thought had been given to the work required and the means of performing it both by the Trustees and by the members of the Faculty of Agriculture. The Trustees found themselves under obligations to administer upon property placed within their control, not even the option of refusal being left to them, and they proceeded to perform their duty under the best advice and counsel within their reach. They recognized that they were charged with a duty towards the great agricultural interests of the State, and that they could not evade the responsibility which the law placed upon them. They invited the President and Secretary of the State Board of Agriculture, of the State Horticultural Society and of the State Dairymen's Association, to confer with them at a meeting called for the purpose in Chicago, March 21, and, after a full consultation had with those gentlemen, the Trustees adopted a plan of organization (given in full at page 88 of this volume) under which a Board of Direction was appointed and a working staff employed. (See page 11).

The Board of Direction held its first meeting at the University, March 28th, and laid out its work for the ensuing season. Its outline of operations was approved by the Executive Committee of the Trustees March 31st, and work was at once begun.

The experiments undertaken are as follows:

1. Field experiment. Corn, testing varieties.
2. Field experiment. Corn, testing varieties for ensilage.
3. Field experiment. Corn, time of planting.
4. Field experiment. Corn, depth of planting.
5. Field experiment. Corn, thickness of planting.
6. Field experiment. Corn, planting in hills or drills.
7. Field experiment. Corn, effect of depth and time of planting.
8. Field experiment. Corn, frequency of cultivation.
9. Field experiment. Corn, depth of cultivation.
10. Field experiment. Corn, effect of root pruning.

11. Field experiment. Corn, effect of fertilizers.
12. Field experiment. Oats, quantity of seed per acre.
13. Field experiment. Oats, compact or loose seed bed.
14. Field experiment. Oats, time of sowing.
15. Field experiment. Oats, depth of sowing.
16. Field experiment. Grasses, comparison of varieties.
17. Field experiment. Clovers, comparison of varieties.
18. Field experiment. Grasses and clovers, sown with or without grain.
19. Field experiment. Grasses, field tests of varieties.
20. Field experiment. Clovers, field tests of varieties.
21. Field experiment. Grasses and clovers, field tests of mixtures.
22. Field experiment. Weeds, number and kinds on given areas.
23. Field experiment. Rotation. University experiments continued.
24. Field experiment. Fertilizers, comparison of.
25. Feeding experiment. Feeding ensilage to growing cattle. (Results published in Bulletin No. 2).
26. Feeding experiment. Feeding cattle of different breeds.
27. Feeding experiment. Cost of production of young steers.
28. Feeding experiment. Cost of production of young colts.
29. Feeding experiment. Cost of production of young calves.
30. Feeding experiment. Effect of ash constituents upon pigs.
31. Tree culture. Orchard, soil cultivation and management.
32. Tree culture. Orchard, soil fertilization.
33. Tree culture. Apples, testing new varieties by planting.
34. Tree culture. Apples, testing new varieties by top-grafting.
35. Tree culture. Apples, testing hardiness of root-grafted and double-worked trees.
36. Tree culture. Pears, testing new varieties.
37. Tree culture. Plums, testing new varieties.
38. Tree culture. Cherries, testing new varieties.
39. Tree culture. Forest trees, growing of.
40. Vine culture. Grapes, testing new varieties.
41. Vine culture. Grapes, methods of training.
42. Vine culture. Grapes, soil treatment.
43. Small fruit culture. Blackberries, testing varieties.
44. Small fruit culture. Raspberries, testing varieties.
45. Small fruit culture. Strawberries, testing varieties.
46. Small fruit culture. Strawberries, method of management.

47. Gardening. Tomatoes, effect of artificial fertilization upon earliness of product.

48. Gardening. Beans, testing varieties.

49. Gardening. Sweet corn, testing varieties.

50. Field experiment. Grasses and clovers, effect of ripeness on yield and chemical qualities.

51. Small fruit culture. Strawberries, raising seedlings.

52. Small fruit culture. Raspberries, soil management.

53. Field experiment. Wheat, effect of time and manner of harvesting.

54. Field experiment. Corn, root growth.

55. Tree and vine culture. Fungicides, use of.

56. Gardening. Potatoes, investigation of scab.

57. Tree culture. Orchard, investigation of soil moisture.

58. Feeding experiment. Pigs, comparison between corn, grass, and corn and grass in feeding.

59. Feeding experiment. Cost of production of young heifers.

60. Record of milk product. Milk measured for use in experiment No. 29.

61. Field experiment. Wheat, effect of fertilizers. Wheat sown in 1887.

The results of one of these experiments, No. 25, have already been published in Bulletin No. 2. The other experiments will be reported upon in future bulletins.

Besides this actual experimentation, much has been done to put the Station into working order.

An office has been fitted up for the occupation of the Secretary, who keeps in detail the record of the experiments undertaken and of the operations in connection with them, and attends to the accounts, correspondence, and publications of the Station.

A library room has been furnished, and already about $3,500 has been spent for books and periodicals relating to agriculture, horticulture, botany, and chemistry. In purchasing books for the Station library, the purpose has been to supplement the University library in these lines of literature. The volumes bought so far are chiefly standard German and French works.

A chemical laboratory, in commodius quarters and well supplied with apparatus suitable for its work, has been put into operation at an expense of about $3,000. About $700 has been spent for apparatus for the botanical laboratory of the Station, which is in charge of Prof. Burrill and is in the same rooms with the botanical laboratory of the University.

There have been built upon the farm a small fertilizer house and a silo fitted up so that it may be divided into three compartments and with a total capacity of forty to fifty tons. Also a ware-

house has been built for various kinds of work intermediate between the field and the office—handling grains and seeds; receiving, weighing, storing, packing, etc. The building is 30x56 feet, 18 foot post, and has a basement or cellar 8 feet deep. The main story is divided into four rooms, which are plastered. The upper floor is dropped 5 feet below the plate, thus furnishing a large dry loft for storage. The building has chimneys built from the ground so that it may be warmed throughout if desired. A wide platform, sheltered by a veranda roof, extends along the whole south side of the building, at which wagons may readily receive and deliver loads.

Some apparatus for taking meteorological observations and soil temperatures has been purchased and put into position.

It will be seen from this statement that though the Station did not begin operations until April, a good deal has been done; and now, at this date, September 1, it is about closing up the work upon a considerable number of experiments; has others in hand, some of which will continue for a short time longer while others will not be completed for several years, and has plans laid for still other experiments to be taken up in the near future; with its working corps organized and a good plant, so to speak, it should do its share to show the wisdom of the Hatch bill, and may reasonably be expected to demonstrate its own usefulness.

The officers of the Station desire to be in direct personal communication with the agricultural public, particularly of the State of Illinois. Information which the Station has upon any subject within the scope of its operations will always be given promptly and cheerfully. Questions will be answered directly by correspondence, and, if thought to be of general interest, the answers will be given through the bulletins, or through the press.

But the Station cannot commit itself to undertake the discussion of questions which will involve extended investigation and experiment outside the lines of work which the officers of the Station have selected. Especially will this be true of investigations which have only a personal and private interest. Analyses of soils, waters, fertilizers, foods, etc., will be undertaken only as they come legitimately in connection with the regularly adopted experiment-work of the Station.

The Station has published two bulletins, one in May, detailing the steps that have called it into existence; its organization and regulations; the fields into which investigation is to be pursued, and the plans for the season's work; the other in August giving, as stated above, the results of an experiment with ensilage. 10,000 copies of each were printed. The law provides that the bulletins shall be sent free to all newspapers in the State of Illinois and to persons engaged in farming who may request that they be sent. We have the names of over six thousand farmers on our mailing list and shall be glad to extend it so as to include all who may think it will be useful to them to know what this Experiment Station is doing.

HISTORICAL SKETCH OF THE UNIVERSITY OF ILLINOIS.

TWENTIETH ANNIVERSARY, MARCH 13, 1886.

BY SELIM H. PEABODY, LL. D., REGENT.

In presenting a sketch of the life of the University, I propose to follow the example of the elder preachers, and begin at the beginning. This beginning I find in a document of which much has been said within a year or two, namely, the famous ordinance of 1787, a document which antedates the constitution of the United States, and yet was not abrogated thereby. I have time and use for but one clause, and that a very brief one, from that notable document. I wish that clause were emblazoned upon the walls of this chapel. It is this:

"Religion, morality and knowledge, being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged."

From this germ has sprung an abundant growth. Yet in itself it simply formulates a general principle. It says only that a certain thing shall be done. It does not say how or by whom it shall be done, or when, except that it shall be done forever. Yet the principle has shown a vigorous and inherent vitality. Since this statement of it as a thing that ought to be done, the national Congress has seen fit to act in accordance with it in four notable ways, and it is yet to be seen whether these shall be followed by a fifth.

1. Congress has bountifully endowed the common schools of the northwest by setting aside for their support, first one section, and afterwards, in the newer States, two sections of land in each township.

2. As each new State was organized, Congress gave to it a valuable donation of land expressly to found and endow a university.

3. Each State received from Congress a grant of land for the endowment of instruction in branches of learning related to agriculture and the mechanic arts, and in other scientific and classical subjects.

4. Congress has appropriated generous means for the endowment of research, in lines thus far restricted to agriculture, in the foundation of agricultural experiment stations. This may certainly be included in the means of education named in this ordinance.

5. Will Congress take the next step, and make a vigorous effort to banish illiteracy from every part of that magnificent empire which knows no other emblem of sovereignty but the starry flag?

Illinois has been the Nation's beneficiary in all the respects named. She has received her endowment of talents. When the master comes and calls for the reckoning, I hope it will not appear that she has buried any of her talents in the earth; but I fear that she will not be able to show a proper increment of five other talents which entitle her to the plaudit, "Well done, good and faithful servant," such as has been earned by some of her sister States, say Michigan or Wisconsin.

Her donation for common schools has been well-used. Her system of school suffers in comparison with none. Her university fund was for forty years turned into the public treasury and its proceeds distributed among the common schools, and for thirty years since has been used for the support of normal instruction. Each of these is a grand and noble object, well worthy of the fostering care of a generous, intelligent and appreciative public. Neither of them should for a moment suffer, but neither of them answers the condition of the endowment made for the support of university education. Let it not be thought for an instant that this University desires to deprive the normal schools of what they have so long enjoyed, a fund not adequate to their necessities. But the facts which I have referred to may be urged as very good reasons why the State should be both just and generous toward the institution which is her acknowledged University.

I can in only the briefest way refer to the discussions upon educational matters in general, and in particular, upon education having special reference to the wants of the growing industries of the country, held in the years 1851–1854, in this State. They sprang from the active thought of the time. They were rife east as well as west, and received a mighty stimulus from the first of the great industrial expositions, that held in Hyde Park, London, in 1851. Professor Turner, of Illinois, must always be held in honorable memory for the earnest work done by him in advocating the recognition of the new conditions which the progress of science was making for the nations. Any one who is interested to know the movement of the thought of that time will find the subject admirably written up by Mr. Pillsbury in the last report of the Superintendent of Public Instruction of this State.

I quote a few of Professor Turner's pregnant paragraphs, being sure that my hearers who are familiar with things as they now are in this institution will recognize the marvelously close parallel between the almost forgotten thought of that day and the actual performance of the present day.

In Professor Turner's "Plan for a State University," I find the following:

"There should be connected with such an institution in this State a sufficient quantity of land of various soil and aspect for all of its needful experiments and processes in the great interests of agriculture and horticulture.

"Buildings of appropriate size and construction for all its ordinary and special uses, a complete philosophical, chemical, anatomical, and industrial apparatus; a general cabinet embracing everything that relates to, illustrates, or facilitates, any of the industrial arts; especially all sorts of animals, birds, reptiles, insects, trees, shrubs, and plants, found in the State and in the adjacent States. Instruction should constantly be given in the anatomy and physiology, the nature, instincts, and habits of animals and insects; on the nature, composition, adaptation, and regeneration of soils; on the nature, strength, durability, cost, use, and manufacture of all materials of art and industrial processes; on political, financial, and manual economy; on national, constitutional, and civil law; on the laws of vicinage, or the laws of courtesy and comity between neighbors, as such, and on the principles of health and disease in the human subject: in short, upon all those studies and sciences, of whatever sort, which tend to throw light upon any art or employment which any student may desire to master, or upon any duty which he may be called to perform, or which may tend to secure his moral, civil, social, and industrial perfection as a man.

"No species of knowledge should be excluded, practical or theoretical, unless, indeed, those specimens of organized ignorance found in the creeds of party politicians and sectarian ecclesiastics should be mistaken for a species of knowledge."

How far is this from Mr. Cornell's motto, "I would found an institution where any person can find instruction in any study?"

In the session of the legislature which was held in 1855 a bill was reported, and was received with great favor, but failed to become a law on account of the lateness of the season, to incorporate an institution of learning upon the lines which had been laid down as before described, the trustees named being Professor Turner, and five others, with six more to be afterwards chosen.

The declared object of this institution was "to impart instruction in all departments of useful knowledge, science and art, * * so that the University may become a resort for acquiring an accomplished and finished education in all useful, practical, literary, and scientific knowledge."

The name of this institution was to be "The Illinois University," identical with that now only a little more euphoniously expressed as the University of Illinois.

The movement which has been referred to in Illinois, uniting with one of similar import in the eastern States, culminated in the passage of a bill by Congress in 1858, commonly known as the

Agricultural College bill, which was vetoed by President Buchanan. Then followed the civil war, in the midst of which, even in the darkest hours of that sad conflict, a similar act was passed and received the signature of President Lincoln. This act provided, in phraseology that must be familiar to every one who hears me, "for instruction in the branches of learning relating to agriculture and the mechanic arts, without excluding other scientific and classical studies." As to this last and much discussed clause, I have to remark that I have been assured by persons thoroughly familiar with the facts that the bill never could have passed the Senate of the United States without this clause, and that if such exclusion had been insisted upon, the bill would have been worthless to several of the States, both east and west. I am fully aware of the adverse criticism which has been made against many of the institutions founded upon this grant, charging perversion of funds, abandonment of principle, and other faults, which, if committed, were equally deserving of censure. I have no disposition to make counter charges against the authors of such charges, any more than I would punish by imprisonment the inability to see color by such as are color blind. I hope always to be able to assert as confidently as I have done hitherto, and do now most emphatically insist, in the words of the Hon. John Eaton, late Commissioner of Education, that no institution has, in proportion to the means committed to it, more perfectly fulfilled, both in the spirit and in the letter, the law of 1862, than has the University of Illinois.

The legislature that convened after the close of the war passed an act for incorporating the Illinois Industrial University, and located it at Urbana, in the county of Champaign. The State put up the University as a prize to be won by the highest bidder, and the prize was awarded as has been stated. The amount of the bid was estimated at $400,000. The items, so far as I can learn, were 930 acres of land, $100,000 in money, and a brick building whose site is still visible. About one-third of the money was expended in making the building temporarily habitable, and in necessary improvements on the land. The other two-thirds was, to put it mildly, borrowed by the legislature, but was never repaid. The building served a good purpose, until one more suitable and commodious could be erected. In 1880 it became a ruin under the stress of destroying elements, and the Trustees took it down to prevent the boys from burning it up.

The land mostly remains.

The first Board of Trustees met and organized on Tuesday, March 12, 1867, so that this day which we now celebrate may properly be counted as the twenty-first birthday of the University, the day on which it comes to its majority. The meeting was held in the representatives' hall at Springfield. At that meeting Dr. John M. Gregory was elected Regent. Dr. Gregory had been Superintendent of Public Instruction of the State of Michigan, and was thoroughly versed in educational affairs. He entered immediately upon the work of organization; the arrangement of col-

leges and schools; the drafting of plans and courses of study; the selection of professors and teachers; the multiplicity of details which was involved in the perfecting of so large and so complicated a piece of mechanism as the University was designed to become. Time has demonstrated the excellency of the work, the far-sighted breadth of the plans, the good judgment used in the choice of men, and the wise adjustment of means to ends.

The University was opened to sudents, March 2, 1868, and inaugural ceremonies were observed on Wednesday, March 11th, addresses being delivered by Dr. Gregory, and the then State Superintendent, the Hon. Newton Bateman.

The number of students during the first term was 77. The subjects taught were algebra, geometry, natural philosophy, history, rhetoric, and Latin. The instructors at the time of the inauguration were the Regent, Dr. Gregory, and Professors William M. Baker and George W. Atherton. Of these the first died in 1873, while still in the service of the University; the second soon resigned, and is now the distinguished President of the Pennsylvania State College.

Although the formal opening occurred in March, and a class was taught during the spring term, the actual beginning of the University work may properly be set at the opening of the succeeding fall term. By that time Professors Burrill, Shattuck, Snyder, Bliss and Stuart, had been appointed, and were on duty; the first three named have been continuously at their posts until the present day. Major Powell, the present director of the U. S. Geological Surveys, was appointed Professor of Natural History, but never did the University any service.

It will not be possible for me in the brief time allotted, to follow minutely the changes in the corps of instruction as they have occurred, or to notice other matters much in detail. Even the salient points can be only briefly touched. The utilization and division of the land for agricultural and horticultural purposes received first attention. In the season of 1869 the orchard was planted, the forest plantation stocked, and the arboretum planned. The land was otherwise suitably divided and the barns were erected.

