FIFTH ANNUAL REPORT

OF THE

BOARD OF TRUSTEES

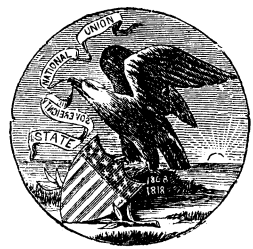
OF THE

ILLINOIS INDUSTRIAL UNIVERSITY,

FOR 1871–2.

WITH

MINUTES OF MEETING OF EXECUTIVE COMMITTEE, LECTURES, ETC.



SPRINGFIELD:
STATE JOURNAL STEAM PRINT.
1873.

"Few persons are aware how great a promoter of study physical labor is, if not carried to excess, among those of fair intelligence and good habits. * * *

"The brain needs rest, and it gets it most effectually in muscular toil, and it returns to study with a keen appetite. If the brain-workers of every city could have one day of every week for physical labor, on a farm or in a shop, they would retain their health much longer, and possess more intellectual vigor than they do where every day is given to intellectual effort. * * * This habit of work should be formed early in life, if we would have it a source of pleasure. Work is the greatest educator and blessing that we have, or are likely to have."

PROFESSOR TYNDALL.

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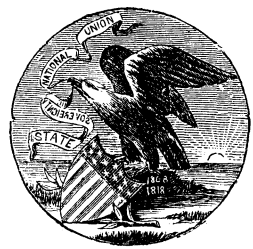

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OFFICERS OF THE BOARD OF TRUSTEES.

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CORRESPONDING SECRETARY.

PROF. EDWARD SNYDER,

RECORDING SECRETARY.

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TREASURER.

STANDING COMMITTEES 1872-3.

Executive.—J. M. Gregory, J. R. Scott, L. W. Lawrence, J. O. Cunningham, Emory Cobb, A. M. Brown, J. H. Pickrell, J. M. Pearson, M. C. Goltra.

Agriculture.—J. H. Pickrell, Alex. Blackburn, W. B. Anderson, D. A. Brown, J. R. Scott.

Horticulture.—A. M. Brown, B. Pullen, S. Edwards, O. B. Galusha, P. R. Wright.

Finance.—Emory Cobb, I. S. Mahan. S. S. Hayes, C. R. Griggs, L. B. McMurray

Buildings and Grounds.—M. C. Goltra, J. M. Van Osdel, J. R. Scott, R. R. Harrington, J. O. Cunningham.

Auditing.—L. W. Lawrence, P. R. Wright, O. B. Galusha, T. S. Mahan, Alex. Blackburn.

By-Laws.—I. S. Mahan, J. L. Pickard, D. A. Brown.

Courses of Study and Faculty.—J. M. Gregory, N. Bateman, J. L. Pickard, S. S. Hayes, J. P. Slade, S. Edwards.

Military.—M. Brayman, W. B. Anderson, G. S. Bowen, J. W. Scroggs, P. R. Wright.

Library and Cabinet.—N. Bateman, J. P. Slade. I. S. Mahan, J. L. Pickard, C. R. Griggs.

Mechanical.—J. M. Pearson, L. B. McMurray, G. S. Bowen, R. R. Harrington, M. C. Goltra.

State of the Institution.—J. L. Pickard, J. P. Slade, B. Pullen.

OFFICERS AND INSTRUCTORS.

JOHN M. GREGORY,
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Professor of Chemistry.

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Professor of Mechanical Engineering.

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Professor of Botany and Horticulture.

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Professor of Mathematics.

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Instructor in Bookkeeping.

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Professor of Geology and Zoology.

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Professor of Civil Engineering.

I. D. FOULON,
Instructor in French.

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Lecturer on Veterinary Science.

HARALD HANSEN,
Instructor in Architecture and Free Hand Drawing.

*JUDGE J. O. CUNNINGHAM,
Lecturer on Commercial Law.

CHARLES W. SILVER,
HENRY S. REYNOLDS,
Assistants in Chemical Laboratory.

NON-RESIDENT.

DR. MANLY MILES,
Professor of Agriculture.

*THOMAS MEEHAN,
Lecturer on Vegetable Physiology and Fruit Growing.

HON. W. C. FLAGG,
Superintendent of Experimental Farm.

ASSISTANTS IN FARM, GARDEN AND SHOPS.

E. A. ROBINSON, Foreman of Machine Shop.
D. A. STEDMAN, Foreman Wood-working Dep't.
E. L. LAWRENCE, Head Farmer.
*THOMAS FRANKS, Florist.
H. K. VICKROY, Orchardist and Gardener,

* For 1871-72.

HISTORICAL.

The Illinois Industrial University is both state and national in its origin and character.

The public movement, which gave rise to this University, began a quarter of a century ago. Public meetings of the friends of industrial education were held in all parts of the State, and numerous petitions, signed by thousands of the agriculturists and other industrial classes, flooded the State Legislature. At length, in 1856, the General Assembly adopted joint resolutions asking Congress to make grants of public lands to establish colleges for industrial education. After long discussions, Congress passed the necessary law in July, 1862, making the magnificent grant of public lands out of which has arisen that long list of agricultural colleges and industrial universities now scattered over the continent.

Illinois, the first to ask, was among the first to accept the grant, and great public interest was immediately excited in the question of its organization and location. Princely donations, in some cases of half a million of dollars, were tendered by several counties to secure the location of the institution in their midst. In February, 1867, a law was passed, fixing the location and defining the plan of the university, and, in May of the same year the board of trustees met at the University building donated by Champaign county, and finally determined the location. During the year much of the scrip was sold or located, necessary alterations were made in the buildings, apparatus and library were purchased, a faculty partly selected, and preparations made for active work. The 2d day of March, 1868, the university was opened for students, and on the 11th of the same month, formal inauguration exercises were held.

In the autumn of 1871 the university was opened for the instruction of female students, and now it offers all its advantages to all classes of society, without regard to sex, sect or condition.

NAMES OF STUDENTS.

Name.	Residence.	County.	Course.	Years
Adams, George C	Fairmount	Vermilion	Agricultural	1
Adams, W. W	Urbana	Champaign		
Aldrich, Jashub W	Tiskilwa	Bureau	Agricultural	3
Allen, Emory A	Sheffield	Bureau	Civil Engineering	1
Anthony, Joseph R. J	Princeton	Bureau	Literature and Science.	
Austin, Thomas W	Louisville	Clay		
Baker, Frank S	Tarboro	North Carolina	Literature and Science.	1
Baker, Horatio F	Mattoon	Coles	Civil Engineering	1
Baker, Ira O.	Mattoon	Coles	Civil Engineering	3
Baker, Julian M	Tarboro	North Carolina	Literature and Science.	1
Baker, William S	Tarboro	North Carolina	Agricultural	1
Balcom, Stephen F	Edgewood	Effingham	Civil Engineering	1
Ballou, Edward L	Shelbyville	North Carolina	Agricultural	1
Barlow, William L	Tarboro	North Carolina	Agricultural	1
Barnes, Arthur E	Champaign	Champaign	Chemical	1
Barnett, George	Indianola	Vermilion	Commercial	1
Barnett, John	Indianola	Vermilion	Agricultural	1
Bartlett, Arthur W	Indianapolis	Indiana	Mechanic'l Engineering	1
Beasley, Joseph T	Champaign	Champaign	Agricultural	2
Berlin, Robert C	Granville	Putnam	Architectural Eng	1
Bird, Albert J	Rochelle	Ogle		
Blagden, Alonzo D	Genoa	De Kalb	Commercial	1
Blake, Arthur E	Mendota	La Salle	Civil Engineering	1
Boles, Frank	Bloomfield	Edgar		
Boon, Thomas J	Sidney	Champaign	Civil Engineering	1
Bowers, John H	Blue Grass	Vermilion	Civil Eng. and Military	1
Boyer, Charles S	Walla Walla	Washington Ter	Mining Eng. and Mil.	1
Bradley, Cyrus D	Milan	De Kalb	Commercial	1
Bradley, Reuben H	Roscoe	Winnebago	Civil Engineering	1
Bradway, Augustus C	Hainesville	Lake	Mechanic'l Engineering	1
Brenneman, Joseph	Granville	Putnam	Agricultural	1
Breese, Ambrose	Sandwich	De Kalb	Mechanic'l Engineering	1
Brooks, Francis M	Newton	Vermilion	Commercial	1
Brooke, Samuel P	Lyndon	Whiteside	Elective	2
Brown, Dillon S	Genoa	De Kalb	Agricultural	1
Brown, Frank B	Peru	Indiana	Elective	1
Brown, Ralph L	Marengo	McHenry	Literature and Science.	1
Burwash, Milo B	Champaign	Champaign	Agricultural	4
Butler, Alban	Decatur	Macon	Civil Engineering	1
Bursom, Luther E	Vermilion	Edgar		
Campbell, John P	McLeansboro	Hamilton	Civil Engineering	2
Cantrell, John E	Lincoln	Logan	Mechanic'l Engineering	3
Cate, Horatio W	Hamilton	Hancock		
Chandler, William B	Bourbon	Douglas	Agricultural	1
Chapman, Henry H	Elvaston	Hancock	Agricultural	2
Chase, Willis H	Chicago	Cook	Civil Eng. and Military	2
Clay, Luther G	South Pass	Union	Horticultural and Mil.	1
Coats, Henry L	Nunda	McHenry	Civil Engineering	2
Codington, Vantile W	Menomonee	Wisconsin	Mechanic'l Engineering	1
Coffin, Earl W	Oakland	Coles	Agricultural	1
Cole, Henry C	Chester	Randolph	Chemical	1
Cole, Richard H	Peru	Indiana	Civil Eng. and Military	2
Collins, Leander A	Carbondale	Jackson		
Columbia, Thomas B	Champaign	Champaign	Elective	2
Connor, Henry	Burton	Adams	Lit. and Sci. and Mil.	1
Connet, Dickey	Champaign	Champaign	Agricultural	1
Cook, Francis	Nokomis	Montgomery		
Corson, Edward	Richland	Sangamon	Mech. Eng. and Mil.	1
Covington, Marcellus E	Havana	Mason	Elective	1
Cowen, Robert H	Champaign	Champaign	Agricultural	1
Coykendall, Milton	Brushy Fork	Douglas	Elective	1
Craig, Augustus L	Aledo	Mercer	Literature and Science.	1
Craig, Calvin	Liberty	Adams	Chemical	1

Catalogue—Continued.

Name.	Residence.	County.	Course.	Years
Craver, James C	Jonesboro	Union	Chemical	2
Crawford, John S	Champaign	Champaign		
Crawley, John J	Tuscola	Douglas	Elective	2
Crayne, William H	Urbana	Champaign	Mechanic'l Engineering	2
Crayne, John S	Urbana	Champaign	Agricultural	1
Cussins, James S	Decatur	Macon	Lit. and Sci. and Mil	2
Davenport, Joseph J	Minonk	Woodford	Military	1
Davis, Charles	Marengo	McHenry	Lit. and Sci. and Mil	1
Davis, John J	Freeport	Stephenson	Agricultural and Chem.	3
Davis, Taylor	Bourbon	Douglas	Lit. and Sci. and Mil	2
Dier, William A	Forreston	Ogle	Literature and Science.	1
Dobson, Franklin P	Minonk	Woodford	Civil Eng. and Military	1
Dove, Clarence F	Forreston	Ogle	Literature and Science.	1
Dowe, Arthur W	Rock Island	Rock Island	Civil Engineering	1
Dowell, Wilson J	Lexington	McLean	Architectural	3
Drake, Joseph F	Belvidere	Boone	Horticultural	1
Draper, Edwin F	Nokomis	Montgomery	Military	1
Drewry, Ebenezer L	Mason	Effingham		
Drewry, Henry N	Mason	Effingham	Elective	3
Dunayski, Frank A	Danzig	Germany	Agricultural	1
Dunham, Horace E	Pittsfield	Pike		
Dunlap, Burley A	Savoy	Champaign	Civil Engineering	1
Dunlap, Clermont D	Norwood	Cook	Civil Engineering	2
Dunlap, Ernest L	Savoy	Champaign	Agricultural	1
Dunlap, Henry	Savoy	Champaign	Agricultural	2
Dunlap, Warren	Keokuk Junction	Adams	Civil Engineering	2
Dunning, Russel O	Jefferson	Cook	Horticultural	2
Eaton, Herbert	Philo	Champaign	Agricultural and Mil'ry	3
Eaton, Ernest	Philo	Champaign	Agricultural	3
Elder, Joseph W	Marissa	St. Clair	MechanicalEngineering	1
Ellison, Theodore S	Marine	Madison	Agricultural	1
Ellis, Wm. C	Champaign	Champaign	Civil Engineering	2
Estep, Harvey C	Rantoul	Champaign	Civil Engineering	2
Everhart, Winfield S	Neoga	Cumberland	Mech'l Engin'g and Mil	1
Eyman, Walter	Belleville	St. Clair	Civil Engineering	1
Faulkner, Watson	Champaign	Champaign	Commercial	2
Faulkner, James	Clement	Clinton	Horticulture and Mil'ry	2
Ferris, William W	Champaign	Champaign		
Fidler, William A	Neoga	Cumberland		
Filson, William F	Xenia	Clay		
Flagg, Alfred M	Moro	Madison	Lit're & Science & Mil.	4
Foster, Charles W	Scott	Champaign	Agricultural	3
Folks, Willis K	Champaign	Champaign	Civil Engineering	1
Frederickson, William O	Champaign	Champaign	Civil Engineering	1
Gabriel, Gregory	Armenia, Asia Min		Agricultural	2
Gardner, Willis S	Champaign	Champaign	Elective	1
Gennadius, Panajiottis	Anthens, Greece		Agricultural	2
Gill, John D	Antwerp			
Goodrich, Nathaniel K	Cobden	Union	Commercial and Mili'ry	1
Graham, Charles P	Champaign	Champaign	Elective	3
Gregory, Charles E	Rochelle	Ogle	Lit're & Science & Mil.	2
Gregory, Samuel F	Sand Lake, N. Y		Elective and Military	2
Gridley, George N	Half Day	Lake	Agricultural	3
Groves, Charles W	Champaign	Champaign		
Groves, John I	Champaign	Champaign		
Hall, Walter O	Sugar Creek	Vermilion	Agricultural	2
Hancock, Oscar W	Neoga	Cumberland		
Hannah, Richard H	Rossville	Vermilion	Horticultural	1
Hansbrough, John F	Chicago	Cook	Commercial	1
Hatch, Frederick L	Bliven's Mills	McHenry	Agricultural	2
Hatch, Miles F	Bliven's Mills	McHenry	MechanicalEngineering	3
Haworth, Filmore A	Georgetown	Vermilion	Agricultural	1
Hays, Charles I	Bridgeport	Lawrence	Horticultural	2
Hennessey, Augustus L	Utica	LaSalle	Civil Engineering	3
Hessey, Clarence K	Champaign	Champaign	Architecture	2
Hill, Edgar L	Effingham	Effiingham	Chemistry and Military	3
Hobart, Charles H	Downer's Grove	DuPage		
Holmes, Charles B	Urbana	Champaign	Elective	1
Holton, Henry C	Indianola	Vermilion	Elective	2
Hook, Samuel H	Urbana	Champaign	Civil Engineering	2
Hoover, Henry C	Urbana	Champaign		
Hornbarger, Oliver B	Macon	Macon	Elective	1
Howe, Charles	Wenona	Marshall	Agricultural	1
Hubbard, George W	Urbana	Champaign	Elective	1
Huey, Charles J	Clement	Clinton	MechanicalEngineering	1
Hughs, John M	Sparta	Randolph		
Hull, Evlyn T	Alton	Madison	Horticultural	1
Hurst, David A	Chillicothe, Ohio		Elective	1
Jack, Samuel B	Beaucoup	Washington	Agricultural	1
Jeffers, Charles P	Lyndon	Whiteside	Chemical	2

Catalogue—Continued.

Name.	Residence.	County.	Course.	Years
Jennings, Emmett F.	Palermo, N. Y.		Elective	1
Johnson, Sammie E.	Okalla	Ford	MechanicalEngineering	1
Jones, Thomas A.	Brighton	Macoupin	Agricultural	1
Judy, William S.	Talula	Menard	Elective	1
Kennedy, David C.	Clay City	Clay	MechanicalEngineering	2
Kennedy, William J. W.	Clay City	Clay	Elective	2
Kennedy, John W.	Peru	LaSalle	Elective	2
Kenower, George F.	Clement	Clinton	Literature and Science.	1
Kingsbury, Charles S.	Bowensburg	Hancock	Civil Engineering	1
Knapp, Albert J.	Joliet	Will	Mech'l Engin'g and Mil	1
Kyle James H.	Urbana	Champaign		
Lambert, Cyrus W.	Rantoul	Champaign	Military	2
Lawhead, Charles A.	Champaign	Champaign		
Leflar, John E.	Batavia	Kane	Literature and Science.	2
Leers, Matthew	Sigel	Shelby	Elective	1
Lindley, Jacob	New Providence, Io		Literature and Science.	1
Lindsley, Ira S.	Grove City	Christian	Agricultural	2
Linn, Edward W.	Montgomery, Ala.		Agricultural	2
Loomer, Melvin H.	Marengo	McHenry	Military	1
Love, Sharon S.	Philo	Champaign	Agricultural	1
Lufkin, George A.	Villa Ridge	Pulaski	Civil Engineering	2
Lyford, Charles C.	Roscoe	Winnebago	Agricultural	2
Lyman, George H.	Richland	Sangamon	Civil Engineering	4
Lytle, George W.	Champaign	Champaign	Commercial	1
Mabin, George G.	Belvidere	Boone	Literature and Science.	1
Mann, Frank I.	Gilman	Iroquois	Chemistry and Military	1
Mann, James R.	Gilman	Iroquois	Military	1
Mann, Howard A.	Batavia	Kane	Literature and Science.	2
Manson, William C.	Beaufort, N. C.		Commercial	1
Matthews, James N.	Mason	Mason	Elective	4
Matthews, Wilson T.	Camden Mills	Rock Island	Agricultural	1
McCauley, John C.	Lincoln	Logan	Literature and Science.	1
McCauley, James I.	Beaucoup	Washington	Commercial	1
McDannell, Urillo S.	Rock Island	Rock Island	Literature and Science.	1
McKinley, William B.	Champaign	Champaign	Literature and Science.	1
McVicker, W. D.	Saratoga			
Merrill, Warren	Astoria	Fulton	Agricultural	2
Merriman, Charles M.	Champaign	Champaign	Agricultural	1
Miller, Charles W.	Chicago	Cook	Chemical	2
Millot, Henry C.	Harvel		Elective	1
Miltimore, Chancy K.	Janesville, Wis.		Elective	1
Mingle, Charles I.	Clyde	Whiteside	Agricultural	1
Mitchell, Audubon Q.	Attilla	Williamson	Elective	1
Moore, Aaron H.	Louisville	Clay		
Morris, John C. C.	Lincoln	Logan	Elective	2
Morrow, Andrew T.	Pittsfield	Pike	Civil Engineering	3
Morse, Mahlon C.	Belvidere	Boone	Chemical and Military.	1
Moss, Frank C.	Belvidere	Boone	Chemical and Military.	1
Nebeker, Corie A.	Mahomet	Champaign		
Newby, Samuel M.	Mooresville, Ind.		Agricultural	2
Ockerson, John A.	Elmwood	Peoria	Mining Engineering	3
Ohern, Patt C.	Ellisville	Fulton	Civil Engineering	1
Page, Calvin S. H.	Champaign	Champaign		
Paige, James A.	Brush Valley, Penn.		Civil Engineering	1
Palmer, William F.	Clinton	DeWitt	Military	1
Palmer, Frank M.	Clinton	DeWitt	Military	1
Pancake, George H.	Mahomet	Champaign	Civil Engineering	3
Parker, Calvin E.	Philo	Champaign	Agricultural and Milita.	4
Parker, George W.	Wenona	Marshall	Mechanical Engineering	1
Parks, James H.	Little York	Warren	Civil Eng. and Military.	1
Parsons, Fernando A.	Waterloo, Iowa			
Patch, Emery	Janesville, Wis.		Mechanical Engineeriug	2
Paton, John	Lincoln	Logan	Mechanical Engineering	1
Patton, William T.	Paxton	Ford	Elective	1
Payne, Thomas	Oakland	Coles	Mechanical Engineering	1
Peadro, Benjamin F.	Windsor	Shelby	Mechanical Engineering	1
Peadro, Robert	Windsor	Shelby	Civil Engineering	1
Pearce, Wilbur R.	Flora	Clay	Literature and Science.	1
Perry, Edward E.	Beaufort, N. C.		Agricultural	2
Perry, George M.	Terre Haute	Henderson	Literature and Science.	2
Perry, James D.	Terre Haute	Henderson		
Phœnix, Samuel T.	Bloomington	McLean	Horticultural	2
Phillips, Parley A.	Damascus	Stephenson	Elective	3
Pickrell, Watson	Mechanicsburg	Sangamon	Agricultural	1
Pickrell, William	Mechanicsburg	Sangamon	Horticultural	2
Platt, Franklin C.	Warren	JoDaviess	Military	2
Plessner, Herman	Champaign	Champaign	Agricultural	1
Poage, James S.	Aledo	Mercer		
Pollock, William C.	Mt. Vernon	Jefferson	Chemical	1