It was in the original plan to open at once a machine shop as an adjunct to instruction in mechanical engineering. After some unavoidable delays, S. W. Robinson was appointed professor in that department and entered upon his work at New-year's, 1870. Some machinery was at once put to work in the wooden building north of the half-way House. It is probable that tool or machine instruction was first given in America at the Worcester Free Institute, which was formerly inaugurated in November, 1868, six months after the opening of this University. I have not been able to find that Professor Robinson's practice shop had any other predecessor in this country. In 1871, the legislature appropriated $25,000 for erecting and equipping a machine shop and

drill hall in one building. The shop was built during the same year, and was formally opened for service, September 13, 1871. In the same year instructions in wood-work was given, a part of the new building having been assigned for that purpose, and equipped with work benches and tools. In March, 1873, N. C. Ricker, who had taken a course in architecture in the University, followed by study in European schools, was appointed instructor in, and afterwards Professor of, Architecture. He brought from Europe some suggestions of great practical utility as to shop-work, which were at once adopted. A full exhibit from both shops was made in 1876 at the Centennial Exposition in Philadelphia. At that time and place Dr. Runkle, then President of the Massachusetts Institute of Technology, as he himself says, first saw those forms of shop instructional work, which he caused to be introduced during the next year into the courses of instruction in the school under his charge. Dr. Runkle is now quoted, by no fault of his own, I am sure, as the father of shop-training instruction in America. With no wish to detract from any distinction rightfully his, I have to insist that instruction was given in our shop seven years in iron-work, and five years in wood-work, before his shops were opened, and that our work was exhibited to the public and received a diploma of merit in the year before his shops were opened.

I have it also from Mr. Josephus Collett, the President of the Board of Trustees of the Rose Polytechnic Institute, at Terre Haute, that but for a visit to our shops by Mr. Collett, soon after they were set in operation, Mr. Rose's beneficence would have been turned in an entirely different direction, and the institution at Terre Haute would have been of a totally different character.

I have turned aside to make these statements of history for reasons of importance to the credit of the University, and to get the facts permanently on record.

The question of the admission of women as students of the University was raised in 1869, and after a lengthy discussion was settled in the affirmative, in March, 1870. Since that time about one-fifth of the numbers in attendance have been women. Their presence has come to be viewed as a matter of course, causing neither question nor comment. None of the evils, perhaps not so much of the benefits, which the contestants so confidently predicted, have been observed. It must be admitted, however, that in some solitary instances—the instances always become solitary, as two become one—students of the University have concluded to join hands and travel together along life's journey, carrying their Eden with them. I have never discovered but one person who really seems to be grieved over the fact, but I think the reason in his case is the remembrance that there was no such school when he was young.

In the session of 1871, the legislature authorized the construction of the main University building, according to the plans and estimates laid before it, at a cost of $150,000, and appropriated

$75,000 as the first moiety to be expended on it, it being understood that at the next session an equal amount in addition would be appropriated to finish the work. Contracts were let and the work was begun, the corner stone being laid with appropriate ceremony on the 12th of September, 1871. The work was pushed forward as rapidly as was consistent with good workmanship, until the first appropriation was expended, but the walls were not all completed and the roof was not on. A broad, white streak on the west wall, above the library windows, remains the indelible record of the time when the work could go no farther. The legislature met, but adjourned without making the promised appropriation, and in April, 1872, as the records show, the Trustees found themselves obliged to use the Champaign county bonds then remaining in their hands, to complete the work, as was necessary to prevent serious damage to what had already been done, and to prepare the building for much needed uses. Every effort was made that this money, which really belonged to the endowment fund, should be repaid by the State, but such efforts were unavailing, Money was furnished for heating apparatus and furnishing only. The building was finished, and it was dedicated December 10, 1873. While not remarkable architecturally, it is one of the most admirably arranged and convenient educational buildings to be found in the land. Its cost was kept within the sum originally assigned for its construction.

The other of the larger buildings, the chemical laboratory, was authorized by the legislature of 1877, was finished in the summer of the next year, and was dedicated at commencement in 1878. Its cost, fitted and furnished, was $40,000.

At the same commencement in 1878, degrees were first conferred upon graduates. When organized the University was thought to be unique. Its name was intended to show that. Its chief officer received a title which was never borne by anybody else who occupied a similar position. Its graduates were not to have diplomas or degrees, but were to receive certificates, which, it was argued, would be much more valuable, since they would show the exact attainments in kind and quality, which the bearer had reached. But somehow, the great world refused to accept the new dispensation. The graduates found their paper not current in the market. The name of the institution was persistently misinterpreted. The Regent has to be at all times prepared to show that he is not a Trustee but only their servant; while it stands upon record that when the earlier professors went to the State Teachers' Association and sought admission to the college section, it was denied them because an institution that gave no degrees had no rightful claim to call itself a college. In 1877 the alumni petitioned the legislature to give the University authority to grant degrees; the legislature heard their complaint and granted their prayer. The University gives degrees, and has been admitted to grace. Every student is entitled, as before, under the law, to a certificate, after one year's membership in good standing in the University, which

certificate shall show in detail the subjects he has studied, and his standings in them. Graduation with a certificate is still permitted; a kind of side exit; usually used by those who find it inconvenient, for some reason, to pass out at the front door.

Another peculiar institution that had its home here for a period of years, was the student's government. It has now been so long gone that there can scarcely be a student here who has any personal knowledge of its operations. It was organized in 1870. It was an epitome of a republican government, having legislative, judiciary, and executive departments. Some of its officers were elected, some appointed. It had all the paraphernalia of a court, but a prison; but from its decisions there was no appeal; for its penalties, no pardon. Its courts were quite like other courts in the outer world—"when they were good, they were very, very good; when they were bad they were horrid." The scheme was ingenious, and could be explained so as to seem very attractive; but it lacked poise, consistency, permanency. There was no security for even-handed justice. One set of officers would, with the best intentions, but with zeal not tempered with discretion, set itself at work to exterminate every form and instance of evil. This would bring a reaction, and at the next election a set of officers—and we had a new administration every term—whose only purpose in getting possession of the government was to hide it under a bushel and keep it quiet; and they would do it very effectually. And yet, to their credit be it said, we had some excellent presidents, and worthy chief justices, who governed righteously and wisely during their brief term of authority. The history of this experiment in college discipline would of itself furnish material for a full and most interesting paper. It is enough to say that after this government had passed years of very varied vicissitudes, in 1883 the students deliberately laid down their authority, to the entire satisfaction of all concerned.

The years 1878-1880, judged by certain standards, have been deemed the most prosperous in the history of the University. The most needful buildings had been erected and occupied. The courses of study were fully organized, and a thoroughly competent corps of teachers was conducting the work of instruction. The average number of students for the three years named was exactly 400. The era of adverse criticism, not to say of vituperation, had passed. The people of the State of Illinois were coming to know that a grand and growing university had been planted in their midst, and that it was worthy of their confidence and support.

At the same time, evils were menacing the institution both from without and from within. That which I refer to as from without, was the serious disturbance of its finances, which resulted from no lack of care, prudence, or forethought on the part of its financial advisers, but from disturbed conditions in the finances of the country, which could neither be avoided nor palliated.

The original endowment in land scrip, received from the United States, had all been converted into money, except the comparatively insignificant amount of 25,000 acres. This amount was located, and one can now express only his unavailing regrets that the locations had not been made ten times as numerous, according to the prudent suggestions of one of the most far-sighted men on the Board of Trustees (Mr. Cobb). Such a policy, properly carried into effect, would have made the endowment of to-day not less than one million of dollars.

Assuming that the sale of the scrip was necessary and proper, as doubtless they who ordered its sale honestly believed, the sum realized, $320,000, was as much as could reasonably have been expected at the time. As fast as the cash was received it was invested in such securities as the law demanded, and the rate of interest then current in the State, eight to ten per cent, yielded from $25,000 to $30,000 per annum, for the payment of the current expenses of instruction. The panic of 1873, and the consequent readjustment of values, did not begin to show its effect upon the finances of the University until about 1877, and the years following, when the options of redemption upon securities held by the University began to be available, and debtors refunded their loans at lower rates of interest. In this way the income of the University shrank $9,990 between 1877 and 1879, and between 1877 and 1883 diminished one-half. To meet this contraction in income, a corresponding reduction in expenses was required by common prudence, as well as by the charter of the University. To this end the salaries of all leading professors were reduced; as places became vacant, they were left so, the duties being distributed to other persons; certain departments, as those of commerce, mining, and domestic economy were cut off; the fees to be paid by the students were raised; and the most rigid economy was everywhere observed. To use the nautical figure, it had become necessary to take in every bit of canvas that could be spared; but it is evident that a ship under reefed topsails upon a chopping sea will not sail as well as when, over smooth and laughing waters, every sail is swelling to the propitious gale. Meanwhile the internal condition of affairs was gloomy. The cordial agreement which had existed between the students and the Regent and Faculty became strained, and, finally, open rupture and rebellion occurred. Even if I could do so intelligently, it would not be profitable to enter upon an explanation of the troubles that existed in the winter and spring of 1880. It were better to let the dead, which the dead past has buried, lie quietly in their graves. I have never known, as I have never sought to know, the exact bearing of the relative weight of the several causes, financial or other, that brought about the result, which was the resignation of the first Regent, at commencement in June, 1880.

Dr. Gregory had served the University for twelve long and arduous years, at a time when the noblest qualities of mind and heart,—wisdom, foresight, promptness, courage,—all the characteristics of a competent leader, were in the most urgent demand. In none of these respects was he found wanting. The difficulties of his position, the honesty of his purposes, the magnificent breadth and adaptibility of his plans, the strength of his character, can be understood and appreciated by no person more fully than by him whose fortune it has been to follow in Dr. Gregory's path. The friends of the University should ever be loyal to the memory of its first Regent.

And now comes the most difficult part of my allotted task. The person who essays to write the history of events in which he himself has been an actor, should possess the rare faculty of putting himself without himself, so that in all respects he may treat both himself and those about him with the most complete impersonality. This task I find myself incompetent properly to undertake. If I have accomplished anything here, and I hope that my work has not been altogether fruitless, it has been by dint of patience, perseverance, and silence, and now silence will be the best account I can give of a good many things.

Although I had held a brief connection with the University, it had been severed for some months, and at the time of Dr. Gregory's resignation I was in other occupation a thousand miles away. The telegram which brought me news of his resignation was indeed a surprise; but a far greater surprise was one which came later, announcing that I was appointed temporarily to fill the remaining time of his term of service. I had as little expectation of the appointment as I have now to become the president of the United States. But the telegram had the significance of an order, which I felt I must obey. I knew, indeed, that there were difficulties to be encountered. What pursuit has not? And I kept finding them out—for that matter they are still discoverable, though many have passed away.

In the first place, many of the students looked askance at the new Regent, part because he was not Dr. Gregory, part because he was not Dr. McCosh. The seniors were said to have held a meeting to determine whether they would return or not, but kindly consented to give the new man a trial. Then followed the duty of administration upon the affairs of the estate, with provision to be made for payment of the legacies. There was the legacy of the depleted treasury. There was the legacy of the course in domestic science, bequeathed by its resigning professor. There was the legacy of the military rebellion, although most of the dead and wounded had been removed. There was the legacy of the student's government, the senior tree, the fraternity question, the management of the *Illini*, and more. One by one these matters have been settled, the legacies paid off, and, on the whole, as I

believe to the general satisfaction of those concerned. They were lively issues in their time; they are mostly dead now, and so let them remain.

The period since 1880 has been marked by no large undertakings, like the authorization and construction of a large building, but some enterprises of less moment have been carried through successfully.

Financial affairs received early and careful attention. Up to 1881, the legislature had made appropriations for buildings only, and for some special purposes, as library, apparatus, museum, or shops. At that session the Trustees resolved to ask, in addition to the usual sums, for $10,000 per annum for the expenses of instruction. The sum named was cut down to about half and then allowed. The next legislature was asked for $14,000 for the same purpose, and the grant was made. The next legislature granted $12,000, and the last legislature $16,000 per annum for the same purpose.

In 1884 the opportunity seemed favorable for selling the lands of the University lying in Nebraska, amounting to something over 9,000 acres. By judicious management, and the proceeds of this sale, the endowment fund has been raised since that time from about $320,000, as it was before, to upwards of $450,000, all safely and carefully invested.

In 1885 application was made to the legislature to change the name of the University, and to give it the name it now bears, The University of Illinois. The application was contested very bitterly, especially in the senate, but was finally granted, and the name has been borne with quiet dignity since the first of July of that year. Without doubt, important benefits have already resulted from that so long desired change, and greater good will result in the future.

The University has largely extended the knowledge of itself among the people of the State, through its alumni, through its students, and through the efforts of its officers in visiting and addressing gatherings of the people, convened for a great variety of purposes. These addresses have concerned all the vital topics of the times, not political or denominational. For example, the number of agricultural, educational, and other gatherings attended during the past year, by members of the University Faculty, is certainly more than one hundred, and the number of addresses given has been more than two hundred. The University has made large exhibitions of its technical work; six months at the State house in Springfield; sixteen months at the expositions at New Orleans; at the great educational displays at Madison, Wisconsin, and at Chicago; at the State fairs, and in many minor instances.

Among the material improvements, a few may be enumerated:

The purchase of ground adjoining the University park, extending the front to the next street; the purchase of ground, extending the arboretum to the street railway; the adornment of the Uni-

versity park and arboretum with suitable fences, and much fencing elsewhere. The construction of a boiler house and chimney in the rear of the main building, and the removal of the boilers thereto from the main building. The building of fire walls in the mansard roof of the main building, and the improvement of the ventilation therein. The building on the north farm of a dairy house and a farm cottage. The building of a small observatory for the accomodation of the theodolite. The building of a gun-house, and the removal thereto of the artillery and ammunition from the machine shop. The consequent enlargement of the carpenter's shop, as also of the machine shop, and the addition of several thousand dollars' worth of tools and machines in each of these departments. The building of a blacksmith-shop and foundry, with suitable equipment of tools.

The rearrangement of the physical laboratory and lecture room, and the preparation of a room for the study of electrical measurements in the east basement of the main building, with purchase of a dynamo and accompanying apparatus.

The equipment of the botanical laboratory, and fitting for its use of two rooms in the basement. The transfer of the State Laboratory of Natural History from Normal, and the arrangement of the west basement into suitable apartments for the use of this laboratory, the office of the State Entomologist, and the zoölogical laboratory of the University.

The purchase of a large testing machine, and the opening of a testing laboratory at the machine shop. The re-furnishing of the assaying laboratory. The equipment, at a cost of several thousand dollars of a laboratory of mining and metallurgy now in progress.

The opening of the large hall of the upper story of the west wing for the reception of a museum of industrial art, which is already filled with work from our own shops, and with the many objects of interest returned from the exposition at New Orleans; and the installation of the Victor Emanuel memorial therein.

The completion of cases in the library; and a multitude of other items designed to facilitate instruction in every department of the University.

In many respects the corps of instruction remains unchanged. Ten of the professors have been in the service of the University for periods of from ten to twenty years. The department of zoölogy has been reorganized, and with the State Laboratory shares the labors of a professor and an assistant professor of zoölogy. Other appointments have been: a professor of geology; a professor of mining engineering; a full professor of mechanical engineering; a professor of Latin; a professor of rhetoric and oratory; an instructor in modern languages, and an instructor in drawing. Other appointments are not named because, when made, they were made to fill vacancies, and were not extensions of the facilities of instruction. Courses have been extended or reconstructed to make the most of the work of these new laborers.

I shall not be pardoned if I fail to notice one other event in tha history of the University which is expected to exert a considerable influence upon its future prosperity. I refer to the law passed by the last legislature, providing that the Trustees of the University shall be elected by the people of the State. As is well known, I did not favor the passage of this law. My reason was, and is, that I believe it essential to the prosperity of this as a State University, that it should be kept absolutely free from the turmoil of political complications, and the dangers resulting therefrom. During four sessions of the legislature, I had worked faithfully to secure its recognition by all parties as a non-political institution, and I do believe that a good deal of success had attended such efforts. The next general election is bound to be hotly contested. It will be presidential, gubernatorial, congressional and for State officers all together, and the University will be plunged into the thickest of the flame. In this opinion I am not singular. It was fully sustained by the earnest statements of the Governor, of Senator Cullom, Congressman Cannon, the Secretary of State, and every other State officer with whom I ever conversed, as well as by those who had experienced the workings of such a law at the University of Michigan, including President Angell, Judge Cooley, the distinguished chairman of the Interstate Railway Commission, the Secretary of the Board of Regents, and several of the members of that Board. Nevertheless, as it is the law I am bound to accept it, and to hope that it will work beneficially.

In view of the facts thus briefly presented, it may be claimed, in no spirit of boastfulness, but only in honest candor, that in respect to these items which may be considered evidences of prosperity, to-wit:

1. The present condition of the University finances;

2. Its material equipment of lands, books, museums, shops, laboratories, etc.;

3. The number, character, scholarly eminence and well earned fame of its instructors; and,

4. The excellence, thoroughness and completeness of its courses of study and the instruction therein—in each and in all of these respects, the University never has stood upon a nobler or more conspicuous eminence than now. But these results are not mine that I should boast of them. Such honor as grows out of this state of affairs belongs first to the Board of Trustees of the University. Gentlemen who for years—one during the entire twenty-one years in which the Board has had an existence—have given freely their time, their interest, their wisdom, their best efforts to foster the interests of the institution which has been placed under their charge. For the kind and considerate attention which they have ever given to my suggestions concerning the conduct of this enterprise, they have my sincere thanks. For their efforts to advance the interests of the people of Illinois, centered in this University, thanks are inadequate.

Next, great honor belongs to that other body of noble and worthy men, the Faculty and instructors of the University. Faithful, scholarly, competent, these thirty stand here together as one brotherhood, imbued with one single purpose, striving together only to show how each may most surely advance the interests of the science which he loves, and of the University which he serves. When I came among them, they greeted me with open hands, and their kindest aid has ever been cordially afforded me.