Catalogue—Continued.

Name.	Residence.	County.	Course.	Years
Poole, Frank R	Cobden	Union	Civil Engineering	1
Pope, Benjamin W	Du Quoin	Perry	Elective	1
Pope, Peyton S	Big Muddy	Franklin	Elective	1
Porterfield, Newlan E.	Sidney	Champaign	Mechanical Engineering	3
Prather, Hamar S	Urbana	Champaign	Agricultural	1
Pratt, George D.	Mahomet	Champaign	Commercial	2
Prickatt, Charles M	Ringwood	McHenry	Elective	1
Ptoudfit, Samuel M	McLeansboro	Hamilton	Elective	2
Pulliam, William F	Tolono	Champaign		
Puckett, Russell T	Nora	JoDaviess	Agricultural	1
Puckett, Emerson R.	Nora	JoDaviess	Agricultural	1
Rea, Richard G.	Urbana	Champaign		
Reinhardt, Adolf	Granville	Putnam		
Reiss, Willis A	Belleville	St. Clair	Civil Engineering	4
Reynolds, Henry S.	Urbana	Champaign	Agricultural	3
Reynolds, Stephen A	Belvidere	Boone	Liter. and Sci. and Mil.	4
Rhodes, James F	Dwight	Livingston	Liter. and Sci. and Mil.	1
Rhodes, Joseph W	Dwight	Livingston	Mechanical Engineering	1
Rice, William O	South Pass	Union		
Richards, George B	Seneca	McHenry	Civil Eng. and Military.	1
Rickard, Thomas E	Springfield	Sangamon	Agricultural and Mil.	4
Ricker, Clifford N	LaHarpe	Hancock	Architectural	3
Reiger, William V	Kansas City, Mo		Agricultural	2
Rising, Rudolph.	Champaign	Champaign	Commercial	1
Robarts, Heber	Carbondale	Jackson		
Robbins, Henry E.	Wenona	Marshall	Mechanical Engineering	3
Robbins, Simeon V	Wenona	Marshall	Mechanical Engineering	1
Roemer, William C	Toledo, Ohio		Elective	1
Robinson, Elna A	Janesville, Wis		Mechanical Engineering	2
Rolfe, Charles W	Oswego	Kendall	Natural Science	4
Russell, Sullivan J	Elmwood	Peoria	Civil Engineering	1
Salter, Rembrandt R	Champaign	Champaign	Military	2
Sampson, Charles C	Fair Play, Wis			
Satterlee, Frank W	Batavia	Kane	Literature and Science.	2
Satterlee, Louis A.	Batavia	Kane	Elective	2
Saxton, John C	Belvidere	Boone		
Scott, George W.	Champaign	Champaign	Elective	1
Scovell, Melville A	Champaign	Champaign		
Scudder, Clarence O.	Creston	Ogle	Chemical	1
Shaw, Charles L.	Pittsfield	Pike	Military	1
Shawhan, George R.	Sidney	Champaign	Literature and Science.	1
Sheldon, Clarence F	Urbana	Champaign	Literature and Science.	1
Sheriff, Edward W.	Paris	Edgar	Elective	1
Short, Albert R.	Fairmount	Vermilion	Agricultural	2
Silver, Charles W	Urbana	Champaign	Agricultural	4
Silver, Howard	Urbana	Champaign	Agricultural	3
Smith, Charles A.	Mt. Vernon, Ind		Mechanical Engineering	2
Smith, Ira W	Burlington	Kane	Agricultural	1
Spencer, Hamilton	Bloomington	McLean	Agricultural	1
Spradling, William F.	Sheridan	Logan		
Starr, Frank A. E.	Elsah	Jersey	Horticultural and Mil'y	1
Stayman, John M.	Champaign	Champaign	Elective	1
Stevens, Francis A.	Newton	Jasper	Agricultural	2
Stevens, Ithel S.	Urbana	Champaign		
Stevens, Harmon G.	Homer	Champaign	Elective	2
Stone, Edwin B.	New Lebanon			
Story, George	Chicago,	Cook	Civil Engineering	2
Strawn, Wilder F.	Odell	Livingston	Military	1
Stribling, Edgar M.	DuQuoin	Perry	Agricultural	
Stribling, John B.	DuQuoin,	Perry	Mechanical Engineering	
Stull William	Marengo	McHenry	Civil Engin'ng and Mil.	1
Sturgis William F.	Denmark,	Perry-Vermilion		
Swarthout, James P.	West Dresden, N Y		Literature and Science.	1
Swartz, Alexander C.	Fairview	Fulton	Civil Engineering	3
Sweet, Leonard C.	Champaign	Champaign		
Talbott, Charles W.	Harristown	Macon	Military	2
Tate, Charles M.	Rushville	Pike	Elective	2
Termis, Isreal W.	Vermilion	Vermilion	Elective	2
Thompson, Alonzo O.	Urbana	Champaign	Agricultural	1
Tice, Calvin E.	Champaign	Champaign	Commercial	1
Trowbridge, Silas	Decatur	Macon	Mechanical Engineer'g.	2
Turner, Isaac	Todd's Point	Shelby	Civil Engineering	1
Vause, William H.	Mattoon	Coles	Elective	1
Ward, Henry A.	Terre Haute	Henderson	Mechanical Engineer'g.	1
Walker, Edwin G.	Monroe City Mo.		Mechanical Engineer'g.	4
Walker, Enoch	Clinton	DeWitt	Mechanical Engineer'g.	1
Walkley, Albert	Jacksonville	Morgan	Elective	1
Walton, Andrew J	Decatur	Macon	Agricultural	1
Watts, William	*Watts		Civil Engin'g and Mil.	2

Catalogue—Continued.

Name.	Residence.	County.	Course	Years
Welch, Thomas J	Urbana	Champaign	Agricultural	1
Weston, Charles	Champaign	Champaign	Elective	1
Wharry, Walter W	Sycamore	DeKalb	Chemical and Military	2
Wharton, Jacob N	Bement	Piatt	Mining Engineering	3
Whitcomb, Alonzo W	Urbana	Champaign	Elective	4
White, Alfred	Buckley	Iroquois	Literature and Science	2
White, Wallace	Olney	Richland	Mechanical Engineer'g	1
Whitney, Albert G	Champaign	Champaign	Elective	2
Whitney, Lewis C	Champaign	Champaign	Elective	2
Whitzell, Thomas J	Urbana	Champaign		
Wilber, Albert H	Belvidere	Boone		
Wiley, Oscar S	Mason, Mich		Literature and Science	2
Wiley, Edgar J	Mason, Mich		Agricultural	3
Williams, Louis E	Montrose, Iowa		Agri'l and Nat'l Science	3
Williams, Thomas T	Sterling	Whiteside	Military	1
Winkler Joseph	Oakland	Coles	Mechanical Engineer'g	1
Winn, George	Woodstock	McHenry	Commercial	1
Wood, Lansing F	Chicago	Cook	Horticultural	1
Wood, Reuben O	Woodburn	Macoupin	Military	3
Woods, Harvey C	Sterling	Whiteside	Agricultural	1
Worrell, Robert J	Bowen		Civil Engineering	1
Wright, Frank E	Arcola	Douglas	Civil Engin'g and Mil'y	2
Wright, Lawrence	Albion, Ind		Military	1
Wylie, Robert J	Marissa	St. Clair	Mechaical Engineer'g,	1
Young, Edmund B	Lula		Agricultural	1
Young, Horace D	Gilman	Iroquois	Civil Engin'ng and Mil.	2
Zook, John W	Olney	Richland	Agricultural	1
Anderson, Laura M	Champaign	Champaign	Literature and Science	1
Anderson, Lucy	Champaign	Champaign	Literature and Science	1
Anderson, Ella J	Champaign	Champaign	Literature and Science	1
Angle, Kate	Champaign	Champaign	Elective	1
Ayers, Charlotte	Urbana	Champaign	Literature and Science	1
Baker, Ella S	Champaign	Champaign	Literature and Science	2
Baker, Genevieve	Champaign	Champaign	Literature and Science	2
Blasdell, Maria	Champaign	Champaign	Elective	1
Campbell, Amanda	Philo	Champaign	Literature and Science	1
Canine, Francis	Champaign	Champaign	Elective	2
Carey, Elizabeth B	Champaign	Champaign	Elective	1
Chase, Ella	Urbana	Champaign	Eelective	2
Cheever, Alice	Champaign	Champaign	Literature and Science	2
Coffeen, Sadie E	Sidney	Champaign	Elective	2
Columbia, Francis M	Champaign	Champaign	Elective	1
Detmers, Johanna H. M	Manhatten, Kan		Chemical	3
Douglass, Sarah M	South Richland, N Y		Elective	2
Fillmore, Delia M	Champaign	Champaign	Elective	2
Folks, Ida L	Champaign	Champaign	Elective	1
Goodwin, Francis E	Urbana	Champaign	Elective	1
Gourley, Ada	Springfield	Sangamon	Elective	1
Gregory, Mary E	Champaign	Champaign	Literature and Science	4
Gregory, Helen B	Champaign	Champaign	Literature and Science	1
Greuzard, Eugenie	Champaign	Champaign	Elective	1
Hall, Abby G. L	Champaign	Champaign	Elective	1
Hill, Sarah	Urbana	Champaign	Elective	1
Holton, Martha G	Champaign	Champaign	Elective	1
Ivers, Mary A	Champaign	Champaign	Elective	1
Kariher, Kate	Champaign	Champaign	Elective	1
Kellogg, Flora L	Woodville	Adams	Elective	2
Lee, Alice M	Champaign	Champaign	Elective	1
McCullough, Mary A	Paris	Edgar	Elective	1
McWilliams, Anna	Urbana	Champaign	Elective	1
Merriman, Rilla	Champaign	Champaign	Elective	1
Merriman, Emma M	Champaign	Champaign	Elective	1
Potter, Adela F	Champaign	Champaign	Literature and Science	2
Raymond, Jennie	Sidney	Champaign	Elective	2
Rea, Augusta M	Urbana	Champaign	Elective	2
Reynolds Mary A	Belvidere	Boone	Elective	1
Romine, Mary F	Urbana	Champaign	Elective	2
Roots, Annette C	Champaign	Champaign	Elective	1
Steele, Mary C	Urbana	Champaign	Elective	1
Stevens, Lottie J	Urbana	Champaign	Elective	1
Stewart, Emma	Champaign	Champaign	Elective	2
Stewart, Maggie E	Champaign	Champaign	Elective	1
Summers, Charlotte	Springfield	Sangamon	Elective	1
Thomas, Elizabeth	Champaign	Champaign	Literature and Science	1
Victor, Caroline D	Champaign	Champaign	Elective	1
Walker, Eva M	Champaign	Champaign	Elective	1
Whitcomb, Abby	Urbana	Champaign	Elective	2
Whitcomb, Emma S	Urbana	Champaign	Elective	2
Whitcomb, Mary E	Urbana	Champaign	Literature and Science	1
Yeasley, Mary	Urbana	Champaign	Elective	1

RECAPITULATION.

By Sexes.

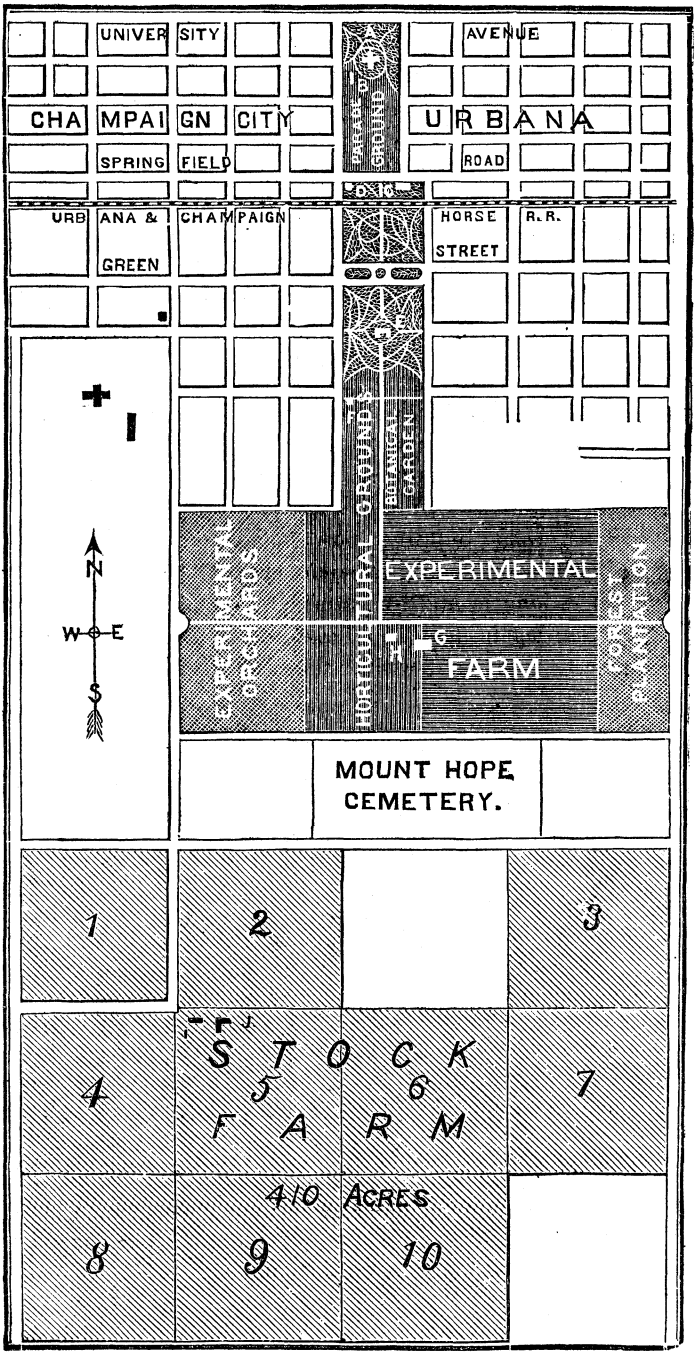
Male Students	328
Female Students	53—381

By Studies.

Agricultural	63	Horticulture	8
Agricultural and Chemical	1	Horticulture and Military	3
Agricultural and Military	3		— 11
Agricultural and Natural Science	1	Literature and Science	36
	— 68	Literature, Science and Military	8
Architectural	3		— 44
Architectural and Engineering	1	Mechanical Engineering	30
	— 4	Mechanical Engineering and Military	3
Chemical	9		— 33
Chemical and Military	5	Military	15
	— 14	Mining Engineering	2
Civil Engineering	35	Mining Engineering and Military	1
Civil Engineering and Military	10		— 3
	— 45	Natural Science	1
Commercial	13	Unassigned	44
Commercial and Military	1		
	— 14	Total	381
Elective	83		
Elective and Military	1		
	— 84		

By Residence.

Adams	4	Pike	4
Boone	8	Pulaski	1
Bureau	4	Putnam	3
Champaign	116	Randolph	2
Christian	1	Richland	2
Clay	6	Rock Island	3
Clinton	2	Sangamon	8
Coles	6	Shelby	4
Cook	7	St. Clair	4
Cumberland	3	Stephenson	2
DeKalb	6	Union	5
DeWitt	3	Vermilion	11
Douglas	5	Warren	1
DuPage	1	Washington	2
Edgar	3	Whiteside	5
Effingham	4	Will	1
Ford	2	Williamson	1
Franklin	1	Winnebago	2
Fulton	3	Woodford	2
Hamilton	2	Unknown	3
Hancock	4		
Henderson	3	Total from Illinois, 69 Counties	343
Iroquois	4		
Jackson	2	*From other States and Territories.*	
Jasper	1		
Jefferson	1	Alabama	1
Jersey	1	Indiana	6
Jo Daviess	3	Iowa	3
Kane	5	Kansas	1
Kendall	1	Michigan	2
Lake	2	Missouri	2
LaSalle	3	New York	4
Lawrence	1	North Carolina	7
Livingston	3	Ohio	2
Logan	5	Pennsylvania	1
Macon	6	Washington	1
Macoupin	2	Wisconsin	5
Madison	3		
Marshall	4	Total from other States	35
Mason	2		
McHenry	10	*From Foreign Countries.*	
McLean	3		
Menard	1	Armenia	1
Mercer	2	Germany	1
Montgomery	3	Greece	1
Morgan	1		
Ogle	5	Total from other countries	3
Peoria	2		
Perry	4	Grand total	381
Piatt	1		



Map of Farms, Buildings, Grounds, Etc.