Thirdly, great commendation is due to the young men and women who are now students at the University. I think it is admitted that all fathers and mothers have a right to believe that their own children are a little better than the children of any other family. But aside from this personal interest, which I am sure no one will rebuke, it is right and just for me to say in sober earnestness, that no better scholarship, no greater earnestness, no higher fidelity to duty, no more courteous, manly or womanly character has ever been shown here within these walls than is the every day characteristic of those who are here assembled. I have a right to be, I am proud of my boys and girls.

Lastly, thanks are freely given to all friends of the University, at home and abroad, alumni and others, who have a kind thought for its welfare, a kind word in its behalf, a friendly influence to extend a knowledge of its usefulness, an honest purpose to stand for its defense and to support and strengthen its good name. They have all helped to make its prosperity possible.

And now may our hearts go up in humble thankfulness to the Father of all mercies and the God of all grace, acknowledging with unaffected gratitude our reliance upon his generous and undeserved support.

Hitherto hath God helped us.

UNIVERSITY EXPERIMENTS AND INVESTIGATIONS.

A DISEASE OF BROOM-CORN AND SORGHUM.

By T. J. Burrill, Ph. D., Professor of Botany and Horticulture.

Crops of broom-corn and sorghum have, during recent years, been much reduced by a peculiar affection of the plants, the nature or cause of which has been quite unknown. The two plants are believed to be cultural varieties of the same original species usually referred to *Sorghum vulgare*. It is not, therefore, strange that they should be subject to the same diseases. What follows holds good for both, though the conveniences of study caused most of the experiments related to be made upon broom-corn.

DESCRIPTION OF DISEASED PLANTS.

Sometimes the appearance of injury is noticeable upon young plants. They grow very slowly, are slender and yellowish in color, and are easily pulled from the ground. The lower leaves die, having previously shown discolored (yellow or red, mostly the latter) patches on various parts of their surface. Not unfrequently, these conditions prevail in special areas of the field; perhaps several acres, not apparently different in composition of soil, condition of drainage, etc., will have throughout their extent this dwarfed and sickly crop, while the rest of the plantation remains healthy and vigorous. More often the evidence of disease appears, to a greater or less extent, over the entire field, all, or an exceedingly variable proportion of the plant suffering. Not unfrequently stalks four or five feet high can be lifted with ease from the soil, the roots being mostly dead and rotten.

Upon the aerial parts the conspicuous evidence of disease, aside from the smaller size of affected plants, is the red-blotched leaves and leaf-sheaths. The latter are particularly spotted at the upper portion, just below the ligule. If they are stripped from the stalk, the carmine coloration is seen to be conspicuously brilliant inside, and often extending over a large area of the interior surface of the sheath. On the leaves themselves the spots are usually more numerous along the mid-veins. The stalks themselves are

usually not locally affected until late in the season, when they too show evidence of the disease by the appearance of red or rusty spots. On the "brush" of broom-corn similar discolored patches are to be observed, and these directly injure the product. The rusty, corroded places may be frequently found on the brush of manufactured brooms.

The diseased roots also turn red but soon decay, and of course lose the bright color. The oldest roots die first, and, as new ones are successively emitted from the base of the stem in the order commonly occurring in these plants, they in turn become affected and perish. This is why the plant yields to so slight a pull, while healthy ones resist a vigorous effort. Upon close examination it is evident that the exterior parts of the roots or cortex is the portion in which the disease is resident, the woody fibers of the interior remaining for a long time unchanged, except through natural decay after the death of the whole root. But the woody part is stained from contact with the external layer.

SUPPOSED CAUSES.

The injuries now described have been attributed to insects, to parasitic fungi, to unfavorable conditions of soil and climate, and to constitutional weakness of the plants themselves. The crops are not comparatively important ones in the country at large, and are usually locally cultivated, so that relatively little attention has been given them by scientific investigators. But an account of careful studies upon the diseased plants, and upon the insects infesting the fields, is given in the Thirteenth Report of the State Entomologist of Illinois (1883), by Professor S. A. Forbes. Reference is also given here to previous publications.

The studies mentioned were avowedly unsatisfactory, but finding great numbers of plant lice, of four distinct species, in the fields, it was thought that these, or some of them, probably caused the mischief. If, however, the injury could be assigned to the lice at all, Professor Forbes concluded that the main injury must have been done before the time of his examination, and that the depredating insects had largely disappeared, for their distribution at the time did not correspond with the evidence of damage done. He thought the trouble might be due to fungi, and specimens were sent me for examination, upon which a negative report was made. I am not aware that the disease in question has been elsewhere attributed to specified insects.

In the *Prairie Farmer* for August, 1884, (Vol. LVI, p. 532), I gave a description of a fungus, supposed to be an unnamed species of *Chœtostroma*, found in abundance upon affected leaves of broom-corn. This seemed to cause some, at least, of the damages noted. It has been observed several times since, and probably does cause some injury to the crop, but cannot be connected in any way with the main disease with which we are now concerned.

So far as I am informed, this completes the accounts that have been published having reference to the particular and conspicuous injury under discussion. If the references really are complete, it is easy to understand that very little has been known upon a disease of long standing, and of wasteful effects.

A MICROBE CONNECTED WITH THE DISEASE.

In July, 1886, I collected for microscopical examination some of the diseased plants, and, upon using higher magnification than formerly found numerous bacteria within the affected tissues. An assistant in the State Laboratory of Natural History, Mr. Chas. Woodworth, was then asked to make special observations and experiments. The results were speedily convincing that a specific micro-organism was in some way connected with the disease, and apparently as cause. But for some reason still unknown, after August 1, 1886, the inoculation experiments undertaken were not successful, and, other work pressing, the matter was dropped for the time. A pure culture had, however, been made of a Bacillus from the affected plants, and the disease had apparently been produced by the use of this artificial culture.

Seeds of broom-corn were planted in the green-house in February, 1887, and April 6th, Mr. M. B. Waite, at the time a senior student, commenced experiments upon the young plants from material taken from old diseased stalks obtained at the time from the fields. This old stock was found to contain great numbers of living microbes, similar to those obtained by culture. There were also found in the old material many spores of bacilli, recognizable by their shape, size, and peculiar optical characteristics. The cultures from this old material were not always pure, but the prevailing organism was a Bacillus, of recognizable peculiarities, and evidently the same as that found the year before. This organism was easily obtained in a state of purity, by means of plate cultures, and was also found to be pure in several direct transfers from the old stock.

The inoculation experiments upon the young plants were at once successful, both from macerations of old material, and from the pure cultures of the Bacillus. Checks were made upon the same or similar plants by the use of sterilized water, and of sterilized fluid, like that in which the cultures were made, viz.: beef broth and potato infusion. Studies were prosecuted until the first of June, when they were again interrupted to be resumed a month later. The gentleman last named continued the work when taken up again, but my own attention was more directly given to it.

Without pausing now for the detailed record of experiments, a general summary of results is presented.

THE MICROBE DESCRIBED.

In the described disease of broom-corn and sorghum a specific Bacillus is constantly found in the affected tissues, both of the roots and of the aerial parts of the plants. Pure cultures of this Bacillus may be made in beef broth, and in infusions of potato and maize kernels, as well as upon nutrient gelatine and agar agar. The best growth takes place at a temperature of about 36° to 37° C., but development proceeds more slowly as the temperature is reduced to 25° C. Lower temperature has not been tried. In potato infusion in a test-tube, inoculated with a minute amount of a previous culture, or directly from diseased tissues, and placed in an incubator at 36° C., the limpid fluid becomes sensibly turbid in twelve hours, and conspicuously so in twenty-four hours. Spores begin to be formed at the last named time, provided the amount of nutrient material is small. These are produced in a characteristic and uniform manner, one in the middle of each individual, and when the latter are connected in chains the spore-bearing segments look like open links.

In the most active stage of growth—about twelve hours under the above conditions—organisms are found almost uniformly in pairs. In the preparation for spore-formation, changes take place in the protoplasmic contents of the cells, indicated by the action of staining agents. During active growth, methyl-violet (dissolved in glycerine) stains uniformly and deeply the whole body. When spore-formation begins, the central area of each cell is noticeably paler. At first this lighter colored portion looks like a pale, indistinct, equatorial band or zone, without distinct limitations. Gradually the differentiation becomes more pronounced, until one sees a cylindrical cell with a dark spot in each end, and a comparatively large, central, white area. Sometimes the end spots appear like circular dots; but usually they conform to the external shape of the cell, and are concave on the sides looking toward each other. These spots grow gradually smaller with the maturing spore, but do not wholly disappear until the cell wall dissolves and leaves an oblong free spore entirely colorless, except, perhaps, at the ends where the violet stains still leaves it mark. When still older, this agent does not color the spores at all. Aniline red, with carbolic acid, does stain them. The Bacillus averages .7 *u** in transverse diameter, but varies from about .5 *u* to 1 *u*. The joints (or cells) are short, but run from 1 to 3 *u* in length—1.5 *u* being most common. When newly divided the segments of a pair are oval, but usually the shape is short-cylindrical. As the spores form, the sides of the cell bulge outward, so that the outline of the whole is elliptical, the ends remaining, however, semi-circular. During the period of active growth the organisms have flagellate motions; but these are not very rapid, compared with those of many other species, neither does the power seem to be long retained.

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* A *u* is .000,004 inch, or .001 millimeter.

On plate cultures the characteristic growth is white or pearl-like, with peculiarly lobed and fimbriate margins. Gelatine is not liquified. In liquids in the incubator, as described, a pellicle forms upon the surface within twenty four hours, but afterwards becomes thicker. It is white, or nearly so, usually polished or glazed above with characteristic granules and pits. The growth extends upward on the sides of the tube about three millimeters. After a time the pellicle becomes brittle, easily breaks up, and gradually settles to the bottom as a flocculent precipitate.

PROPAGATION EXPERIMENTS.

When a culture fluid, filled with the living and growing microbes, is smeared upon the surface of a healthy leaf, either above or below, of broom-corn or sorghum, after forty-eight hours minute red specks can be seen by the unaided eye. These specks are usually thickly dotted over the entire surface to which the application was made, but sometimes more abundant over certain areas only. By the aid of suitable magnification, it can be readily determined that the minute red specks owe their location to the stomates or breathing pores of the leaf. If a leaf is previously marked off into checks, say two inches square, and upon alternate blocks is painted a culture fluid containing the Bacillus, while the remaining blocks are similarly treated with water or sterile culture fluid, the results are very striking and convincing. The former become sprinkled throughout with red dots, while the latter remain unchanged. At a later time, under favorable conditions (not too dry), say four to six days, the leaf becomes irregularly blotched, but clearly shows the original checks of diseased and healthy areas.

If a portion of a diseased leaf is slightly flamed, to destroy all living organisms on the surface (but not internally heated), then slightly cut with a flamed knife and, by bending, broken at the place of the cut, an uncontaminated exposure can be made of the diseased tissues. A glass pipette, just from the flame, may now be thrust into the newly exposed, reddish substance, and a culture started with pretty strong presumptions that whatever growth results, comes from the infected leaf. In this manner, time after time, a pure culture of the specific Bacillus has been secured and from these cultures the disease has been again started. Moreover the Bacillus has been clearly identified, as for as microscopical appearances will do this, in the affected tissues themselves, both when the disease occurred spontaneously, that is naturally, and when artificially started as described.

If sections are made of a newly affected leaf, it is again easy to demonstrate that the disease starts at the stomates. The guard cells themselves may or may not be changed, but the cells next the aerial cavity show the initial influence of the disease. From the stomates the injuries spread slowly through the cells next to them, the originally distinct specks soon coalescing and forming continuous blotches.

THE INJURIES TO THE PLANTS.

The cell walls are in nowise injured, so far as can be made out by the microscope, except that they are stained throughout with red. The first change observed in the cell-contents is a shrinking of the protoplasm as when treated with alcohol. It separates from the cell wall and appears rigid, instead of having its normal plastic consistence. The chlorophyll granules, if present, lose their green color and break up into smaller granules. Shrinking still continues, and the mass becomes tinted with red. From this time on the change does not appear to be always the same. Sometimes the shrunken mass seems tough, and remains like a lump in the middle of the cell. In other cases it breaks up into granular debris immersed in water. If starch grains existed at first they are decomposed. At length the whole substance passes into what seems to be an emulsion of oily matter in water. The spherical particles are dark red, and usually exhibit Brownian or molecular motion. In certain cells minute starch grains, of uniform size and shape, like little double convex lenses, occur in great numbers and oscillate rapidly in the cell fluids. They may be easily mistaken for microbes; but iodine stains them blue, revealing their nature. They have been observed only near the borders of the diseased areas within red-stained cells. The surfaces of the walls of the cells, from which the contents have disappeared, seem to have a granular deposit upon them. Here, again, one needs caution in looking for bacteria, as the deposited granules often appear somewhat like them. The liquid itself in the diseased cells is reddish in color, and certainly stains the cellulose of the walls beyond the area actually penetrated by the microbes.

No attempts have been made to ascertain the chemical nature of the changes which take place either in the plants or the culture media; but it is evident from what has been said that the injuries are chemical rather than mechanical. The effect is, at least at first, purely local. It seems, however, quite probable that cells adjoining the invaded ones sometimes suffer from the absorption of the fluid only of the actually diseased parts. It, indeed, may be true that the protoplasm, which shrinks into a lump and remains without further change, is killed by the poisoned liquid and not by the direct action of the microbes. The latter have not been observed in such cells. The red coloring matter is not directly elaborated by the organisms, but results from chemical decompositions of the cell-contents. The bacteria themselves are white, and do neither absorb nor excrete the red matter. Culture fluids tried remain unstained.

REMEDIES.

The question is sure to be asked, and properly too, "What are you going to do about it?" The so-called practical man is apt to care nothing for such information as the foregoing. He says, 'Give us the cure, never mind about the cause."

It is not always easy to say how a formidable enemy can be safely met when he can be seen; but it is true that a known foe is himself more exposed than one who fights under cover. The knowledge of the cause may lead to the cure. At any rate it is a rational foundation for further procedure.

A review of the facts presented certainly suggests some remedial measures. The destructive organisms infest any or all parts of the plants, and live over winter in the old material. In the case of broom-corn there is a large amount of stubble left upon the ground. It has been observed that since the introduction of the improved riding plows, and their use in turning under this old material instead of burning, as necessity formerly required, the disease has been much more destructive. If successive crops of these plants are to be raised on the same ground, undoubtedly the thing to do, so far as the disease is concerned, is to return to the former practice of burning the old refuse. But this will hardly dispose of the roots and underground portions of the stems which are infested with the parasites. Rotation of crops is much better than trusting to burning, and field practice has given excellent demonstration of the utility of this system of management. Crops are sometimes injured in the way described on land not previously planted with sorghum or broom-corn; but the danger is invariably less, and with the further knowledge of the operations of the bacteria, perhaps, may be wholly avoided. The same microbe does not appear to affect wheat, oats or maize, though we must expect to find it on some other members of the great grass family, very likely upon certain weeds.

The most serious damage is done to the roots, and no doubt these are far more liable to be infected from organisms already in the soil, than from such as might be washed down into fresh ground by rains. If the soil, on the other hand, contains great numbers of the living microbes, many of these will get into the air by the evaporation of water from the infected earth. This last has been disputed; but experiments have repeatedly proved that bacteria may be carried over in the practice of distilling water, as well as disseminated by natural evaporation. Whether they ride on tiny droplets, or are simply moved by the aerial currents produced, we need not pause to inquire. Certain it is, bacteria are more plentiful in the air every morning after the evaporation of dew. Of course, their own powers of movement are useless for such dissemination as we now consider.

It is quite possible that special fertilizers may be of service in checking the ravages of the disease, but nothing is now known upon this subject. The general fertility of the soil does not appear to enter into the problem, unless it is true that the disease is more injurious upon rich land. Sometimes it is worse on lower levels, where the soil is usually better. It seems to be generally true, the more luxuriant the growth, the more conspicuous the appearance of disease after artificial inoculation. Moist weather also seems favorable to the spread and abundant development of

the malady. Rains appear to be natural agents in the ordinary infections. The leaf-sheaths admit water, and this carrying with it the destroying germs, gives the latter access to the tender inner surface, protected from the drying winds. During the unusually dry weather of the present season, the crops suffered, in the particular manner under consideration, much less than commonly.

According to the tenth census of the United States, there were produced in 1879, 12,792 lb. of sugar and 28,444,207 gallons of molasses from sorghum, and 29,480,160 lbs. of broom-corn. Counting the sugar at five cents per pound, the molasses at thirty-five cents per gallon, and the broom-corn at one hundred dollars per ton, and estimating the loss from this disease at five per cent. of the entire sum—which is believed to be far within the actual amount—we have $571,506.00 as an annual tribute laid upon these comparatively unimportant crops in our country by the microscopic invaders, belonging to a single company of the mighty host which we are just beginning to recognize as warriors and enemies. Is it not time that we were opening our eyes and bestirring ourselves for a determined engagement? Victory ought to be, and may be ours.

ON THE MOISTURE OF THE SOIL AND ITS RELATIONS TO TILE DRAINAGE AND TO CULTIVATION.

Reported by T. F. Hunt, B. S., Assistant in Agriculture.

Throughout the valley of the upper Mississippi during the present season there has been a great deficiency in the rainfall. The average rainfall in this valley during the past ten years for the five growing months—March, April, May, June and July—is 17.96 inches. This year it was 11.59 inches, leaving a deficiency of 5.35 inches, or 36 per cent. The deficiency in central Illinois was 6.37 inches—almost exactly the same. The average rainfall for the months of June and July is 7.82 inches, while this year it was 3.86 inches, making a deficiency of nearly four inches, or more than 50 per cent. The deficiency in central Illinois was 4½ inches, while in Champaign county the rainfall reported by the regular meteorological observer was 5 inches less during June and July than the average for those months during ten years in central Illinois.