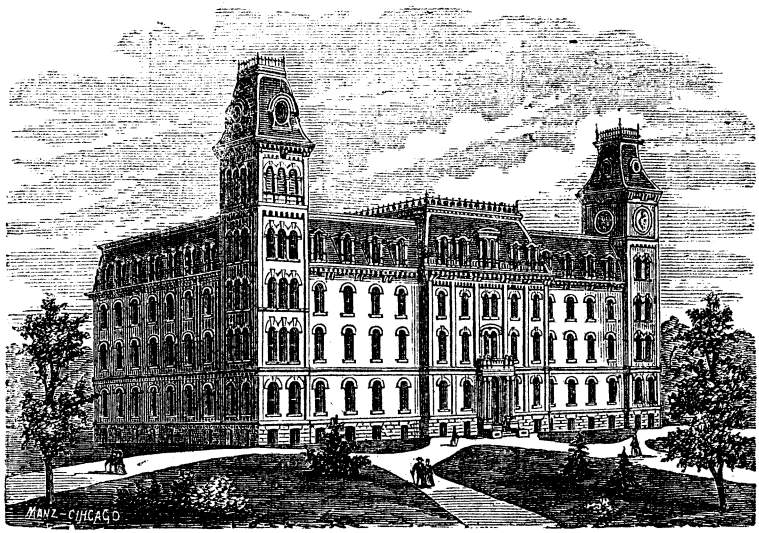
LOCATION.

The University is situated in the city of Urbana, adjoining the limits of the city of Champaign, in Champaign county, Illinois. It is 128 miles from Chicago, on the Illinois Central Railroad. The Indianapolis, Bloomington and Western Railway passes near the grounds. The county is one of the most beautiful prairie regions in the West. The two contiguous cities, constituting really only one community, have together a population of nearly 9,000, well supplied with churches and schools, and affording boarding facilities for a large body of students.

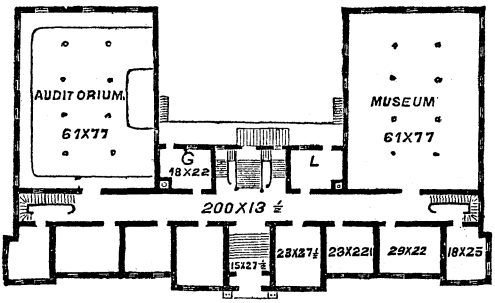
BUILDINGS AND GROUNDS.

The domain occupied by the University, and shown on the foregoing map, embraces about 623 acres, including stock farm, experimental farm, orchards, gardens, nurseries, forest plantations, arboretum, botanic garden, ornamental grounds, and military parade ground.

The old University building now occupied partly by class rooms, library and laboratory, contains some seventy dormitories for students. It is 125 feet in length, and five stories in height, with a wing of 40 by 80 feet, four stories in height. This building was donated by Champaign county. A cut of it will be found on the last page of cover.



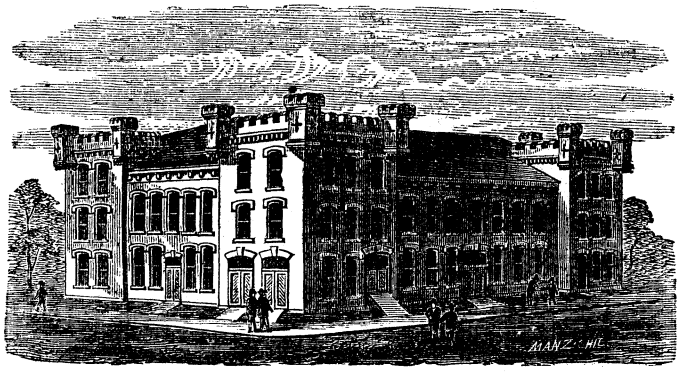
New University Building.



Main Floor.

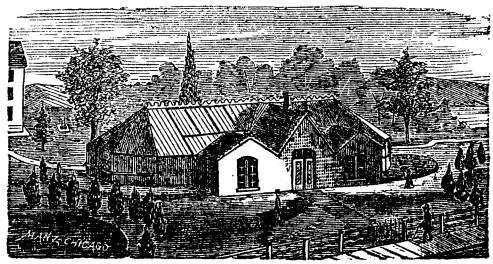
The new University building is one of the most spacious and convenient to be found on this continent. It is 214 feet in length, with a depth on the wings of 122 feet. The above cuts exhibit a perspective view, and the plan of main floor.

This building is designed wholly for public use. The library wing is fire-proof, and contains five large halls devoted to the library and various cabinets and museums. The chapel wing affords a large physical laboratory and lecture-room, and spacious draughting rooms. In the main part are thirty class rooms of good size, and also cloak and wash rooms for both sexes, store rooms, and several large halls for students' literary societies. This building is expected to be completed in September next.



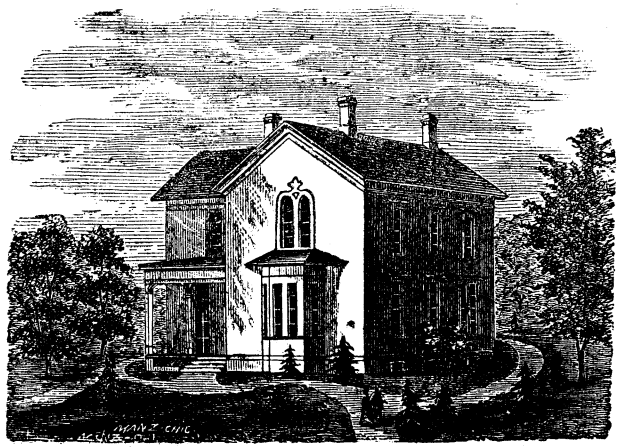
The new Mechanical Building and Drill Hall, shown in the above perspective view, is of brick, 128 feet in length by 88 feet in width. It contains a boiler and forge room; a machine shop, furnished with steam engine, lathes, and other machinery; pattern and finishing shop, and shops for carpentry, cabinet work, wood working machinery, paint rooms, printing rooms, draughting rooms, and rooms for models, finishing, etc.

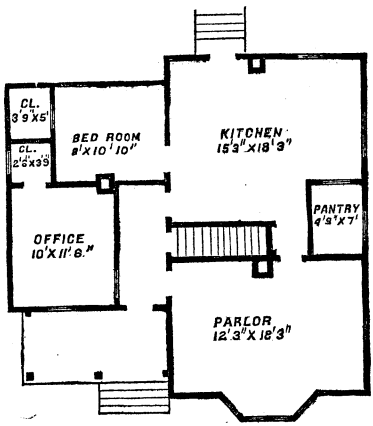
In the second story a large drill hall, 120 by 80 feet, sufficient for the evolutions of a company of infantry, or a section of a battery of field artillery. One of the towers contains an armorer's shop and military model room, an artillery room, and a band room.



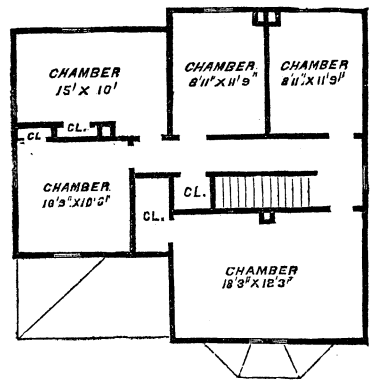
The Green House, shown here, is 70 feet by 24, exclusive of wing, containing potting, seed and furnace rooms. There is, besides, another green house, 12 feet by 35 feet.

The University has two large and valuable barns belonging to the stock and experimental farms and gardens, and four dwelling houses for the superintendents. Views and plans of some of these are here presented.





First Floor.



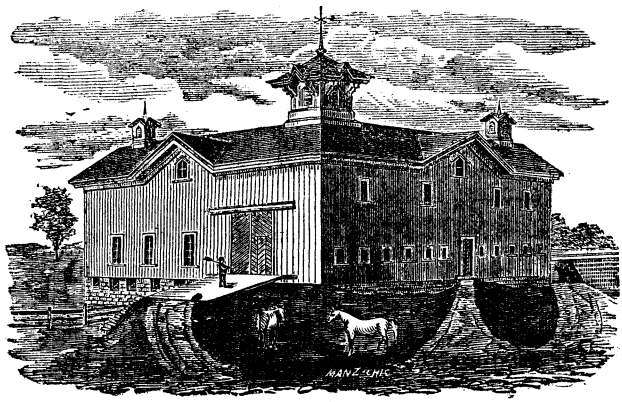
Second Floor.

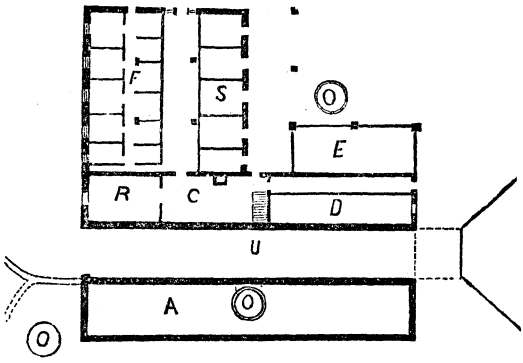
The Farm House, shown here, and recently built on the horticultural grounds, is designed to afford a fair model for a farmer's house. It is tasteful in appearance, economical in cost, and compact and convenient in arrangement.

A cellar under the whole, walled with hard brick, and having a cement floor, affords a laundry, a large cistern, and an ample cellar, in two compartments, one of which may be given to dairy uses, and the other to vegetables.

The front door is sheltered by a pleasant verandah, and the front hall or entry affords direct admission to office, parlor and kitchen. The "office," a small room, which the intelligent farmer will find abundantly useful for his business affairs, will also serve as a library and reading room, on wet days and in the evenings. The "parlor" is a spacious apartment, and rendered doubly pleasant by the bay window. The "kitchen" is also of good size, and many farmers' families make this the "living room," as they call it, where the cooking and eating are both done and the family work goes on. A lean-to, serving as a summer kitchen, and well room, has been added since the building was first erected.

A glance at the second floor will show a goodly number of sleeping rooms, all but two of which are supplied with closets.

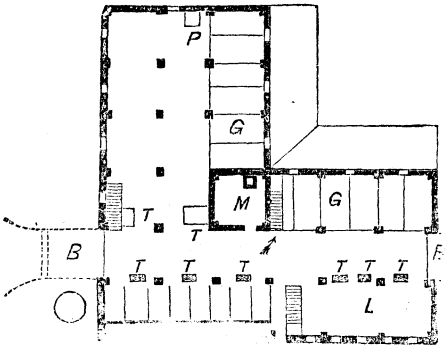




Basement Plan.

We present here the perspective and the plans of the basement and first floor of the barn recently erected on the Stock Farm of the Industrial University. The barn has a north and west front of 80 feet each. Each limb, or ell, is 40 feet wide. It is of the kind known as a side-hill barn.

In the *basement plan*, the space marked R is a root cellar. C the cook room, furnished with a steam boiler to steam food, and a small engine to furnish power for grinding, threshing and cutting. D is a set of hog pens, and E another set of pens or yard under the shed which extends along both sides of the barn in the angle. S represents a set of bull stalls for the several breeds. F a series of stalls for fine breeding cows, with calf pens in the rear of each. O O shows the place of the large cisterns taking the water from the roofs.



Main Floor.

In the plan of the first floor, B B are bridges. T T T show trap doors in the rear of horse stalls to allow droppings to be thrown into the manure pit. L shows a series of box stalls for breeding mares. G G grain bins. M a harness room. P a large ventilating tube or flue, leading from cattle room below to the cap above the roof. There are doors in the sides of this flue, through which hay can be thrown down for feeding the cattle. Above the main floor are ample hay lofts.

PROPERTY AND FUNDS.

Besides the lands and buildings already described, which are, with furniture, library, etc., valued at $300,000, the University owns 25,000 acres of well selected lands in Minnesota and Nebraska. It has also endowment funds invested in state and county bonds, amounting to $364,000, besides other property and avails valued at $33,000. The state has appropriated $25,000 to the agricultural department for barns, tools, stock, etc.; $20,000 to the horticultural department for green

house, barns, drainage, tools, trees, etc.; $25,000 for mechanical and military building, machinery, etc.; $75,000 to begin the erection of the main building, which is to cost $150,000; $10,500 to furnish the chemical laboratory; and $20,000 for library and apparatus.

LIBRARY.

The library, which has been carefully selected with reference to the scientific studies required in the several practical courses, includes now about 8,000 volumes. The large library hall is fitted up as a reading room, and is open every day and evening for study, reading and consultation of authorities. It is well provided with American, English, French and German papers and periodicals, embracing some of the most important scientific and art publications, monthlies, quarterlies, etc. The following is a list of the periodicals regularly received at the library:

Agricultural.

American Agriculturist.
Carolina Farmer.
Colman's Rural World.
Cultivator and Country Gentleman.
California Farmer.
Chemische Ackersman. (German.)
Hearth and Home.
Journal d'Agriculture. (French.)
Massachusetts Ploughman.
Michigan Farmer.
National Live Stock Journal.
Northwestern Farmer.
Prairie Farmer.
Reconstructed Farmer.
Rural New Yorker.
Southern Planter and Farmer.
Southern Cultivator.
Western Rural.
Western Farmer.
Willamette Farmer.
Western Agriculturist.

Horticultural.

Gardener's Monthly.
Horticulturist,
La Propogation. (French.)
Revue Horticole. (French.)

Engineering.

American Builder.
Architectural Review.
Le Moniteur des Architects. (French.)
Mining Journal. (London.)
Manufacturer and Builder.
Railroad Gazette.
Publication Industrielle. (French.)
Scientific Press.
Scientific American.
The Builder. (London.)
The Workshop.
Von Nostrand's Ecl. Eng. Magazine.

Natural Science.

Annalen der Physic. (German.)
American Naturalist.
American Journal of Science.
British Journal of Science. (London.)
British Microscopic Journal. (London.)
Comptes Rendus. (French.)
Geological Magazine. (London.)
Journal of Franklin Institute.
Nature. (London.)
Philosophical Magazine. (London.)

Educational.

Chicago Schoolmaster.
Illinois Teacher.
Maine Journal of Education.
Michigan Teacher.

Literary.

Athaeneum, (London.)
Atlantic Monthly.
Blackwood's Magazine.
Edinburg Review.
London Quarterly.
North British Review.
North American Review.
Revu des Deux Mondes. (French.)
Scribner's Magazine.
St. Paul's Magazine.
The Nation.
Westminister Review.

Language.

Archiv fur das Studium der neueren Sprachen und Lit.

News.

Illinois Staats Zeitung.
Universe Illustre. (French.)
Centralia Sentinel.
Champaign Gazette.
Chicago Post.

AIMS OF THE UNIVERSITY.

"Its leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."—*Act of Congress*, 1862, *Sec.* 4.

"The trustees shall have power to provide the requisite buildings, apparatus, and conveniences; to fix the rates of tuition; to appoint such professors and instructors, and establish and provide for the management of such model farms, model art, and other departments and professorships as may be required to teach, in the most thorough manner, such branches of learning as are related to agriculture and the mechanic arts, and military tactics, without excluding other scientific and classical studies."—*Act of General Assembly*, 1867, *Sec.* 7.

In accordance with the two acts above quoted, and under which the University is organized, it holds as its principal aim to offer freely the most thorough instruction which its means will provide, in all the branches of learning useful in the industrial arts, or necessary to "the liberal and practical education of the industrial classes, in the several pursuits or professions in life." It includes in this, all useful learning—scientific and classical—all that belongs to sound and thorough scholarship.

Its practical aims will be best understood by a survey of the following departments of instruction, for which it offers the best facilities:

1. *Scientific Agriculture*, embracing Soil Culture in all its varieties, and, for all Crops, Animal Husbandry, Stock Breeding, Feeding, etc., Veterinary Science, Agricultural Chemistry, Rural Engineering and Drainage of lands.

2. *Horticulture*, including Market Gardening, Fruit Growing, Management of Nurseries, Forests, Green Houses, Propagating Houses, and Ornamental Grounds.

3. *Mechanical Engineering.* Theory and practice in construction of machinery, pattern making, and working in iron and brass. Study of the Motors, Strength of Materials, and Mechanical Drawing.

4. *Civil Engineering*, including Land and Government Surveys, Railroads, Canals, Bridge Building, Topographical Surveys and Leveling.

5. *Mining Engineering*, embracing Mine Surveys, Sinking and Tubing of Shafts, Driving of Adits, and Methods of Working; Assaying, Treatment of Ores, and Metallurgy.

6. *English Language and Literature.* A thorough and extended course in higher Grammar, Rhetoric, Criticism and Essay Writing, to fit students for editorial or other literary work, or teaching.

7. *Analytical Chemistry.* Chemistry applied to the Arts; Laboratory Practice with reagents, blow-pipe, and spectroscope. A full course to fit students to become chemists, druggists and pharmaceutists.

8. *Architecture.* Architectural Drawing, Styles of Building, Plans, Materials, Estimates, Ornamentation.

9. *Military Tactics.* Manual of Arms, Squad, Company and Battalion Drill, Brigade and Division Evolutions, Bayonet and Sword Fencing, Military Arms, Roads and Fortifications.

10. *History and Social Science*, General and Special History, Political Economy, Rural and Constitutional Law.

11. *Mental and Moral Philosophy*, and Logic.

12. *Modern and Ancient Languages.* French, German, Latin and Greek.

13. *Commercial Science*, Book-keeping, Commercial Law, etc.

14. *Mathematical Science*, Pure and Applied, Natural Philosophy, Astronomy.

15. *Natural History*, Botany, Zoology, Geology, Physical Geography.

16. *Drawing*, Free Hand, Projection, etc.

FREEDOM AND CHOICE OF STUDIES.

The University being designed, not for children but for young men and women who may claim to know something of their own wants, powers and tastes, *entire freedom in choice of studies*, is allowed to each student, subject only to such necessary conditions as the progress of the classes, or the convenience in teaching, requires. It is not thought useful or right to urge every student, without regard to his capacity, taste or practical wants, to take entire some lengthened curriculum, or "course of studies." Liberty everywhere has its risks and responsibilities as well as its benefits,—in schools as well as in society; but it is yet to be proved that compulsory scholarship is necessarily better, riper and more certain than that which is free and self-inspired. Each student is exhorted to weigh carefully his own powers and needs, to counsel freely with his teachers, to choose with serious and independent consideration, the branches he may need to fit him for his chosen career, and then to pursue them with earnestness and perseverance, without faltering or fickleness.

It is necessarily required: 1st, That students shall be thoroughly prepared to enter and keep pace with the classes in the studies chosen; and 2d, That they shall take these studies in the terms in which they are taught in course.

It is expected that each student shall have three distinct studies, affording three class exercises each day. But on special request to the Faculty, he may be allowed less or more, to meet the exigencies of his course.

No changes in studies can be made after the beginning of a term, without permission of the Faculty.

It is recognized that students will often need advice in the selection of studies and in the arrangement of a proper course. To meet this need, the Faculty have carefully arranged several courses of studies which are expected to be followed by those who have no special reasons for diverging from them.

Due care will be taken to prevent as far as possible all abuse of the liberty of choice. Students failing to pass satisfactory examinations in their chosen studies, will not be permitted to remain and take other studies without a vote of the Faculty.