This great deficiency in the rainfall, together with a high temperature and an excess of sunshine, caused a drouth of unusual severity. Empty tiles, stagnant streams, dry wells, parched pastures, meadows yielding but half their usual return, reduced yield of the cereals—wheat excepted—the prospect for corn discourag-

ing, the foliage of large forest trees wilted by the scorching sun, and vegetation in general famishing for water, suggested an inquiry into the relation of soil moisture to tile drainage and to cultivation.

Ten to fifteen million dollars have been expended in tile drainage in Illinois. It is estimated that tile has been laid in this State enough to reach three times around the world. This vast amount is increased annually by an outlay of about two million dollars. The quantity of water taken out of the soil in this way in an ordinary season must be prodigious. No doubt is likely to arise as to the benefit of this in a wet season. But what about its effect in a period of drouth like the preceding? Will the amount of moisture be increased or decreased during drouth? Surely the interests at stake require that we proceed carefully in coming to a conclusion on this subject.

During this season, it has been possible to raise corn and keep it free from weeds with a minimum amount of cultivation. The question arises as to what effect cultivation has during drouth. Shall we cultivate freely, or shall we cultivate the least possible amount necessary to kill weeds? Will cultivated land contain more moisture than uncultivated? To determine certain phases at least of these inquiries, a series of tests, recorded in the succeeding pages of this report, was made of the percentage of water in soil, both tilled and untilled—producing different crops under different methods of cultivation.

METHOD OF PROCEDURE.

An excavation was made a little more than two feet deep, one side being made vertical and smooth. By means of a trowel, made for the purpose, a block of soil 3 inches square and 12 inches in vertical length was taken out of this side from top downwards. The soil was transferred to a pan and immediately weighed. A like prism from the second foot in depth was then similarly removed and treated. In all cases duplicate samples were taken under like conditions one rod distant. In the table given each even numbered sample is a duplicate of the preceding odd numbered sample. The unaccented number indicates the first foot, or top soil, and the accented number the second foot, or subsoil.

The samples were thoroughly dried in a hot air bath at 80°–90° C. (176°–203° F). Samples which were in comparison were dried at the same time. Percentages were obtained by dividing loss of water by weight of dry soil.

RESULTS IN DETAIL.

Nos. 1 and 2 were taken in a cornfield near a line of tile drain. The exact distance can not be stated, as the tile could not be precisely located, but it was not many feet away. The corn was drilled, two and three kernels at every 12 inches. It was begin-

ning to ripen. The soil—a black loam common to our prairie region, over a grayish clay subsoil, commonly called blue clay—was rather coarse and lumpy, as though it had been stirred when too wet. The ground had been plowed in the spring, having been previously in corn, and the corn had been cultivated three times. Nos. 3 and 4 were taken in same cornfield—15 rods from tile drain at Nos. 1 and 2. Here the stand of corn was not so heavy, there being one and two kernels in a hill 16 inches apart, and the corn was much greener than at Nos. 1 and 2. The soil had been similarly treated and was similar except that it was very fine and friable while the subsoil merged into yellow clay. The elevation was somewhat higher, sufficient for natural drainage, and would ordinarily be expected to be drier. In this test there was found to be 2.5 per cent. of water in favor of untiled land. While the amount of moisture in the first foot in either case is nearly the same, in the second foot there occurred over five per cent. more moisure away from the tile drain. How much this result was affected by the corn being thicker along the line of tile drain can not be stated. Being thicker, more, presumably, would be lost from the evaporation of the leaves, while on the other hand, the ground being more shaded there would be less evaporation from the surface of the soil. On account of the conformation of the land, in a wet time more water would be found along line of tile. The nature of the land indicated that the natural drainage of the untiled land was superior to the artificial drainage of tiled land.

Nos. 5 and 6 were taken in an oat stubble, near a tile drain—probably not five feet from the line of tile, and about 20 rods from its mouth. The soil was similar to Nos. 1 and 2. Nos. 7 and 8 were taken in an oat stubble, ten rods from a tile drain and from Nos. 5 and 6, but on a somewhat higher elevation. The soil and its location were similar to Nos. 3 and 4, and they form an admirable basis of comparison between cultivated corn land and oat stubble. In this instance (see table 1) there was more water near the tile drain by 2.2 per cent. In the first foot there was 5.1 per cent. more water near tile, while in second foot 0.4 was indicated in favor of untiled land.

Comparing Nos. 1 and 2 with 5 and 6, oat stubble shows 0.7 per cent. more water than cultivated corn field. It is fair to state that the sample was taken nearer the mouth of the drain than that from corn land. Comparing Nos. 3 and 4 with Nos. 7 and 8 the cultivated corn shows 4.1 per cent more water than the oat stubble. The first foot contained 3.6 and the second 4.5 per cent. more than stubble field. The stubble field had been exposed to the sun 13 days, the length of time since the grain was cut.

It has already been noted that the foregoing tests do not form a fair basis of comparison between tiled and untiled land because the untiled land was on a higher elevation, surface drainage being sufficient to make the land tillable. The tile was simply laid through low places which required tilling to make tillage practicable in wet seasons.

I, therefore, searched for a place where all the conditions should be alike, except that one part should be tiled and one untiled; where both were formerly equally wet, but where the tile had brought one part into a condition that could be cultivated without being troubled with excessive moisture in wet seasons, while the untiled land was yet troublesome to work in such seasons. I found the desired conditions on the farm of Mr. E. O. Chester in Champaign. Running almost parallel in a southwesterly direction at about 80 rods from each other are two depressions in his land which were formerly equally wet. One of these is now tiled and in all seasons is in tillable condition, while the untiled land is stated by Mr. Chester to be a little troublesome to cultivate in a wet season. These depressions both run through the same oat stubble field and then pass into broom-corn fields. The soil—common black prairie loam, was all of the same nature except those differences due to moisture and cultivation.

Here, then, were the desired conditions for a double test of the amount of water in tiled and untiled land. Nos. 9 and 10 were taken in oat stubble in untiled land. The soil was moderately fine and friable, the subsoil running into the grayish or blue clay near the bottom of the second foot. Nos. 11 and 12 were also taken in oat stubble. No. 11 directly over tile drain and No. 12 one rod from tile drain. No. 11 was of like texture throughout, coarse and lumpy, the grayish clay being mixed with the black loam. No. 12 was rather coarse, the top soil being more friable than No. 11, while the subsoil broke up into angular lumps. No. 11 appeared drier than No. 12. In fact, of the 48 samples I took, personally, the two taken at No. 11 appeared the driest. However, it was simply an appearance and not the fact. The per cents. of water (see table 1) were practically the same, being 14.0 and 14.4 respectively, while Nos. 9 and 10 had an average of 13.4 or 0.8 per cent. of water in favor of tiled land.

Nos. 13 and 14 were taken in a broom-corn field in untiled land which was in a fine friable condition, while Nos. 15 and 16 were from a tiled field of broom-corn, the soil being in condition similar to Nos. 13 and 14. The untiled land contained 14.7 per cent. while the tiled contained 16.4 per. cent. of water or 1.7 per cent. in favor of the latter.

Comparing Nos. 9 and 10 with Nos. 13 and 14, which were taken within four rods of each other, it is found that on untiled land the cultivated broom-corn field contained 1.3 per cent. more water than oat stubble. Comparing Nos. 11 and 12 and Nos. 15 and 16, which were taken within ten rods of each other, it is found that on tiled land the broom-corn field contained 2.2 per cent. more water than the oat stubble.

To determine the different percentages of water in land under different crops and cultivation, tests were made in a corn-field, a blue-grass and timothy pasture, and a clover stubble, all adjacent and in other particulars similar. The soil was the ordinary black loam running into yellowish clay at bottom of second foot. The

pasture was dried up, the blades of grass being dead from the drouth. The clover tops were still green, making a feeble growth. The corn was fresh and green. The pasture (see table 1) contained 12.3 per cent. and the clover stubble 11.0 per cent. of water or 1.3 per cent. in favor of the pasture land. Blue-grass and timothy failed to grow in soil containing 9.7 per cent. of water in first foot, where the roots get their main supply, while clover remained green, making a feeble growth in soil containing but 8.8 per cent. of water in first foot. This is in accordance with the prevalent belief that clover can stand drouth better than blue-grass and timothy.

Comparing Nos. 23 and 24 with Nos. 17 and 18, the corn land is found to contain 4.2 per cent. more water than clover stubble, or comparing with Nos. 21 and 22, 2.9 per cent. more than in pasture field. In taking samples an excavation was made 2 ft. 4 in. deep. An appreciable number of corn roots was found at this depth. It will be noticed that in second foot there is 18.3 per cent. of water while but 12 per cent. in first foot. These two facts,—depth of roots and high percentage of water in second foot in cultivated corn field,—indicates why corn is able to withstand such excessive drouth.

SOILS FROM MARION COUNTY, ILLINOIS.

It was thought not at all improbable that different soils might give very different results. To test this samples of the white soil of Southern Illinois were obtained by Mr. G. W. McCluer, of the University, in Meacham township, Marion county, in corn field, oat stubble, and timber land. The land was not tiled.

Nos. 25 and 26 (see table 2) were taken in oat stubble from which the oats had been cut six weeks. This soil is a light drab clay, almost white, fine and friable, the subsoil being the lighter in color because containing less vegetable matter. Nos. 27 and 28 were taken in a corn field in which the stand of corn was very light, in fact, a practical failure on account of drouth. Soil, similar to Nos. 25 and 26. Sample from oat stubble contained an average of 8.7 and those from corn field 12.7 per cent. of water or four per cent. in favor of soil in corn field. In this test the increased amount of water would seem to be owing to cultivation, as the corn stood so thinly and was so small as to cast but little shade.

Comparing Nos. 25 and 26 with Nos. 5, 6, 7, 8, 9, 10, 11, and 12 it is found that stubble land in Champaign county contained 4.3 per cent. more water than in Marion county; and, again, comparing Nos. 27 and 28 with Nos. 1, 2, 3, 4, 13, 14, 15, 16, 23, and 24, it is found that the corn and broom-corn land in Champaign county contained 2.1 per cent. more water than the corn field in Marion county. There was more difference between the uncultivated than the cultivated land.

Nos. 29 and 30 were taken in timber, consisting mostly of post oak and hickory. The soil was similar to Nos. 25 to 28, except more tough impervious clay in second foot. There was a little smaller percentage of water in first foot than was found in corn field and a little more than in oat stubble. In second foot there was a surprising percentage of water, there being 21.5, while there was but 10.2 in oat stubble, and 14.5 in corn field.

SOIL FROM WARSAW, HANCOCK COUNTY, ILLINOIS.

Through the kindness of Mr. A. C. Hammond, Secretary of the Illinois Horticultural Society, Warsaw, Hancock county, I was enabled to make farther tests of water in soil under varying conditions.

Nos. 31 and 32 (see table 3) were taken in Mr. Hammond's orchard, the soil being a dark clayey loam, somewhat peculiar to that region. A crop of rye was plowed under about the first of June, as well as the previous year; the land was plowed once afterward and harrowed several times. Nos. 33 and 34 were taken in a new meadow 15 rods from where samples were taken in orchard, the soil being similar. The soil in the orchard contained 24.6 per cent. of water, while that in the meadow contained 12.1 per cent., or about twice as much in the orchard as in the meadow. In regard to this Mr. Hammond writes: "This work has been a great surprise to me. In my own orchard there was no dividing line between the dry and moist earth but moisture extended to depth dug, while in every other instance the top was moist two or three inches, caused by late rains and the rest of the way down it was hard and dry."

Nos. 35 and 36 were taken from potato field of J. F. Johnson on the bluff (Loess soil) overlooking the Mississippi. The soil had received no cultivation, except digging the potatoes, since June 1st. Nos. 37 and 38 were taken on similar soil from a wheat stubble field 100 feet distant. The potato field contained 8.0 per cent. of water, the wheat stubble, 9.0 per cent., or one per cent. more water in uncultivated fields. The cultivation was not at the right time or of the proper kind to check evaporation in time of drouth.

Nos. 39 and 40 were taken in corn field six feet from tile drain. Nos. 41 and 42 were taken 100 feet distant. The land was almost flat, the last mentioned samples being taken possibly six inches higher than those near the tile drain. The soil was a clay loam very similar throughout. It will be noticed that there is a difference of 5.6 per cent. of water between Nos. 39 and 40. In regard to this Mr. Hammond writes: "In digging these holes No. 39 seemed to be drier than No. 40 and the weight shows less moisture, but I could see no local reason why it should be so." Of course, this difference between duplicates destroys in large measure the value of the results. The samples, however, near tile drain (see table 5) were found to contain on an average 2.1 per cent. more water than those 100 feet from tile drain.

In all the comparisons between cultivated and uncultivated soil there existed certain conditions, the effect of which could not be determined. An oat stubble had been exposed a greater or less time to the direct rays of the sun. The stubble may be a protection. How much, is unknown. The corn field was shaded by the growing corn, but the latter was rapidly evaporating large quantities of water from its leaves, the amount of which can be only vaguely estimated. The oat stubble evaporated practically none.

EARTH IN CANS.

To eliminate these sources of error, I had two cans made, 12 inches deep and 6 inches in diameter, with an air tight receptacle at the bottom to receive water. Each was filled with the same kind of soil, containing 14.3 per cent. of water. (See Table 7.) Both were filled with soil, firmly pressed, to within two inches of top, the amount of soil used differing by only three ounces. One can was filled to top with soil firmly pressed and the other filled with loose soil, the latter to be cultivated. To each was added two pounds of water, one pound being poured on the surface of each and the other placed in the receptacle at bottom. Each were then placed in sun and each lost at end of three days (see Table 7) 8 oz. of water. The surface of the one was then cultivated 1½ inches deep daily. At end of seven days the cultivated soil had lost 5 oz. and the uncultivated 9½ oz. of water. The water saved during a week on an acre of land by cultivation would be 30 tons, or would be equal to about one-fourth of an inch of rainfall.

LOSS OF WATER BY DRYING IN AIR.

Sixteen samples of soil (Nos. 1 to 8, Table 1) containing an average of 14.3 per cent. of water were put into pans having an exposed surface of three-fourths of a square foot and a depth of one inch. They were exposed in a still room to the direct rays of the sun, the temperature of the room averaging at mid-day about 90° F. The average loss of water in two days was 6 11-16 oz. or 8.4 per cent. of the weight of dry soil and 58.7 the total amount of water contained. This gives some idea of the amount of water that must be raised by capillary attraction, during a drouth, in order to keep soil in moist condition.

Two pounds of water were applied to each of 4 samples of dry soil weighing 5 pounds each and the surplus water allowed to drain away. At the end of eight hours, drainage ceased and there remained from 46.8 to 52.0 per cent. of water with an average of 49. 3 per cent. A saturated soil may contain, therefore, about half its weight in water.

SUMMARY.

Eighty samples of soil, forty from the first foot in depth and forty from the second, taken in Champaign, Marion, and Hancock

counties between August 1 and 19, 1887, gave an average of 13.2 per cent. of water. This in two feet of soil is equal to four inches of rainfall or 110,000 gallons of water per acre, which is about equal to the average monthly rainfall in this region and is over four times the rainfall in Champaign county during the two months previous to making the tests, as reported by the observer for the Illinois State Weather Service.

Forty-four samples taken in Champaign county gave an average of 13.5 per cent. of water, which is a little more than one-fourth the amount contained by a thoroughly saturated soil. Twenty-two samples of the first foot contained on an average 12.0 per cent. and a like number of the second foot 15.0 per cent. of water. The lowest per cent. of water found in the first foot of soil was 8.5. It was found in two instances, one in an oat stubble and one in a clover stubble. The clover was green and growing, while blue grass and timothy on adjacent soil containing an average of 9.7 per cent. of water was parched. The highest per cent. in first foot, 16.0, was found in a broom-corn field in two instances, in one instance tiled and one untiled. Twelve per cent. was the lowest found in the second foot, being in an oat stubble, and 18.4 the highest, being in a corn field.

Comparing the average of 40 samples taken on tiled and untiled land, which are in some measure comparable, there was found to be in two feet of tiled soil 14.1 per cent. of water, and 13.2 in untiled land. In the first foot, 13.6 in tiled and 11.3 in untiled; in the second foot, 14.5 in tiled and 15.0 in untiled. Comparing Nos. 9 to 16 (see Table 1), which for reasons before given are the only samples strictly comparable as to tiled and untiled land, there was found in two feet of soil 15.3 per cent. of water in tiled, and 14.0 in untiled land; in first foot, 14.4 in tiled and 13.3 in untiled; in second foot, 16.2 in tiled and 14.8 in untiled.

On the whole, it may be said, that no striking difference was found in the amount of water in tiled and untiled land. The difference in all probability amounts practically to nothing, but such as it is, it is in favor of tiled land. There need be no fear, therefore, that the laying of tile, which has been pushed forward with such enterprise and good judgment by the Illinois farmer, in the last ten years, will ever prove anything but a benefit, and he may keep on laying it at the rate 12,000 miles annually with the perfect assurance that he will get abundant returns for the capital invested. On the other hand, the increased yield of crops claimed to be produced on tiled land during drouth must be explained on other grounds than the increased percentage of moisture.

Fifty-six samples of soil taken in fields growing cultivated and uncultivated crops, show somewhat more moisture in soil growing cultivated than in that growing uncultivated crops. In two feet deep there was an average of 13.6 per cent. in the soil in cultivated crops and 11.6 per cent. in that in uncultivated crops; in first foot 12.0 vs. 10.3, and in second foot 15.6 vs. 12.8 per cent. respectively.