COLLEGES AND SCHOOLS.

The University embraces the following Colleges and Schools. A College, it will be observed, is designed to provide a combined course of instruction made up of the several branches of learning needful for some one profession, or class of professions. A school is a subdivision of a college.

I. THE COLLEGE OF AGRICULTURE.

Subdivided into two schools, as follows:

1. *School of Agrieulture Proper.*
2. *School of Horticulture and Fruit Growing.*

II. THE COLLEGE OF ENGINEERING.

Subdivided into four schools, as follows:

1. *School of Mechanical Science.*
2. *School of Civil Engineering.*
3. *School of Mining Engineering.*
4. *School of Architecture.*

III. THE COLLEGE OF NATURAL SCIENCE.

Subdivided into two schools, as follows:

1. *School of Chemistry.*
2. *School of Natural History.*

IV. THE COLLEGE OF LITERATURE AND SCIENCE.

Subdivided into two schools, as follows:

1. *School of English and Modern Languages.*
2. *School of Ancient Languages and Literature.*

Also, a *School of Commerce*, a *School of Military Science*, and a *School of Domestic Science and Arts.*

Under the head of the several colleges and schools, the student will find marked out the course of studies selected to fit him for his chosen pursuit. A completion of one of these courses, or of the equivalents allowed in it, will be required to entitle the student to graduate.

A student desiring to pursue any given branch of study further than is provided for in the courses in the schools, will find a statement of the extent and course of instruction given in such branch under the head of the proper department of study.

COLLEGE OF AGRICULTURE.

FACULTY.

THE REGENT.
DR. MANLY MILES, Professor of Agriculture.
T. J. BURRILL, Professor of Horticulture and Botany.
A. P. S. STUART, Professor of Chemistry.
S. W. SHATTUCK, Professor of Agricultural Engineering.
D. C. TAFT, Professor of Geology and Zoology.
DR. H. J. DETMER, Lecturer on Veterinary Science.
HON. W. C. FLAGG, Superintendent of Agricultural Experiments.

ADMISSION.

Candidates for admission to the College of Agriculture must be at least fifteen years of age, of good moral character, and able to sustain a satisfactory examination in the following branches:

1st. IN ENGLISH GRAMMAR—In the formation of words, the parts of speech, properties of nouns and pronouns, the declensions, conjugations, etc., and in the analysis and syntax of sentences and use of modifying words and connectives.

2d. IN GEOGRAPHY—Form, size, motions and circular division of the earth; latitude, longitude and zones; the continents and their grand divisions; countries and capitals of Europe and America; mountain systems and chief rivers and lakes of Europe and America, boundaries, capitals, chief towns, great railroads and canals, of the States of the Union.

3d. ARITHMETIC—Decimal system of notation and numeration, the four grand rules or operations, with clear explanations of processes, rea-

sons and proofs, classifications of numbers, reduction, denominate numbers, fractions, reduction of fractions, addition, subtraction, multiplication and division of fractions, decimal fractions, operations in decimals, per centage, interest, ratio, proportions, involution and evolution.

4th. ALGEBRA—Definitions, notation by letters and signs, simple operations, changes of signs and reasons, algebraic fractions, equations, transformations of equations, solutions of problems, methods of eliminations, calculus of radicals.

5th. HISTORY OF THE UNITED STATES—Discovery and settlement of the several States, Indian and other wars, struggle between France and England for possession, the early history of Illinois and the West, the revolutionary war.

Students entering any time after the beginning of the first term must pass examinations in the studies already pursued by the class.

ADMISSION IN 1873.—As the law requires that no student shall be admitted who shall not pass a satisfactory examination in the studies of the common schools, and as the new school law prescribes that the "elements of the natural sciences" shall hereafter be taught in the common schools, candidates for the College of Agriculture in the University, in the fall of 1873, and thereafter, must be prepared in the elements of Human Physiology, in Botany and in Natural Philosophy, in addition to the studies heretofore required.

Candidates for Partial and Elective courses of study will also be admitted upon the above conditions.

RECOMMENDED COURSES OF STUDY.

SCHOOL OF AGRICULTURE.

FIRST YEAR—*First Term.* Plane Geometry; Chemistry; English or Latin; History, two lectures a week. *Second Term.* Botany; Chemistry, Laboratory Practice; English or Latin; History, two lectures a week. *Third Term.* Botany; Analytical Chemistry; English or Latin.

SECOND YEAR—*First Term.* Soils and Fertilizers; Cryptogamus Botany and Vegetable Physiology; Trigonometry and Surveying; French or Chemistry. *Second Term.* Chemical Treatment of Soils and Manures; Drawing and Mapping; Zoology; French or Physics. *Third Term.* Mechanical Treatment of Soils and Drainage; Entomology, French or Chemistry or Physics.

THIRD YEAR—*First Term.* Fruit Growing, Orchards, etc.; Anatomy and Physiology; German or History. *Second Term.* Animal Husbandry; Geology; German or History. *Third Term.* Agricultural Book-keeping, Farm Records; Rural Law and Economy; German or History.

FOURTH YEAR—*First Term.* Dairy Farming and Farm Manufactures; Mental Philosophy or Constitutional History; History of England and American Literature. *Second Term.* Veterinary Surgery; Physical Geography and Mineralogy; Rural Architecture. *Third Term.* Landscape Gardening; History of Agriculture; Geology of Illinois; Political Economy; History of Philosophy or Logic.

SCHOOL OF HORTICULTURE.

FIRST YEAR—Same as in School of Agriculture.

SECOND YEAR—Same as in School of Agriculture.

THIRD YEAR—*First Term.* Fruit Growing, Orchards, etc.; Anatomy and Physiology; German or History. *Second Term.* Propagation of Plants, Nurseries, etc.; Geology; German or History. *Third Term.* Small Fruits and Vegetables; Rural Law and Economy; Book-keeping; German or History.

FOURTH YEAR—*First Term.* Green Houses and Green House Plants; Mental Philosophy or Constitutional History; History of English and American Literature. *Second Term.* Garden Architecture; Physical Geography and Meteorology; History of Civilization. *Third Term.* Landscape Gardening; Geology of Illinois; Political Economy; History of Philosophy or Logic.

I. THE SCHOOL OF AGRICULTURE.

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

The instruction unites as far as possible, theory and practice—theory explaining practice, and practice illustrating and enforcing theory.

APPARATUS.

The College has for the illustration of Practical Agriculture, a large stock farm of 410 acres, provided with a large stock barn, fitted up with stables, pens, yards, cooking room, etc.; and fine stock of several breeds of neat cattle, embracing Short Horns, Herefords, Devons, Ayrshires, and Jersey Cattle. It also has several breeds of swine and sheep, to illustrate the problems of breeding and feeding.

An Experimental Department, aided by a special appropriation, has also been organized. It includes field experiments in the testing of the different varieties and modes of culture of field crops, and in the comparison and treatment of soils, carried on at the University farm, where about sixty acres are devoted to this purpose, and at other points representing the different soils and climates of the State. It includes also experiments in horticulture and agriculture, under the direction of the Professor of Horticulture and of the Farm Superintendent, and of experiments in feeding animals of different ages, and development upon the various kinds of food. In common with similar departments in the several State agricultural colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science. At a meeting held at Chicago, in August, 1871, the representatives of a dozen or more of these institutions agreed to co-operate in this work, and to make experiments in common, as well as others peculiar to their several States.

A veterinary hall and stable is provided, and a Clinic is held in the Fall or Winter Term, to illustrate the lectures on Veterinary Science.

Surveying and drainage are illustrated by practice in the field. Chemistry is pursued by work in the laboratory. Collections of seeds, soils, plants, implements, skeletons of animals, models and apparatus are provided to illustrate the several branches of Agricultural Science.

II. SCHOOL OF HORTICULTURE.

The aim of this school is to afford a scientific and practical education, specially adapted to the wants of those who cultivate garden and orchard plants. In the fertile soils and favorable climate of our State, with our rapidly increasing population and easy transportation, this department of human industry, always of prime importance, is becoming more and more prominent, more lucrative to the successful grower, and more essential to the comforts and enjoyments of home. The enhanced price of land, the competition of numbers, the increasing depredations

of insects, and the ravages of vegetable diseases, render imperative increased knowledge and skill on the part of the cultivator, while the demand of the age calls loudly for general intellectual and moral culture fully equal to that given to the other pursuits and professions of life.

INSTRUCTION.

The instruction is both theoretical and practical. The class room recitations and lectures are supplemented by instructive practice in the fields and plant houses. In connection with the lectures upon methods of obtaining and perpetuating new varieties of plants, students have practical exercises in cross-fertilizing, seeding, grafting, budding, etc., as a part of their regular education. So, in connection with the studies of ornamental plants and grounds, the care of the green houses, etc., constitutes an essential feature of the student's work. Ladies and gentlemen alike engage in the studies and exercise of the course.

APPARATUS.

To furnish the practical portions of the course of instruction, the school is well provided, and the means of illustration are fast accumulating.

Of 130 acres of land devoted to its use, twenty are planted with forest timber trees, including nearly all the valuable kinds, both native and introduced. An apple orchard of 1,200 varieties is just coming into bearing, nearly 400 varieties of pears are growing upon the horticultural grounds, 25 varieties of cherries, 40 of grapes, and many kinds of raspberries, blackberries, strawberries, currants, gooseberries, etc. The nurseries are well filled with young ornamental and useful plants, and in the vegetable gardens, a large collection has been made. An arboretum and a botanical garden have been commenced, in which it is proposed to gather all the native and hardy exotic plants, so far as practicable. Twenty acres are devoted to the building and ornamental grounds, where much pains are taken to make both summer and winter ornamentation attractive and pleasing. A fine green house, 24 by 70 feet, exclusive of wing, is filled with a rich collection of plants, many of which are choice and valuable kinds. Two other structures afford ample room for the propagation of a large stock of plants, and illustrate the different modes of heating. The cabinets contain many illustrative specimens, and the library has hundreds of volumes of the best horticultural literature known to the world.