In an artificial test of cultivated and uncultivated fallow land, the uncultivated was found to lose nearly twice as much moisture as the cultivated land. The excess of water lost in uncultivated land in one week was equal to a rainfall of one-fourth inch.

TABLE I.—*Samples taken from farms of the University of Illinois, and of E. O. Chester, Champaign County, Illinois.*

LOCATION.	Number.....	Weight of soil—ounces.....	Weight after drying—ounces.....	Loss of water—ounces.....	Per cent. of water.....	Per cent. to depth of 2 feet.....	Average per cent.....
University farm—corn field near tile drain, Aug. 1, 1887	1	88	78	10	12.8	13.0	12.7
	1′	90.5	80	10.5	13.1		
	2	93	83	10	12.0	12.3	
	2′	111.5	99.5	12.5	12.6		
University farm—corn field 15 rods from tile drain, Aug. 2, 1887	3	84.5	75	9.5	12.7	15.4	15.2
	3′	95	80.5	14.5	18.0		
	4	71.5	64	7.5	11.7	14.9	
	4′	91.5	77.5	14	18.0		
University farm—oat stubble near tile drain, Aug. 2, 1887	5	104.5	91.5	13	14.2	14.2	13.4
	5′	97	85	12	14.1		
	6	115.5	102	13.5	13.2	12.6	
	6′	98	87.5	10.5	12.0		
University farm—oat stubble 10 rods from tile drain, Aug. 2, 1887	7	76.5	70.5	6	8.5	10.8	11.1
	7′	78	69	9	13.0		
	8	69.5	64	5.5	8.6	11.3	
	8′	77	67.5	9.5	14.0		
E. O. Chester's farm—oat stubble, not tiled, Aug 6, 1887	9	75.5	67.5	8	11.8	13.1	13.4
	9′	71.5	62.5	9	14.4		
	10	79.5	70	9.5	13.6	13.7	
	10′	82.5	72.5	10	13.8		
E. O. Chester's farm—oat stubble, tiled, Aug. 6, 1887	11	96.5	85.5	11	12.9	14.4	14.2
	11′	84.5	73	11.5	15.8		
	12	86	76	10	13.2	14.0	
	12′	81.5	71	10.5	14.8		
E. O. Chester's farm—broom-corn field, not tiled, Aug. 6, 1887	13	83	71.5	11.5	16.0	15.6	14.7
	13′	90.5	78.5	12	15.2		
	14	77	69	8	11.6	13.7	
	14′	88.5	76.5	12	15.8		
E. O. Chester's farm—broom-corn field, tiled, Aug. 6, 1887	15	80	69	11	16.0	16.5	16.4
	15′	93	79.5	13.5	17.0		
	16	85.5	74	11.5	15.5	16.3	
	16′	96	82	14	17.1		
University farm—clover stubble, Aug. 10, 1887	17	73	67	6	9.0	10.9	11.0
	17′	70.5	62.5	8	12.8		
	18	89.5	82.5	7	8.5	11.1	
	18′	63	55.5	7.5	13.6		
University farm—pastnre, Aug. 10, 1887	21	74.5	68.5	6	8.8	11.6	12.3
	21′	76	66.5	9.5	14.3		
	22	78	70.5	7.5	10.6	12.9	
	22′	72	62.5	9.5	15.2		

Table I.—Continued.

Location.	Number.....	Weight of soil—ounces.....	Weight after drying—ounces.....	Loss of water—ounces...	Per cent. of water.....	Per cent. to depth of 2 feet.....	Average per cent.....
University farm—corn field, Aug. 10, 1887....	23	73.5	66.5	7	10.5	14.5	15.2
	23'	74.5	62.5	11.5	18.4		
	24	72	63.5	8.5	13.4	15.8	
	24'	81.5	69.5	12.5	18.1		

TABLE II—*Samples taken from Marion County, Illinois.*

Location.	Number.....	Weight of soil—ounces.....	Weight after drying—ounces.....	Loss of water—ounces...	Per cent. of water.....	Per cent to depth of 2 feet.....	Average per cent.....
Oat stubble—Aug. 14, 1887.....	25	84	78	6	7.7	8.5	8.7
	25'	82	75	7	9.3		
	26	74.5	70	4.5	6.4	8.8	
	26'	80	72	8	11.1		
Cornfield—Aug. 14.....	27	70.5	63	7.5	11.9	13.7	12.7
	27'	93.5	81	12.5	15.4		
	28	74.5	68	6.5	9.6	11.6	
	28'	87.5	77	10.5	13.6		
Timber—Aug. 14.....	29	81	75.5	5.5	7.3	13.7	14.8
	29'	84	14	14	20.0		
	30	82	6.5	6.5	8.6	15.8	
	30'	85.5	16	16	23		

TABLE III—*Samples taken from Warsaw, Hancock County, Illinois.*

Location.	Number.....	Weight of soil—ounces.....	Weight after drying—ounces.....	Loss of water—ounces.....	Per cent. of water.....	Per cent. to depth of 2 feet.....	Average per cent.....
Cultivated orchard—Aug. 17, 1887.....	31	89	70	19	27.0	26.7	24.6
	31'	93.5	74	19.5	26.3		
	32	88	72	16	22.2	22.4	
	32'	92	75.5	17	22.5		
New meadow—Aug. 17.....	33	79.5	72	7.5	10.4	11.7	12.1
	33'	82.5	73	9.5	13.0		
	34	77	69	8	11.6	12.4	
	34'	81.5	72	9.5	13.2		
Potato field—Aug. 18.....	35	82.5	77	5.5	7.1	8.5	8.0
	35'	83.5	76	7.5	9.9		
	36	82	76.5	5.5	7.2	7.5	
	36'	84	78	6	7.7		

Table III—Continued.

Location.	Number....	Weight of soil—ounces....	Weight after drying—ounces....	Loss of water—ounces....	Per cent. of water.....	Per cent. to depth of 2 feet.....	Average per cent.....
Wheat stubble—Aug. 18	37	86	80	6	7.5	9.0	9.0
	37'	84	76	8	10.5		
	38	83.5	76.5	6.5	8.5	9.0	
	38'	86	78.5	7.5	9.5		
Corn field six feet from tile	39	82.5	75.5	7	9.3	10.8	13.7
	39'	90.5	80.5	10	12.4		
	40	89	76	13	17.1	17.5	
	40'	91.5	79.5	12.5	15.8		
Corn field 100 feet from tile drain	41	87.5	80	7.5	9.4	11.4	14.6
	41'	90	79.5	10.5	13.4		
	42	88	76	7	9.2	11.7	
	42'	89	78	11	14.1		

TABLE 4—*Percentage of water in soil; Champaign, Marion, and Hancock Counties.*

	No.	1st foot.	2d foot.	Average.		No.	1st foot.	2d foot.	Average.
Champaign County.	1	12.8	13.1	13.0	Marion County.	23	10.5	18.4	14.5
	2	12.0	12.6	12.3		24	13.4	18.1	15.8
	3	12.7	18.0	15.4		25	7.7	9.3	8.5
	4	11.7	18.0	14.9		26	6.4	11.1	8.8
	5	14.2	14.1	14.2		27	11.9	15.4	13.7
	6	13.2	12.0	12.6		28	9.6	13.6	11.6
	7	8.5	13.0	10.8		29	7.3	20.0	13.7
	8	8 6	14.0	11.3		30	8.6	23.0	15.8
	9	11.8	14.4	13.1		31	27.0	26.3	26.7
	10	13.6	13.8	13.7		32	22.2	22.5	22.4
	11	12.9	15.8	14.4	Hancock County.	33	10.4	13.0	11.7
	12	13.2	14.8	14.0		34	11.6	13.2	12.4
	13	16.0	15.2	15.6		35	7.1	9.9	8.5
	14	11.6	15.8	13.7		36	7.2	7.7	7.5
	15	16.0	13.0	16.5		37	7.5	10.5	9.0
	16	15.5	17.1	16.3		38	8.5	9.5	9.0
	17	9.0	12.8	10.9		39	9.3	12.4	10.9
	18	8.5	13.6	11.1		40	17.1	15.8	16.5
	21	8.8	14.3	11.6		41	9.4	13.4	11.4
	22	10.6	15.2	12.9		42	9.2	14.1	11.7
General average							11.6	14.8	13.2
For Champaign county—									
Average							12.0	15.0	13.5
Lowest							8.5	12.0	10.8
Highest							16.0	18.4	16.5
For Marion county—									
Average							8.6	15.4	12.0
Lowest							6.4	9.3	8.5
Highest							11.9	23.0	15.8
For Hancock county—									
Average							12.1	14.0	16.1
Lowest							7.1	7.7	7.5
Highest							27.0	26.3	26.7

TABLE 5.—*Comparison of percentage of Water in Tiled and Untiled Soil.*

Number and cultivation.	Tiled.			Untiled.		
	1	2	Avg.	1	2	Avg.
Percentage of water in first foot.						
Corn, 1, 2, 3 and 4	12.8	12.0	12.4	12.7	11.7	12.2
Oat stubble, 5, 6, 7 and 8	14.2	13.2	13.7	8.5	8.6	8.6
Broom corn, 13, 14, 15 and 16	16.0	15.5	15.8	16.0	11.6	14.8
Oat stubble, 9, 10, 11 and 12	12.9	13.2	13.1	11.8	13.6	12.7
Corn, 39, 40, 41 and 42	9.3	17.1	13.2	9.4	9.2	9.3
Average	13.0	14.2	13.6	11.7	10.9	11.3
Percentage of water in second foot.						
Corn, 1, 2, 3 and 4	13.1	12.6	12.9	18.0	18.0	18.0
Oat stubble, 5, 6, 7, and 8	14.1	12.0	13.1	13.0	14.0	13.5
Broom corn, 13, 14, 15 and 16	17.0	17.1	17.1	15.2	15.8	15.5
Oat stubble, 9, 10, 11 and 12	15.8	14.8	15.3	14.4	13.8	14.1
Corn, 39, 40, 41 and 42	12.4	15.8	14.1	13.4	14.1	13.8
Average	14.5	14.5	14.5	14.8	15.1	15.0
Percentage of water in two feet.						
Corn, 1, 2, 3 and 4	13.0	12.3	12.7	15.4	14.9	15.2
Oat stubble, 5, 6, 7 and 8	14.2	12.6	13.4	10.8	11.3	11.1
Broom corn, 13, 14, 15 and 16	16.5	16.3	16.4	15.6	13.7	14.7
Oat stubble, 9. 10, 11 and 12	14.4	14.0	14.2	13.1	13.7	13.4
Corn, 39, 40, 41 and 42	10,9	16.5	13.7	11.4	11.7	11.6
Average	13.8	14.3	14.1	13.3	13.1	13.2

TABBE 6.—*Comparison of percentage of Water in Cultivated and Uncultivated Soil.*

Numbers.	Cultivated.			Uncultivated.		
	1	2	Avg.	1	2	Avg.
Percentage of water in first foot.						
1, 2, 5 and 6	12.8	12.0	12.4	14.2	13.2	13.7
3, 4, 7 and 8	12.7	11.7	12.2	8.5	8.6	8.6
15, 16, 11 and 12	16.0	15.5	15.8	12.9	13.2	13.1
13. 14, 9 and 10	16.0	11.6	13.8	11.8	13.6	12.7
23, 24. 17 and 18	10.5	13.4	11.7	9.0	8.5	8.8
25, 26, 27 and 28	11.9	9.6	10.8	7.7	6.4	7.1
35, 36, 37 and 38	7.1	7.2	7.2	7.5	8.5	8.0
Average	12.4	11.6	12.0	10.2	10.3	10.3

Table 6.—Concluded.

Numbers.	Cultivated.			Uncultivated.		
	1	2	Avg.	1	2	Avg.
Percentage of water in second foot.						
1, 2, 5 and 6	13.1	12.6	12.9	14.1	12.0	13.1
3, 4, 7 and 8	18.0	18.0	18.0	13.0	14.0	13.5
15, 16, 11 and 12	17.0	17.1	17.1	15.8	14.8	15.3
13, 14, 9 and 10	15.2	15.8	15.5	14.4	13.8	14.1
23, 24, 17 and 18	18.4	18.1	18.3	12.8	13.6	13.2
25, 26. 27 and 28	15.4	13.6	14.5	9.3	11.1	10.2
35, 36, 37 and 38	9.9	7.7	8.8	10.5	9.5	10.0
Average	15.3	14.7	15.0	12.8	12.7	12.8
Percentage of water in two feet.						
1, 2, 5 and 6	13.0	12.3	12.7	14.2	12.6	13.4
3, 4, 7 and 8	15.4	14.9	15.2	10.8	11.3	11.1
15, 16, 11 and 12	16.5	16.3	16.4	14.4	14.0	14.2
13, 14, 9 and 10	15.6	13.7	14.7	13.1	13.7	13.4
23, 24, 17 and 18	14.5	15.8	15.2	10.9	11.1	11.0
27, 28, 25 and 26	13.7	11.6	12.7	8.5	8.8	8.7
35, 36, 37 and 38	8.5	7.5	8.0	9.0	9.0	9.0
Average	13.9	13.2	13.6	11.6	11.5	11.6

TABLE 7.—*Cultivated and Uncultivated Soil.*

Designations and Dates.	Cultivated.		Uncultivated.		Remarks.
	Weights.	Water lost.	Weights.	Water lost.	
	lb. oz.	oz.	lb. oz.	oz.	
Weight of can	1 14.5	.....	2 0	.....	14.3 per cent. water in soil when weighed.
Weight 10 inches soil	11 11.5	.....	11 14.5	.....	
Weight 12 inches soil	13 13.5	.....	14 6	.....	
Water added	2 0	.....	2 0	.....	2 lb=16.5 per cent.
Gross weight	17 12	.....	18 6	.....	Placed in sun Sept. 8, 9:30 a. m.
September 5th, 7:30 a. m	17 6.5	5.5	18 .5	5.5	
" 6th, 12:30 p. m	17 4	8	17 14	8	
" 7th, 1:30 p. m	17 2.5	1.5	17 13	1	
" 8th, 1:00 p. m	17 1.5	2.5	17 9	5	Cultivated soil daily from Sept. 6 to 12.
" 9th, 1:00 p. m	17 1	3	17 8.5	5.5	
" 10th, 1:00 p. m	17 .5	3.5	17 7.5	6.5	
" " "	17 12	.....	18 6	.....	Water added.
" 12th, 12:30 p. m	17 11	4.5	18 4.5	8	
" 13th, 1:00 p. m	17 10.5	5	18 3	9.5	

TABLE 8—*Loss of Water by Air Drying.*

No.	Weight of soil.	Weight of dry soil.	Per cent. water in soil.	Amount lost from three-quarters sq. ft. surface.			
				Two days.	Three days.	Four days.	Five days.
	oz.	oz.		oz.	oz.	oz.	oz.
1	88	78	12.8	6	6.5	7.5	7.5
1'	90.5	80	13.1	6	7	8	8
2	93	83	12.0	5.5	6	7	7
2'	111.5	99.5	12.6	7	7.5	9	9.5
3	84.5	75	12.7	6	6.5	7.5	7.5
3'	95	80.5	18.0	8.5	10	11	11.5
4	71.5	64	11.7	5.5	6	6.5	6.5
4'	91.5	77.5	18.0	8	9.5	10.5	11.5
5	104.5	91.5	14.2	9	9.5	10.5	10.5
5'	97	85	14.1	8.5	9	10	10
6	115.5	102	13.2	8.5	9	10	10.5
6'	98	87.5	12.0	8	8.5	8.5	9
7	76.5	70.5	8.5	4	4.5	4.5	5
7'	78	69	13.0	6	6.5	7	7.5
8	69.5	64	8.6	4	4.5	5	5
8'	77	67.5	14.0	6.5	7	8	8.5
Average		79.7	14.3	6.69	7.34	8.16	8.46
Average per cent. of loss				8.4	9.2	10.2	10.6

EXPERIMENTS IN FEEDING PIGS, WINTER OF 1886-7.

Reported by T. F. Hunt, B. S., Assistant in Agriculture.

EXPERIMENT NO. 1.

Feeding experiments were begun to determine the food value of skim-milk as compared with corn meal, and the value of shelled corn as compared with corn meal.

For this purpose six Poland-China barrows about 7 months old and varying in weight from 160 to 204 pounds were divided into three lots, so arranged that the variations in the lots were as small as possible, the greatest variation between any two lots being seventeen pounds.

The lots were known as A, B, and C. For three weeks Lot A was fed as much shelled corn as it would eat. Lot B was fed like Lot A, except that the corn was made into a coarse meal; Lot C like Lot B, with the addition of a fixed ration of skim-milk, as large as experience showed they would drink without waste. All had water.

In order to determine that the result obtained by the addition of skim-milk was not due to individual differences in the pigs, at the end of three weeks, the skim-milk was given to Lot B instead of Lot C, the food of Lot A remaining the same, and the feeding was continued three weeks longer.

THE VALUE OF SKIM-MILK.

Lot B (see tables 2 and 3) ate in three weeks, 251 pounds of corn meal, equivalent to four and one-half bushels of shelled corn, or three-fourths of a bushel per pig a week and gained 60.5 pounds; or it required 4.15 pounds of corn meal to produce one pound of increase. Lot C consumed 243 pounds of corn meal and 414 pounds of skim-milk and gained 88.5 pounds.

According to the amount required to produce a pound of increase in Lot B, 243 pounds of corn meal would produce 58.5 pounds of increase, leaving 30 pounds produced through the influence of the 414 pounds of skim-milk. It required, therefore,

13.8 pounds of skim-milk, when fed in connection with corn meal in the ratio of one pound of corn meal to 1.7 pounds of skim-milk to produce one pound of increase. In other words, for every 13.8 pounds of skim-milk consumed, one pound of increase was produced over what would have been with corn meal alone. Thus, 3.3 pounds of skim-milk were equivalent to one pound of corn meal.

During the time the experiment was being conducted corn was worth twenty-eight cents per bushel at Champaign. Including the cost of grinding, corn meal was worth 57 cents per hundred weight. Skim-milk was therefore worth seventeen cents per hundred weight as a food to be fed with corn meal to fattening hogs under the conditions enumerated. The reversal of the trial at the end of three weeks and its continuance for a like period plainly indicated that the gain was not due to individual differences, although no exact statement can be made for the last period on account of their previous dissimilar conditions of diet.

Professor Henry found at the Wisconsin Agricultural Experiment Station (Bul. No. 1, 1883), that when skim-milk was fed alone it required 19 pounds to produce one pound of increase, and that 4 pounds of corn meal, when soaked in water and allowed to become slightly sour, produced the same results. Thus 4.75 pounds of skim-milk were equal to one pound of corn meal, which would make the skim-milk worth, rating corn meal at 57 cents per hundred pounds, twelve cents per hundred pounds.

In a series of five experiments with varying proportions of corn meal and skim-milk, Professor Henry found the following results;

	1	2	3	4	5
Pounds of milk for one pound of increase	9.2	11.7	5.5	14.0	21.0
Pounds of milk = one pound of corn meal	1.84	2.34	1.10	2.80	4.20
Value of milk per cwt. when corn meal is worth 57 cents per cwt	$ .31	$ .24	$ .52	$ .20	$ .14
Ratio of corn meal to skim-milk	1: 5.2	1: 10.6	1: 1.6	1: 1.5	1: 10.0

His average value for skim-milk was higher than that obtained by us. His maximum valuation, rating corn meal as stated above, was fifty-two cents; minimum, twelve cents; average about twenty-eight cents per hundred weight. This was in part due to the fact that a larger quantity of corn meal (5.0 instead of 4.15 pounds) was required to produce one pound of increase. It required on an average 12.70 pounds of skim-milk to produce one pound of increase against 13.6 pounds in our experiment. In the trials by Professor Henry the best result was obtained with corn meal and skim-milk in the ratio of one to 1.6 pounds, nearly identical with that used in our experiment. In the latter case the corn meal was fed dry; in the former soaked with water and allowed to become slightly sour.

In a trial made at the Massachusetts Agricultural Experiment Station with three pigs, it was found that with corn meal and skim-

milk, mixed in the ratio of one to 11.7, it required 2.35 of dry matter to make one pound of increase, while, in our experiment, with a ratio of one to 1.7, it required 2.8 pounds. A comparative trial was not made, but assuming 5 pounds of corn meal to be necessary to produce one pound of increase, it required 17.7 pounds of skim-milk to produce a like result.

From the above considerations, it appears that under favorable conditions, it requires 10 to 15 pounds of skim milk to produce one pound of increase; that from 2.5 to 3.5 pounds of skim-milk are equivalent to one pound of corn meal; that the best results are obtained when the amount of milk is not large relative to the corn meal, say one pound of meal to two pounds of milk; and that when the price of corn is thirty cents or less per bushel, skim-milk can not be economically fed to fattening hogs, except where it is a waste product which can not be utilized in feeding young animals.

SHELLED CORN COMPARED WITH CORN MEAL.

During a period of three week the pigs of Lot A ate (see Tables 2 and 3) 271 pounds, or nearly five bushels, of shelled corn, being forty-five pounds for each pig per week, and gained 74.5 pounds; or it required 3.64 pounds of shelled corn to produce one pound of increase. As already stated 4.15 pounds of corn meal were required to produce the same result, or .51 pounds more corn meal than shelled corn to produce one pound of increase. One bushel of whole shelled corn produced 15.4 pounds of increase. When made into coarse meal and fed dry it produced but 13.5 pounds. The pigs fed on shelled corn, not only gained more (see Tables 2, 3 and 4) in proportion to the amount eaten, but they ate more, and therefore gained more absolutely, as well as relatively.

The fact of their eating more, and apparently, of an ability to eat more shelled corn than corn meal, is a possible explanation of their better relative gain. A smaller proportion of the food eaten was necessary to supply the waste of the system.

NUTRITIVE RATIO.

By reducing the amount of corn and corn meal 15 per cent., the per cent. of water found in a sample analyzed for the purpose, and by estimating 10 per cent. for the solids contained in the skim-milk, it is found, as shown in Table 5 that, with corn meal having a nutritive ratio of 1:8, it required 3.52 pounds of solids to produce one pound of increase; while with corn meal and skim-milk, having a nutritive ratio of 1:5, it required 2.8 pounds to produce one pound of increase, or .7 of a pound less in the latter case.

If the difference in the effect of the foods is in their respective proportions of proteids, fats, and carbohydrates, or nutritive ratio, it appears, so far as this experiment goes, that a food with a nutritive ratio of 1:5 is better for hogs than one of 1:8, leaving out

the question of economy. It must be remembered, however, that digestibility is a very important quality in foods. It is presumable that the solids of milk are more digestible than the solids of corn meal.

Another important element is the amount eaten in a given time. When milk was fed with corn meal more solids were consumed daily than when corn meal was fed alone. More food was available, therefore, to produce increase. Hence palatability becomes important by increasing the amount an animal will consume in a given time.

TABLE 1.—*Weight at beginning of each week; gain per week, and for periods of three weeks, and six weeks, for each pig as numbered.*

	No. 51.		No. 54.		No. 56.		No. 55.		No. 52.		No. 53.	
	Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	Weight.	
November 22	204	.....	160	.....	180	.....	192	.....	179	.....	202	.....
November 29	220	16	168	8	192.5	12.5	205	13	199.5	20.5	229.5	27.5
December 6	231.5	11.5	180.5	12.5	197	4.5	211.5	6.5	207	7.5	239	9.5
December 13	246	14.5	192.5	12	207	10	225.2	14	215.5	8.5	254	15
Three weeks	.....	42	.....	32.5	.....	27	.....	33.5	.....	36.5	.....	52
December 20	252.5	6.5	200	7.5	215	8	234.5	9	216.5	1	256	2
December 27	264	11.5	208	8	222	7	243.5	9	222.5	6	265.5	9.5
January 4	265	1	209	1	229	7	249	5.5	222.5	.....	270	4.5
Three weeks	...	19	.....	16.5	.....	22	.....	23	.....	7	.....	16
Six weeks	.....	61	.....	49	.....	49	.....	57	.....	43.5	.....	68

TABLE 2.—*Weight at beginning of each week; gain per week, and for periods of three and six weeks; gain per hundred pounds of live weight* per week, and average gains per week for each lot.*

	Lot A—Nos. 51—54			Lot B—Nos. 55—56			Lot C—Nos. 52—53		
	Weight.	Gain.	Gain per 100 lb of live weight.	Weight.	Gain.	Gain per 100 lb of live weight.	Weight.	Gain.	Gain per 100 lb of live weight.
November 22	364	.....	.....	372	.....	.....	381	.....	.....
November 29	388	24	6.38	397.5	25.5	6.63	429	48	11.85
December 6	412	24	6.00	408.5	11	2.73	446	17	3.95
December 13	438.5	26.5	6.23	432.5	24	5.70	469.5	23.5	5.13
Three weeks	.....	74.5	6.20	.....	60.5	5.02	.....	88.5	6.98
December 20	452.5	14	3.14	449.5	17	3.85	472.5	3	.64
December 27	472	19.5	4.22	465.5	16	3.50	488	15.5	3.23
January 4	474	2	.42	478	12.5	2.65	492.5	4.5	.92
Three weeks	.....	35.5	2.59	.....	45.5	3.33	.....	23	1.60
Six weeks	.....	110	4.40	.....	106	4.18	.....	111.5	4.30

* Obtained by dividing the gain per week by average weight at the beginning and end of the week.

TABLE 3—*Food eaten by each lot per week, and for period of three and six weeks;*

WEEK ENDING—	LOT A.	LOT B.		LOT C.	
	Shelled corn.	Corn meal.	Skim milk.	Corn meal.	Skim milk.
November 29	80	72	.....	72.5	162
December 6	81.5	81	.....	74.5	126
December 13	109.5	98	.....	96	126
Three weeks	271	251	.....	243	414
December 20	94.5	81.5	126	89	.....
December 27	105	83.5	126	126	.....
January 4	80	85	126	78.5	.....
Three weeks	279.5	250	378	265.5	.....
Six weeks	550.5	501	.....	508.5	.....

TABLE 4—*Pounds of food required to produce one pound of increase as obtained from feeding Lots A, B, and C.*

	Three weeks. Nov. 22, Dec. 13.	Three weeks. Dec. 13, Jan. 4.	Six weeks. Nov. 22, Jan. 4.
Shelled corn	3.64	7.87	5.00
Corn meal	4.15	.....	.....
Skim-milk	13.80	.....	.....

TABLE 5—*Amount of dry food eaten (water-free); pounds of dry food per pound of increase; nutritive ratio for each lot for period of three weeks:*

	Food eaten.	Increase.	Pounds of food (water-free) per lb. of increase.	Nutritive ratio.
Lot A	230	74.5	3.02.	1:8
Lot B	213	60.5	3.52.	1:8
Lot C	248	88.5	2.80.	1:5

EXPERIMENT NO. II.

The following feeding trial was undertaken firstly, to compare more fully the food value of corn meal and shelled corn when fed to hogs; secondly, to determine the value of oats when fed in connection with corn; thirdly, to find the value of a mixed diet, reputed to be more nutritious than corn alone.

Twelve pigs, 9 barrows and 3 sows, about 8 months old and varying in weight from 130.5 to 235 pounds were divided into three lots, so arranged that the variations in lots were as small as compatible with apparently even feeding qualities. The lots were

designated by the letters G, H, and I. Lots G and H contained each 3 Poland-China barrows and one Poland-China sow. Lot I was divided in the same manner as to sex, but these pigs including the sow were cross-bred Poland-China-Berkshires. It was believed, however, that the feeding qualities of the three lots were very similar. This was especially true of Lots G and H.

The pigs had previously been running after corn-fed cattle and had eaten, besides, a liberal supply of ear corn.

Two days previous to the beginning of this experiment, the pigs were placed in a comfortable piggery with access to small yards by means of swinging doors, and during the trial they did not suffer materially from the very variable winter weather.

They were weighed separately each Monday morning about 10 o'clock, having had no water since the previous evening.

They were fed five weeks, Jan. 17–Feb. 24, as follows:

Lot G, shelled corn; Lot H, corn meal; Lot I, equal parts by weight of corn meal and ground oats.

The food was given dry, as much as would be eaten, thrice daily. All had water.

The tables presented show the gains made, the food eaten, and the value of food per pound of increase, for periods both including and excluding the first week of feeding, it being deemed more instructive than to ignore the first week's feeding entirely, as it has an important economic bearing, while it would not be proper to include it where accurate comparisons are desired.

The cost of the food was calculated at one cent less than the average price of the grain at the local market during the period. One-seventh, the usual toll, was added to the value when the grain was made into meal.

SHELLED CORN COMPARED WITH CORN MEAL.

Lot G (see tables 9 and 10) during a period of five weeks gained 181 pounds and ate 834 pounds of shelled corn; or 4.60 pounds of shelled corn produced one pound of increase.

Lot H during same period gained 163.5 pounds and ate 738.5 pounds of corn meal; or 4.52 pounds of corn meal, produced one pound of increase. The pigs fed on corn meal, while gaining less than those fed on shelled corn, ate less and produced one pound of increase with eight hundreths of a pound less food. In this case, the amount of shelled corn and corn meal necessary to produce one pound of increase was practically the same.

Excluding the preliminary week, Lot G during the period of four weeks gained 126 pounds and ate 677.5 pounds of shelled corn: or 5.37 pounds of shelled corn produced one pound of increase.

Lot H during the same period gained 101 pounds and ate 571 pounds of corn meal; or 5.65 pounds of corn meal produced one pound of increase. It required .28 of a pound more of corn meal than of shelled corn to produce one pound of increase.

About 10.5 pounds of increase were produced by a bushel of corn; about ten by a bushel of corn meal.

In the latter period the result was in favor of the shelled corn, while during the period of five weeks it was slightly in favor of the corn meal. The reason for this is not far to seek. It was due to the very irregular gain made by the pigs fed on corn meal, while those fed on shelled corn made a comparatively even although, of course, decreasing gain. During the three alternate weeks, first, third and fifth, (see tables pp. 245, 246) those fed on corn meal gained twelve per cent, more than those fed on shelled corn, while during the second and fourth weeks those fed on shelled corn gained 253 per cent., or over two and one-half times as much as those fed on corn meal. The former made a total gain of 10.6 per cent. more than those fed on corn meal.

The size of the machine will to a certain extent limit the amount of work done, although many elements necessarily modify the total effective results, as, for instance, a fine adjustment of parts, a minimum amount of friction, etc. The larger the hog, likewise, the greater in general will be the gain, although coarseness, or, in other words, a lack of adjustment of parts, requiring too large an amount of food to keep up the normal waste of the system, may, and often does, materially modify the total effective result, and make the smaller animal the more profitable.

The gains made may be compared, after removing this source of variation, by comparing the gain made per hundred pounds of live weight. At the beginning of the trial, Lot G weighed 678.5 pounds and gained per week during the period of five weeks 4.73 pounds per hundred pounds of live weight. Lot H weighed 708.5 pounds and gained per week during same period 4.15 pounds. The pigs fed on corn meal gained approximately, therefore, one-half pound less per week per hundred pounds of live weight, for the period named.

Excluding the preliminary week, those fed on shelled corn (Lot G) gained 3.96 pounds, while those fed on corn meal gained 3.08 pounds per week per hundred pounds of live weight, or approximately nine-tenths of a pound in favor of the shelled corn. Looked at in this way shelled corn gives the best results.

When we compare the cost of food we gain additional information. During the period of five weeks (see table 9) Lot G consumed 834 pounds, or nearly fifteen bushels of shelled corn, which, at twenty-eight cents per bushel, cost $4.17. The increase made was 181 pounds, which makes the cost of food per hundred pounds of increase $2.30.

Lot H consumed 738.5 pounds, equivalent to 13 bushels, of corn meal, which at 57 cents per hundred pounds, cost $4.21. The in-

crease made was 163.5 pounds, which makes the cost of food per hundred pounds of increase $2.58; or twenty-eight cents per hundred pounds more with those pigs which were fed corn meal than with those fed shelled corn.

The difference in the cost was practically due to the cost of grinding the corn. The hog raiser considers a difference of twenty-eight cents per hundred pounds, an important item in selling a bunch of hogs. The same difference in the cost of production is more easily within his control.

Leaving out the preliminary week there is a greater difference in the cost of production. For a period of four weeks Lot G ate 667.5 pounds, or about twelve bushels of shelled corn, costing, as rated before, $3.39. An increase of 126 pounds, makes the cost of the food per hundred pounds of increase $2.69.

Lot H ate 571 pounds of corn meal, equivalent to a little more than ten bushels of shelled corn,—costing at 57 cents per hundred pounds $3.25. An increase of 101 pounds makes the cost of food per hundred pounds of increase $3.22, or fifty-three cents more than those fed on shelled corn,—an item of considerable importance.

Looked at from all sides these trials indicate that when fed dry, whole corn produces better results than corn meal. Where the difference is simply due to the cost of grinding the corn, the difference in the cost of producing a hundred pounds of increase at the low price of twenty-eight cents per bushel for corn, will be twenty-five cents or more,—an item worth the attention of every hog raiser.

These gains were made during the very variable and sometimes severe weather of the latter part of January and February, and the food consumed,—corn, only, be it remembered,—cost on an average $2.45 per hundred pounds of increase and the hogs sold at the close of the trial for $5.00 per hundred pounds, leaving a handsome margin of profit on the increase, besides the increased value of the hogs per pound during the feeding.

CORN MEAL COMPARED WITH GROUND OATS.

The oft repeated statement that corn alone was not the best food, or even a fit food, upon which to fatten hogs, led to the trial of oats in connection with corn, it being generally the most available food to the hog raiser during the winter months.

Lot I (see tables 9 and 10) gained during a period of five weeks 145.5 pounds and ate 816.5 pounds of equal parts by weight of corn meal and ground oats; 5.61 pounds of this mixed food produced one pound of increase. As already stated, 4.52 pounds of corn meal produced one pound of increase. It, thus, required 1.09 pounds more of this mixed food than of corn meal to produce one pound of increase.

Excluding the preliminary week Lot I gained 93 pounds and ate 671 pounds of mixed food, or 7.22 pounds of mixed food produced one pound of increase. It required 5.65 pounds of corn meal to produce the same result, or 1.57 more of mixed food than of corn meal.

Lot I gained an average per week of 3.06 pounds per hundred pounds of live weight, while Lot H gained 4.15 pounds; in other words, the pigs fed on corn meal alone gained more than a pound more a week per hundred pounds of live weight than those fed on a mixed diet of corn and oat meal.

The price of oats was twenty-three cents per bushel, while that of corn was twenty-eight cents per bushel making the value of ground oats eighty-two cents per hundred pounds, or twenty-five cents per hundred pounds more than that of corn meal. Still greater difference will be found, therefore, in the cost of the food consumed.

Lot I ate during the period of five weeks 408.25 pounds of corn meal, costing, at 57 cents per hundred pounds, $2.33; and 408.25 pounds of ground oats, costing at 82 cents per hundred pounds, $3.35; making the total cost of food $5.68. The increase made was 145.5 pounds, which makes the cost of food per hundred pounds of increase, $3.90. The increase produced by corn meal cost $2.58, and by shelled corn $2.30 per hundred pounds. It thus cost $1.32 more per hundred pounds of increase with mixed food than with corn meal, and $1.60 more than with shelled corn.

Excluding the preliminary week, the cost of the mixed food was $5.02, while for the corn meal it was $3.22, and for the shelled corn $2.69 per hundred pounds of increase.

These results are so clear and decisive that he who runs may comprehend them, but the subject may be considered from another standpoint.

Lot H produced one pound of increase from 4.52 pounds of corn meal. Assuming the feeding qualities of Lots H and I to be similar—an assumption we must make if our results are to be of any value—the 408.25 pounds of corn meal fed to Lot I produced 90 pounds of increase, or about 62 per cent. of the increase produced by the mixed food. The remaining 55.5 pounds were produced over what would have been the product of the corn meal; that is, were produced by the 408.25 pounds of ground oats. It required, therefore, 735 pounds or 23 bushels of oats, costing $6.03 to produce 100 pounds of increase. The same increase was obtained with 452 pounds of corn meal—equivalent to eight bushels—cost $2.58; also with 460 pounds or eight bushels of shelled corn costing $2.30. Hence, when corn is worth twenty-eight cents per bushel, oats to be fed ground with corn in equal parts by weight, are worth ten cents per bushel; that is, a bushel of corn is equivalent to nearly three bushels of oats as a food for hogs fed under the conditions specified.

These conclusions are not applicable to other animals, especially ruminants, which on account of their different digestive apparatus are adapted to digest material of a very different nature.

TABLE 6—*Individual weights and gains of Lot G, fed on shelled corn.*

	No. 92.		No. 93.		No. 94.		No. 95.	
	Weight.....	Gain.....	Weight.....	Gain.....	Weight.....	Gain.....	Weight.....	Gain.....
January 17	150		181.5		174		173	
" 24	162.5	12.5	196	14.5	186.5	12.5	188.5	15.5
" 31	165	2.5	203.5	7.5	194	7.5	196	7.5
February 7	174	9	217	13.5	203.5	9.5	210	14
" 14	179.5	5.5	223	6	209	5.5	216	6
" 21	189	9.5	232	9	213.5	4.5	225	9
Four weeks		26.5		36		27		36.5
Five weeks		39		50.5		39.5		52

TABLE 7—*Individual weights and gains of Lot H, fed on corn meal.*

	No. 88.		No. 89.		No. 90.		No. 91.	
	Weight.....	Gain.....	Weight.....	Gain.....	Weight.....	Gain.....	Weight.....	Gain.....
January 17	213.5		130.5		161		203.5	
" 24	236	22.5	141	10.5	176	15	218	14.5
" 31	238.5	2.5	139.5	—1.5	176.5	.5	221	3
February 7	251	12.5	150	10.5	189	12.5	234.5	13.5
" 14	253	2	153	3	190.5	1.5	237.5	3
" 21	262	9	151	4	204.5	14	248.5	11
Four weeks		26		16		28.5		30.5
Five weeks		48.5		26.5		43.5		45

TABLE 8—*Individual weights and gains of Lot I, fed on equal parts, by weight, of corn meal and ground oats.*

	No. 84.		No. 85.		No. 86.		No. 87.	
	Weight.....	Gain.....	Weight.....	Gain.....	Weight.....	Gain.....	Weight.....	Gain.....
January 17	163		151.5		235		222	
" 24	170.5	7.5	160.5	9	255	20	238	16
" 31	175	4.5	162	1.5	259	4	239	1
February 7	182.5	7.5	172.5	10 5	271	12	250.5	11.5
" 14	185.5	3	172	—.5	273	2	248	—2.5
" 21	193	7.5	183	11	283	10	258	10
Four weeks		22.5		22.5		28		20
Five weeks		30		31.5		48		36

TABLE 9.—*Weight, total and average gains, and gains per week per hundred pounds of live weight for each lot.*

	Lot G.				Lot H.				Lot I.			
	Weight	Gain	Average gain per pig	Gain per 100 lb of live weight	Weight	Gain	Average gain per pig	Gain per 100 lb of live weight	Weight	Gain	Average gain per pig	Gain per 100 lb of live weight
January 17	678.5	.....	.....	.....	708.5	.....	.....	.....	771.5	.....	.....	.....
January 24	733.5	55	13.75	7.79	771	62.5	15.62	8.45	824	52.5	13.12	6.60
January 31	758.5	25	6.25	3.35	775.5	4.5	1.12	.58	835	11	2.75	1.33
February 7	804.5	46	11.5	5.88	824.5	49	12.25	6.13	876.5	41.5	10.37	4.85
February 14	827.5	23	5.75	2.82	834	9.5	2.37	1.14	878.5	2	.5	0.23
February 21	856.5	32	8	3.79	872	38	9.5	4.45	917	38.5	9.62	4.30
Four weeks	.....	126	31.5	3.96	.....	101	25.25	3.08	.....	93.5	23.25	2.18
Five weeks	.....	181	45.5	4.73	.....	163.5	40.87	4.15	.....	145.5	36.37	3.06

TABLE 10.—*Pounds of food eaten.*

	Lot G.	Lot H.	Lot I.
	Shelled corn.	Corn meal.	Half corn meal and half ground oats.
First week	156.5	167.5	145.5
Second week	147.5	108	148
Third week	172	146	168
Fourth week	169	151	173
Fifth week	189	166	182
Last four weeks	677.5	571	671
Five weeks	834	738.5	816.5

TABLE 11.—*Total gain per lot; pounds of food eaten; pounds of food required to produce one pound of increase, and cost of food per one hundred pounds of increase.*

Lot	Food.	Gain	Food eaten	Pounds of food to lb of increase.	Cost of food per 100 lb of increase.
	Period of trial—Last four weeks.				
G	Shelled corn	126	677.5	5.37	$2 69
H	Corn meal	101	571	5.65	3 22
I	Corn meal and ground oats	93	671	7.22	5 02
	Five weeks.				
G	Shelled corn	181	834	4.60	2 30
H	Corn meal	163.5	738.5	4.52	2 58
I	Corn meal and ground oats	145.4	816.5	5.61	3 90

Experiment No. III.

THE INFLUENCE OF INSUFFICIENT FOOD.

The experiment here described forcibly illustrates a fact, well known but too often disregarded, that an animal which lacks for a time, proper and sufficient food to keep it in a healthful and normal condition, sustains an injury that will impair its future usefulness. This simple experiment shows that a little cause may produce grave results.

Four small Yorkshire-Chester-White pigs were the subjects of this test. Three were barrows, Nos. 76, 78 and 79, (see table 12), and one a sow, No. 77. The sow and two barrows, Nos. 78 and 79, were about four weeks old; the other barrow, No. 76, was two weeks older. Their average weight was 15.5 pounds.

These were taken from their dams, (see table 14), suitably housed, and fed during two weeks as much corn meal as they would eat, and 84 pounds of skim-milk, being six pounds a day, the quantity they were found to drink without waste. They ate during this period 42.5 pounds of corn meal. They made a total gain of 18.5 pounds during this time, Nos. 76 and 78 gaining eight pounds, and Nos. 77 and 79 ten and one-half pounds.

The pigs were then separated. Nos. 76 and 78, having a total weight of 41 pounds, were placed together (Lot E); and Nos. 77 and 79, having a total weight of 39 pounds, were placed together (Lot F). The pigs of Lot E were then given all the skim-milk they would drink, which was five pounds per day or 70 pounds for two weeks. Those of Lot F were given as much corn meal as they would eat and all the skim-milk they would drink, which was three pounds per day, or 42 pounds for two weeks. During this period they ate 37 pounds of corn meal.

Lot E, or those fed on skim-milk alone, made no gain.

Lot F. with a less quantity of skim-milk and the addition of 37 pounds of corn meal, gained 13.5 pounds.

They were again placed together and received during the remaining eight weeks the same food. During this time they consumed 344 pounds of corn meal and 336 pounds of skim-milk, the milk being discontinued the last two weeks. Those which had previously been on the skim-milk diet for two weeks gained 39 pounds, while those which had had corn meal gained 71 pounds, or 32 pounds in favor of the latter.

The difference in the cost of the food to which we may attribute this difference of gain was eighteen cents. There was, therefore, a loss of 32 pounds of increase, worth five cents a pound, or $1.60, caused by a lack of sufficient food worth eighteen cents. The difference in the appearance of the pigs spoke in even more decisive terms.

It is doubtful whether many pigs do not receive equally poor treatment, for, notwithstanding this lessened gain, the cost of increase during this eight weeks, if we allow they ate half the food, was but $3 per hundred pounds.

During the twelve weeks both lots together consumed 432 pounds of corn meal and 532 pounds of skim-milk. The increase made was 142 pounds, or about three pounds per week for each pig, making the cost of food $2.37 per hundred pounds of increase, rating skim-milk worth seventeen cents per hundred pounds.

TABLE 12.—*Individual weights and gains for period of two weeks, for twelve weeks, and for last eight weeks.*

	No. 76.		No. 78.		No. 79.		No. 77.	
	Weight.....	Gain.....	Weight.....	Gain.....	Weight.....	Gain.....	Weight.....	Gain.....
November 29	19.5	.....	13.5	.....	13.5	.....	15.5	.....
December 13	25	5.5	16	2.5	19	5.5	20.5	5
" 27	25	0	16	0	24	5	29	8.5
January 10	27	2	17.5	1.5	28	4	32.5	3.5
" 24	27	0	25.5	8	42.5	14.5	44	11
February 7	35	8	30	4.5	50	7.5	56	12
February 21	44	9	36	6	60	10	64	8
Twelve weeks	.....	24.5	.....	22.5	.....	46.5	.....	48.5
Last eight weeks	.....	19	.....	20	.....	36	.....	35

TABLE 13—*Weight and gain per lot for periods of two weeks, and last eight weeks, and gain per hundred pounds of live weight:*

	LOT E—NOS. 76 AND 78.			LOT F—NOS. 79 AND 77.		
	Weight.	Gain.	Gain per 100 lb. of live weight.	Weight.	Gain.	Gain per 100 lb. of live weight.
November 29	33	.....	.....	29	.....	.....
December 13	41	8	21.62	39.5	10.5	38.88
December 27	41	0	.0	53	13.5	29.35
January 10	44.5	3.5	8.38	60.5	7.5	13.27
January 24	52.5	8	16.50	86.5	26	35.62
February 7	65	12.5	21.30	106	19.5	20.31
February 21	80	15	20.70	124	18	15.65
Twelve weeks	.....	47	14.75	.....	95	24.18
Last eight weeks	.....	39	16.77	.....	71	21.21

TABLE 14—*Food eaten by lots E and F, for periods of two weeks each:*

Lot.	Food.	Period 1. lb.	Period 2. lb.	Period 3. lb.	Period 4. lb.	Period 5. lb.	Period 6. lb.	12 weeks. lb.	Last 8 weeks. lb.
E	Corn meal	42 5	0.	45.5	80 5	97.5	120	432	344
F			37.						
E	Skim milk	84.0	70.	112	112	112	0	532	336
F			42.						

TABLE 15—*Cost of food per cwt. of increase, lots E and F, for twelve weeks, and for last eight weeks:*

	Food.	Pounds.	Rate.	Cost.	Total cost.	lb. of increase.	Cost per cwt.
Twelve weeks.	Corn meal	432	$0 57	$2 46	$3 36	142	$2 37
	Skim milk	532	17	90			
Last 8 weeks.	Corn meal	344	57	1 96	2 53	110	2 30
	Skim milk	336	17	57			

SUMMARY AND CONCLUSIONS.

1. It required 13.80 pounds of skim-milk to produce one pound of pork when fed with corn meal in ratio 1:1.7 to fattening hogs.

2. Skim-milk could not be economically fed to fattening hogs unless it was a waste product which could not be otherwise more profitably utilized.

3. It required on an average 4.12 pounds or .074 bushels of shelled corn to produce one pound of pork during an average period of four weeks, or one bushel produced 13.5 pounds.

4. It required 4.37 pounds of corn meal to produce one pound of pork, or one bushel of corn made into meal and fed dry, produced 12.8 pounds of pork.

5. When fed dry, shelled corn is more economical than corn meal to feed to fattening hogs.

6. It required 7.35 pounds or .23 bushels of ground oats to produce one pound of pork when fed with equal parts by weight of corn meal.

7. One bushel of corn is worth nearly three bushels of oats, as food for fattening hogs.

8. Corn-fed pigs gained about 4.5 pounds per week and ate about 21 pounds of corn per hundred pounds of live weight.

9. The gain for the amount of food consumed decreased during fattening.

10. Pork was produced during cold weather, with corn at 28 cents per bushel, for less than three cents per pound.

11. An insufficient food supply for two weeks caused a very considerable loss in feeding thereafter.

12. We believe Indian corn to be the most economical pork producing material during winter months in regions where extensively grown.

13. No one should think of deriving sweeping conclusions from the experiments herein detailed; nevertheless, they are believed to possess a value to him who will read them intelligently, interpret them fairly, and apply them with a proper regard to the conditions under which they were made.

FIELD EXPERIMENTS WITH CORN—1887.

Reported by Thomas F. Hunt, B. S., Assistant in Agriculture.

During the summer of 1887, there were grown on the experiment farm of the University of Illinois, 25 contiguous plats of corn, in which were planted 24 varieties or sub-varieties. Two plats, Nos. 4 and 16, were planted with the same variety to test the productiveness of different parts of the field. The result showed a very uniform condition of soil over the whole tract of land. [Table No. 2.]

Fifteen of these varieties were yellow dent, two mixed dent and seven white dent. The seed of fifteen varieties was obtained through the kindness of the *Prairie Farmer*. These had taken premiums, mostly first premiums, at the *Prairie Farmer* Prize Corn Show, held in connection with the Fat Stock Show, at Chicago, in 1886. The seed of eight varieties was raised on the farms of the University, while the seed of one, No. 14, was obtained from W. T. Lamb, Stephenson county. But Mr. Lamb had been furnished seed by the University three years before, and had grown the variety three seasons in a latitude about 150 miles north of Champaign. The seed from Mr. Lamb and home-grown seed of the same variety were grown side by side, both on experimental plats and in field culture, and no difference was observable which could be attributed to the effect of climate. The seed of twelve varieties had been grown in Illinois; of three, in Indiana; of two each, in Iowa, Nebraska and Kansas, and of one each, in Ohio, Michigan and Missouri.

The land on which these varieties were grown had been in mammoth clover for two years. It was well manured with stable manure in the spring and was plowed about two weeks before planting. One-ninth of an acre, eight rows containing 44 hills in a row, was allotted to each variety. The cultivation of the corn was shallow.

MATURITY.

Two rows were husked September 19–21, 130 days from date of planting, the corn weighed and notes taken on ripeness of leaves

and ears. [Table No. 1.] The leaves of seven varieties were found to be ripe; ten had a few green leaves; five were half ripe, while two were quite green.

The ears of eighteen varieties might be considered ripe at this time, although nine were still moist to the touch. Four were still in the milk. The seed of the nine varieties that were ripe and dry was either grown north of this latitude, or was seed of varieties early maturing in this latitude. The seed of three of the four varieties that were green, was grown considerably south of this latitude.

BARREN STALKS.

The corn was planted in hills three feet eight inches apart, four kernels in a hill. The number of stalks and the number of barren stalks were determined in each of two rows in each variety. [Table No. 2.] It was found that there were on an average three and one-quarter stalks to a hill, and that 35 per cent. of these were barren. The greatest percentage of barren stalks was 63; the least 22.3. In general, those plats containing the less number of barren stalks gave the larger yield.

The percentage of barren stalks was determined in seven varieties in 1886. The average was 14.1 per cent.; the greatest 25.2, and the least 6.2. [See Thirteenth Report, University of Illinois, page 190.]

A vacant row was left between successive plats. One of the two rows taken for this test was an outside row. This row contained on an average 32 per cent. of barren stalks, while the second row contained 39 per cent. The reduction of yield from an overproduction of stalks would seem evident. The soil contains only a limited amount of available plant food at any one time. The amount of plant food used by barren stalks was a direct loss to the productive stalks in the same way that weeds reduce the supply of available plant food. The barren stalks may without impropriety be considered weeds. It would seem also less exhaustive to the available plant food of the soil to grow one large ear on one stalk than two equivalent small ears on two stalks, for more stalk in proportion to corn must be produced in the latter than in the former case. It is for much the same reason that one steer weighing 1,600 pounds at three years old can be more economically produced than two steers weighing 800 pounds each at the same age.

This season what the corn lacked was water. Another season the soil might be able to produce four productive stalks, where but two grew imperfectly this year.

YIELD.

October 25–27, 6 rows, one-twelfth of an acre, of each plat were husked, the ear corn was weighed and shelled and the shelled corn weighed. [Table No. 2.] The largest yield per acre was

38.8 bushels. This was Murdock No. 14, an early yellow dent variety grown by Mr. W. T. Lamb, as mentioned above. The next largest yield was 37.9 bushels. The seed of this variety, No. 22, took first premium as "best white dent corn in Illinois" and as "best white dent corn in show" at the *Prairie Farmer* Prize Corn Show. The next largest yield was 36.4 bushels of a large yellow dent variety, No. 15, grown for several years in Champaign county. Next to this was No. 8, yielding 35.1 bushels, the seed of which took first premium as "best yellow dent corn in Ohio," and as "best yellow dent corn in show," and sweepstakes prize as "best corn in show." The variety giving the smallest yield, 22 bushels, was Champion white pearl, No. 21. The average yield was 31 bushels.

It should be remembered that the estimated average yield of corn for 1887 throughout the United States was less than 20 bushels per acre, and that Champaign county was the region most seriously affected by the drouth.

The smaller and earlier maturing varieties gave the larger yields this season, as might be expected from the severe drouth. Nine early maturing, medium sized varieties gave an average yield of 32.5 bushels; ten medium late maturing, large varieties, 39.7 bushels, and four non-maturing varieties, 28.5 bushels per acre.

POUNDS OF EAR CORN TO BUSHEL OF SHELLED CORN.

As before stated, the corn as it came from the field was weighed and shelled, and the shelled corn weighed. The number of pounds of ear corn required to produce a bushel of shelled corn was ascertained by dividing the number of pounds of ear corn by the number of bushels of shelled corn. It was found that the least number of pounds required to produce a bushel of shelled corn was 67, Nos. 1 and 14, and nearly the same in Nos. 10 and 19; the largest number required was 81.9 pounds; the average number for the nine early maturing varieties before mentioned was 68.7; for the ten medium late maturing varieties, 71.3, and for the four non-maturing varieties, 76.7 pounds. [Table No. 2.]

PERCENTAGE OF WATER IN SHELLED CORN.

Three ears of each variety (No. 17 excepted) were selected and the amount of water determined in the corn of each. The largest per cent. of water contained in any variety was 27.32, No. 22; the smallest per cent., 14.57, No. 13; the average per cent., 18.47. The average per cent. of water in the nine early maturing varieties was 16.9; in the ten medium late maturing varieties, 18.5, and in the four non-maturing varieties, 22.4. For the maturing varieties the average was 17.7 per cent. [Table No. 2.]

Thoroughly air-dried corn has a comparatively constant percentage of water. The percentage of water was determined in samples of Leaming and Burr's white, Nos. 4 and 19, grown in

1886. They were found to contain 10.91 and 11.29 per cent., respectively, an average of 11.1 per cent. Many analyses have been made, which do not place the per cent. of water far from this figure. The loss of weight in shelled corn in one year, therefore, from loss of water would be 7.37 per cent., or in 1,000 bushels the loss in weight would be equivalent to 73.7 bushels. When air-dry the average yield of corn would be reduced by loss of water from 31 bushels to 28.7 bushels per acre; in the early maturing varieties, from 32.5 bushels to 30.6 bushels; in the medium late maturing varieties, from 30.7 bushels to 28.4 bushels; in the non-maturing varieties, from 28.5 bushels to 25.3 bushels.

On account of the unusual season, as before stated, the earlier maturing and smaller varieties gave the larger yield. It may often happen in an ordinary season, however, that the smaller yield of these varieties may be compensated by their containing a relatively smaller percentage of water.

The percentage of water found in these samples represents, no doubt, too low an average for a series of years, since the corn was exceptionally dry for that time of the year. The three selected ears would contain a less per cent. of water than the total corn of each plat; but, on account of many small and ill-formed ears this year, it was believed that the samples used would more nearly represent the percentage of water in corn of these varieties in a good season.

PER CENT. OF WATER IN COBS.

The water in the cobs of seven representative varieties was determined. The smallest per cent. of water was 13.61, No. 1; the largest, 46.58, No. 22; the average, 26.92. The water was also determined in the cobs of Leaming and Burr's white, Nos. 4 and 19, of the crops of 1886. They contained 10.44 and 11.06 per cent., respectively, an average of 10.75. Here again we have a nearly constant percentage. [Table No. 2.]

It will be at once seen that a less number of pounds of are corn will be necessary to produce a bushel of shelled corn when one year old than when husked; but not so much less as might be supposed, on account of the relatively large amount of corn to cob. At the end of one year, instead of requiring 71 pounds of ear corn to produce a bushel of shelled corn, it would require 69.6 pounds.

The loss in weight in ear corn in 1,000 bushels from loss of water in the cob in one year, from the above data, would be equivalent to 43 bushels.

LOSS OF WATER IN THE FIELD.

September 19-21, two rows, 1-36 acre, of each plat, were husked and weighed. The yield of ear corn varied from 56 to 126 pounds and averaged 77.5 pounds. [Table No. 2.]

Up to this time there had been no frost. The maturity of the corn had been previously noticed. September 24th a killing frost occurred, followed by several days of rain, amounting to 3.15 inches (see Monthly Weather Review of the Illinois State Weather Service for September, 1887), which in turn was followed by fair weather until the end of the period under consideration.

Assuming that equal areas of the plat would yield equal quantities of corn, the loss of water per bushel during any given time can be determined by dividing the difference in weight of corn from equal areas by the number of bushels of shelled corn produced. The average loss of water per bushel from September 19-21 to October 25-27 was 23.1 pounds. At the latter date, it required, on an average, 71 pounds of ear corn to produce one bushel of shelled corn. At the former date, therefore, it would have required 94.1 pounds to produce one bushel, as shelled corn October 25-27. Ear corn that would have weighed 1,000 bushels September 19-21, five weeks later would have weighed, husked from the field, 755 bushels.

These figures are presented with some hesitation; for the assumption that equal areas of the same plat would yield equal quantities of corn at any given time can not be proved, and, indeed, at best, would only be approximately true. Wide variations would, undoubtedly, take place in individual plats, while the average of the 25 plats would more nearly represent the truth. Since one of the two rows picked September 19-21 was an outside row, and but one of the six picked October 25-27 was an outside row, the amount of loss here given is probably somewhat too high; yet it serves to illustrate the great loss of moisture in a short space of time during the fall, and the advisability of taking this fact into account in feeding animals at different seasons.

SIZE OF EARS.

Selected ears, three from each plat, were measured and weighed. The measurements and weights will be found in Table No. 3 compared with those taken at *Prairie Farmer* Prize Corn Show in 1886. With regard to thirteen varieties obtained from the *Prairie Farmer*, the following table gives a summary of the measurements and weights, showing the reduction in size and weight, and the increase of the percentage of cob to ear:

Average of 13 Varieties.	Nov. 8-18, 1886.	Oct. 25-27, 1887.	Per cent. Reduction.
Length of ear	9.69 in.	8.04 in.	17.0
Circumference of ear	7.12 in.	6.69 in.	6.0
Circumference of cob	4.03 in.	3.75 in.	7.0
Ratio of circumference of cob to circumference of ear	1: 1.76	1: 1.78	.....
Weight of three ears	45.5 oz.	36.6 oz.	19.5
Weight of three cobs	6.75 oz.	6.65 oz.	1.5
Percentage of cob to ear	14.85	17.65	.....

SUMMARY.

Twenty-four varieties of Indian corn were grown during the summer of 1887 under similar conditions.

The seed had been grown in eight States, in differing climates and on differing soils.

Seed grown in the more northern latitudes produced early maturing varieties. Corn from seed grown seventy-five miles south of Champaign failed to mature. Seed was sent 150 miles north of Champaign three years ago, and seed from there was grown here this season beside seed of the same stock grown here. No difference in maturity was observable.

There were, on an average, three and a quarter stocks to a hill, 35 per cent. of which were barren against 14.1 per cent. in seven varieties last season. A reduction of yield from an overproduction of stock seems evident.

The average yield of shell corn was thirty-one bushels; the highest, thirty-eight and eight-tenths bushels; the lowest, twenty-two bushels. The smaller and earlier maturing varieties gave the larger yield this season.

It required seventy-one pounds of ear corn to produce one bushel of shelled corn. The earlier maturing varieties required the less number of pounds of ear corn to produce a bushel of shelled corn.

In three selected ears of each variety there was found 18.47 per cent. of water. There was a variation between varieties of 12.75 per cent. of water. The loss in weight of shelled corn in a year would be equivalent to nearly seventy-four bushels in every thousand.

There was found in the cobs of seven representative varieties an average of almost twenty-seven per cent. of water. The loss in weight of ear corn from loss of water in cob would be equivalent to forty-three bushels in every thousand bushels.

The loss of water by ear corn in the field in five weeks succeeding a heavy frost, was calculated, from data obtained, to be twenty-three pounds for every bushel, or a reduction in weight of 24.5 per cent.

The average length of three ears of each thirteen varieties exhibited at *Prairie Farmer* Prize Corn Show in 1886, was 9.69 inches; the average length this year of ears grown on the University farm was 8.04 inches, a reduction of seventeen per cent. The average weight last year was 45.6 oz.; this year, 36.6 oz., a reduction of 19.5 per cent. The proportion of cob to the ear was 2.8 per cent. greater this year than last year.

TABLE No. 1.—*Number of Variety. Name. Raiser of Seed. Maturity of Leaves and Ears.*

No.	Name of variety.	Persons who raised seed.	Matnrity, September 19–21.	
			Leaves.	Ears.
	Yellow Dent Varieties.			
1	Edmonds' corn	H. B. Edmonds, Taylor, Ill	Ripe	Ripe, dry
2	Legal tender	Nims Bros., Emerson, Ia	Few green	Moist
3	Howard's improved yellow.	H. Howard, Marshall, Mo	Half ripe	Moist
4	Leaming	University farm	Few green	Ripe
5		W. J. Cochrane, Winfield, Kas.	Half ripe	Green, some kernels in milk
6	Hogue's yellow dent	R. Hogue, Crete, Neb	Very few green	Ripe
7	McConnell's improved orange pride	J. H. McConnell, Rigdon, Ind.	Half ripe	Ripe, moist
8	Steward's improved yellow dent	L. W. Steward, Amanda, O	Few green	Ripe, little moist
9	Golden rod	E. Morris, Decatur, Mich	Ripe	Ripe, little moist
10	Boone connty white	J. Riley, Thorntown, Ind	Ripe	Ripe, dry
11	Riley's favorite	J. Riley, Thorntown, Ind	Few green	Ripe, little moist
12	Two-eared Murdock	University farm	Ripe	Ripe, dry
13	Murdock	University farm	Ripe	Ripe, dry
14	Murdock	W. T. Lamb, Ridott, Ill	Ripe	Ripe, dry
15	Champaign	University farm	Few green	Ripe, moist
16	Leaming	University farm	Few green	Ripe
	Mixed Dent Varieties.			
17	Lape's mixed dent	H. T. Lape, Roseville, Ill	Very few green	Ripe, little moist
18	Smith's mixed dent	University farm	Very few green	Ripe
	White Dent Varieties.			
19	Burr's white	University farm	Few green	Ripe, moist
20	Monticello	University farm	Few green	Ripe, moist
21	Champion white pearl	University farm	Half ripe	Green, some kernels in milk
22	Piasa king	F. C. Pickard, Godfrey, Ill	All green	Green, most kernels in milk
23	Champion of the north	A. L. Goddard, Wancoma, Ia	Ripe	Ripe, dry
24	Ohio white dent	M. H. Smith, DeSoto, Neb	Half ripe	Ripe, moist
25		W. J. Cochrane, Winfield, Kas.	All green	Green, some kernels in milk

TABLE No. 2.—*Number of Stalks; of Barren Stalks. Ear Corn. Shelled Corn. Percentage of Water in Corn; in Cobs.*

Number.....	Average No. of stalks in 44 hills.....	Average No. of barren stalks in 44 hills.....	Per cent. of barren stalks.....	Lb. ear corn on 1-86 acre, Sept. 19-21.....	Lb. ear corn to bu. shelled corn, Sept. 19-21, as determined Oct. 25.....	Lb. ear corn on 1-12 acre, Oct. 25-27.....	Lb. shelled corn on 1-12 acre, Oct. 25-27..	Bu. per acre, shelled corn, Oct. 25-27.....	Lb. ear corn to bu. (56 lb.) shelled corn, Oct. 25-27.....	Per cent. of water in shelled corn, Oct. 25-27.....	Per cent. of water in cobs, Oct. 25-27.....
1.....	144	49	34	78	95.3	164.5	137.5	23.5	67	16.57	13.61
2.....	170	79	46.5	79	99	169	134	23.7	70.6	20.01	
3.....	151	73	41.7	64.5	98.5	142.5	110	23.6	75.6	20.08	
4.....	154	46	29.9	88.5	101.2	179	146	31.3	68.6	17.27	21.99
5.....	146	92	63	61.5	87.2	150.5	118.5	25.4	71.1	23.87	
6.....	148	49	33.1	102	108.1	206.5	158.5	34	73	20.06	
7.....	140	47	33.6	85	99.8	186	143	30.6	72.8	17.13	
8.....	147	47	31.3	88	90	204.5	164	35.1	70	17.92	29.66
9.....	124	39	30.9	77.5	94	172	138.5	29.7	69.5	19.69	
10.....	140	35	25	92	94.5	196	163.5	35	67.1	15.05	16.63
11.....	149	57	38.2	80.5	88.5	187.5	153	32.8	68.6	16.39	
12.....	146	61	41.8	72	77	189	157	33.6	67.4	16.31	
13.....	167	53	30.2	90.5	98.4	191	154.5	33.1	69.3	14.57	
14.....	138	34	24.6	84.5	78.4	216.5	181	38.8	67	16.30	16.21
15.....	136	42	30.8	98	96.8	213.5	170	36.4	70.3	16.31	
16.....	139	54	38.8	76.5	85.9	183	149.5	32	68.5	16.67	
17.....	138	56	40.6	69.5	83.1	171	140.5	30.1	68.2		
18.....	120	45	37.5	67.5	87.9	162	129	27.6	70.3	18.61	
19.....	132	41	31	92	101	184.5	153	32.8	67.5	18.36	33.75
20.....	131	52	39.7	66.5	102.5	149.5	109	23.4	76.8	19.36	
21.....	146	61	43.8	64.5	105.7	136	102	22	74.3	18.25	
22.....	157	35	22.3	126	119.6	250.5	177	37.9	79.3	27.32	46.58
23.....	138	33	23.9	78	92.6	173	141.5	30.3	68.8	17.49	
24.....	133	39	29.3	90	96.6	198	156,5	33.5	70.8	19.71	
25.....	112	34	30.4	56	70.2	196	134	28.7	81.9	20.11	
	143	50	35	77.5	94.1			31	71	18.47	26.92

TABLE No. 3.—*Average Length, Circumference and Weight of Ears. Weight of Cobs. Percentage of Cob.*

Number.	Average length of 3 ears, inches, 1886	Average length of 3 ears, inches, 1887	Average circumference of 3 ears, inches, 1886	Average circumference of 3 ears, inches, 1887	Average circumference of 3 cobs, inches, 1886	Average circumference of 3 cobs, inches, 1887	Weight of 3 ears, oz., 1886	Weight of 3 ears, oz., 1887	Weight of 3 cobs, oz., 1886	Weight of 3 cobs, oz., 1887	Per cent. of cob to ear, 1887	Per cent. of cob to ear, 1887
1	8	7	7	6.16	3.75	3.20	37	24	5	3	13.51	12.50
2	10.75	8.75	6.63	6.83	3.50	4.08	47	40.5	7	7.5	14.89	18.52
3	10.50	8.75	7.25	6.42	4.50	3.83	52	36.5	9.5	7	18.27	19.18
4		8		6.16		3.66		32		6.5		20.31
5	10.63	9.21	6.63	6.66	4	3.45	44.5	41	6.5	7	14.61	17.07
6	9.75	8.66	7.63	6.88	4.38	4.08	50	41	6.5	8.5	13	20.73
7	9.75	8.75	7.38	6.58	4.38	3.75	47.5	37.5	6 25	6.5	13.18	17.60
8	8.50	8.17	7.38	7	4	3.79	40.5	36	5.5	6	13.58	16.66
9	9.63	8.12	6.75	6.83	3.88	3.75	41.5	37.5	6	7	14.46	18.66
10	9.13	8.17	6.63	6.33	3.50	3.42	41	31	6	4	14.63	12.94
11		8.17		6.46		3.50		32		4.5		14.06
12		7.05		5.75		3.33		25.5		4		15.68
13		7.17		5.70		3.29		24		3.5		14.58
14		7.25		6.17		3.45		26.5		4		15.09
15		8.38		6.58		3.62		34.5		5		14.49
16		8.46		6.66		3.92		36		6		16.66
17												
18		7.62		6.38		3.58		31		5		16.13
19		8.83		6.70		3.92		40		5.8		21.25
20		7.79		6.38		3.79		32		6		18.75
21		8.20		6.50		3.83		32.5		6.5		20
22	10.33	9.33	7.88	7.04	4.50	4.20	60	45.5	9	10.5	15	23.08
23	8.75	7.66	6.25	6.29	3.50	3.37	30	27.5	5	3.5	16.67	12.72
24	10.38	8	7.38	6.50	4.13	3.46	50	31	7	5	14	16.13
25	10	8.92	7.75	7.42	4.38	4.33	51	47	8.5	11	16.67	23.40

FIELD EXPERIMENT WITH OATS—1887.

REPORTED BY T. F. HUNT, B. S., ASSISTANT IN AGRICULTURE.

The following table gives the yield of grain and straw of six varieties of oats. They were grown on plats 2x9 rods, except Hargett's extra early, which was grown on a plat 2x2 rods.

The land was uniform in character and had been in corn the previous year. It was disked, not plowed, before sowing. After sowing, the land was harrowed and rolled.

The oats were sown April 5th and were harvested July 14th except White Russian, which was harvested July 26th.

The yield of grain of four varieties, of the crop of 1886, is given for comparison. [See Thirteenth Report of University of Illinois, p. 204.]

Name of Variety.	Crop of 1887.				Crop of 1886.
	Straw, pounds.		Grain, pounds.		Grain.
	2x9 rods.	Per acre.	2x9 rods.	Per acre.	Per acre.
White Victoria	318	2,822	168.5	47	32.5
Welcome	389	3,458	217.5	60	46
White Russian	349	3,124	198.5	55	44
New Brunswick	296	2,631	209	58	47.5
Black	327	2,907	219	61	
Hargett's extra early	294	2,620	177.5	49	
Average	329	2,927	198.3	55	

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