CONTRIBUTIONS.

Besides the amounts appropriated from the general fund of the University, the State has granted, by special act of the Legislature, at two

separate sessions, $23,000 for the use of the School of Horticulture, and individuals have often favoredi t by liberal donations of plants, machinery, etc. Further aid is promised, and appeal is now made to friends everywhere for assistance in furnishing the fruit and tree plantations with the fullest possible stock, in the building and furnishing of green houses and conservatories, and in the enlargement of the scientific collections in the aboretum and botanical garden. A catologue of the plants now in the houses and upon the grounds is ready for the printer, and when finished, will be forwarded to parties wishing to exchange or contribute.

COLLEGE OF ENGINEERING.

FACULTY.

THE REGENT.
S. W. ROBINSON, Professor of Mechanical Engineering.
J. BURKITT WEBB, Professor of Civil Engineering.
HAROLD HANSEN, Instructor in Architecture and Drawing.
S. W. SHATTUCK, Professor of Mathematics.
A. P. S. STUART, Professor of Chemistry.
DON CARLOS TAFT, Professor of Geology and Zoology.

ADMISSION.

Applicants should be at least eighteen years of age; and none will be admitted under fifteen. They will be examined in the following branches: English Grammar, Geography, History of the United States, Arithmetic, and Algebra to the equations of the second degree; also in Plane Geometry.

Applicants for admission in September, 1873, will be examined in Algebra, through Powers and Roots of any degree, Calculus of Radicals and Quadratic Equations, and in Natural Philosophy. For admission in September, 1874, the examination will include all of Geometry, and the elements of Botany and Physiology.

Students will find it much to their advantage to present themselves at the opening of the Fall Term, and commence their studies with the regular classes.

Advanced students will be received into the First, Second or Third Year Class, upon passing satisfactory examinations on all the previous studies of the class.

PREPARATION.

Thorough preparation is essential to success in the Professions of the Engineer and Architect, and applicants will do well to make sure of passing their examinations in Mathematics.

The studies are arranged so that those who will make further preparation than is required before entering, can make their courses more extensive and profitable, and the following suggestions will be of use to such as wish to make thorough work. One recitation a day is devoted to English and modern languages; by coming well prepared in English Grammar and composition, with some knowledge of English literature, the whole of this time can be devoted to French and German, each of which should have at least one year. Some preparation in Latin will be of great assistance in these languages. The Engineer or Architect should be an adept in the various departments of Drawing, and some preparation in this branch will be of great advantage. Neatness and exactness of execution should be acquired as a habit. Sufficient preparation in Free-hand and Geometrical Drawing will also make room for an additional term in Botany or Chemical Analysis.

PAPER.

Regulated sizes and quality will be adhered to in College exercises; they are as follows:

5 in. by 8 in. commercial note size, with half-inch margins, for problems and first and second vacation journals.

8 in. by 10 in. with three-quarter inch margins, for other manuscript and small drawings.

10 in. by 15 in. with "sight" 8 in. by 13 in., Patent Office size, for drawings.

Larger sizes will be allowed when deemed necessary by the Professor in charge.

SPECIMENS.

Friends of science and of this institution, merchants and manufacturers, graduates and students, are earnestly desired to contribute specimens of material, machinery and manufactures. It is particularly desired to obtain specimens of ores with their partially and completely manufactured products; specimens, 5 in. by 5 in. by 1 in., of natural and artificial building stones, showing the different styles of finish. Photographs of machinery, and of bridges and other engineering works, both finished and in process of construction; working and finished drawings of engineering constructions, and of machines, architectural designs, engravings and photographs. Also, the illustrated circulars and price lists of manufacturing firms.

These specimens will be labeled with the names of the donors, and placed in the cabinets of the college for the inspection of students and the illustration of lectures.

SCHOOLS.

The College of Engineering consists of four schools, as follows:

I. *School of Mechanical Engineering.*
II. *School of Civil Engineering.*
III. *School of Architecture.*
IV. *School of Mining Engineering.*

COURSES OF STUDY OF COLLEGE OF ENGINEERING.

Explanation.—The figure following a branch indicates the number of hours required per week.

FIRST YEAR.—(The studies of this year are the same in all the courses.) *First Term.*—English or French, Solid Geometry and Algebra commenced, Descriptive Geometry and drawing, 10; History, two lectures per week. *Second Term.*—English or French, Algebra continued, Free-hand Drawing, 10; History, two lectures per week. *Third Term.*—English or French, Trigonometry, Plane and Spherical; Botany; History, two lectures per week.

MECHANICAL ENGINEERING.

SECOND YEAR.—*First Term.*—German, Descriptive Geometry continued, Designing and Drawing, 10. *Second Term.*—German, Analytical Geometry, Shop Practice and Drawing, 10. *Third Term.*—German, Calculus, Shop Practice, 10.

THIRD YEAR.—Vacation Journal and Memoir. *First Term.*—Calculus, Chemistry, principles, Principles of Mechanism. *Second Term.*—Physics, Analytical Mechanics, Shades, Shadows, Perspective, 10. *Third Term.*—Physics, Analytical Mechanics, 6 weeks; Descriptive Astronomy, 5 weeks; Chemistry, laboratory practice, 10.

FOURTH YEAR.—Vacation Journal and Memoir. *First Term.*—Geology or Mental Philosophy, Thermodynamics, Pneumatics, Hydraulics, 4 weeks; Strength of materials, Trusses, 10 weeks. *Second Term.*—History of Civilization, Prime movers, Mill work, Finished Machine Drawings, 10. *Third Term.*—Political Economy, Mill work and Machines, Designs and Estimates, 10; Thesis.

CIVIL ENGINEERING.

SECOND YEAR.—*First Term.*—German, Descriptive Geometry continued, Surveying and Drawing, 10. *Second Term.*—German, Analytical Geometry, Lettering and Drawing, 10. *Third Term.*—German, Calculus, Surveying and Drawing, 10.

THIRD YEAR.—Vacation Journal and Memoir. *First Term.*—Calculus, Chemistry, principles; Railroad Surveying, 10. *Second Term.*—Physics, Analytical Mechanics, Shades, Shadows, Perspective. *Third Term.*—Physics, Analytical Mechanics, 6 weeks; Descriptive Astronomy, 5 weeks; Chemistry, laboratory practice, 10.

FOURTH YEAR.—Vacation Journal and Memoir. *First Term.*—Geology of Mental Philosophy, Practical Astronomy, Geodesy, Hydraulics, 4 weeks; Strength of materials, Trusses, 10. *Second Term.*—History of Civilization, Bridge construction, Finished Engineering Drawings, 10. *Third Term.*—Political Economy, Stone work, 8; Architectural Drawing, 8; Thesis.

MINING ENGINEERING.

SECOND YEAR—*First Term.*—German, Descriptive Geometry continued, Surveying and drawing, 10. *Second Term.*—German, Analytical Geometry, Lettering and Drawing, 10. *Third Term.*—German, Calculus, Surveying and Drawing, 10.

THIRD YEAR.—*First Term.*—Calculus or German, Chemistry, principles; Surveying, Drawing, 10. *Second Term.*—Physics, Analytical Mechanics, Chemistry, laboratory practice. 10. *Third Term.*—Physics, Mineralogy, Crystallography, Descriptive Astronomy; Chemistry, laboratory practice, 10.

FOURTH YEAR.—Vacation Journal and Memoir. *First Term.*—Geology of Mental Philosophy, Practical Astronomy, Geodesy, 10 weeks; Hydraulics, 4 weeks; Chemistry, laboratory practice, 10. *Second Term.*—Mining Engineering, Assaying, Metallurgy. *Third Term.*—Geology of Mining Districts, Metallurgy, Mining Drawings, 10; Thesis.

ARCHITECTURE.

SECOND YEAR.—*First Term.*—German, Descriptive Geometry continued, Joinery and Detail Drawing, 10. *Second Term.*—German, Analytical Geometry, History of Architecture, Drawing, 10. *Third Term.*—German, Calculus, History of Architecture, Drawing, 10.

THIRD YEAR.—*First Term.*—Calculus or Surveying, Chemistry, principles; History of Architecture, Drawing, 8. *Second Term.*—Shades, Shadows, Perspective, Analytical Mechanics, History of Architecture, Drawing, 8 *Third Term.*—Crayon Drawing from casts, 8; Mechanics and Astronomy or Mineralogy; History of Architecture, Drawing, 8.

FOURTH YEAR.—Vacation Journal and Memoir. *First Term.*—Geology or Mental Philosophy, History of Architecture, Drawing, Crayon Drawing from casts, 8; Strength of Materials, Trusses. *Second Term.*—Physics, Architectural Designing, 8; Complete Drawings, 8. *Third Term.*—Physics, Stone work, 8; Specification, Estimates, 8; Thesis.

SCHOOL OF MECHANICAL ENGINEERING.

This school is intended to prepare students for the profession of Mechanical Engineering. It is designed to supply a class of men long needed, not simply practical nor wholly theoretical, but who, guided by correct principles, shall be found fully competent to invent, design, construct, or manage machinery, in the various industrial pursuits. The instruction, while severely scientific, is also thoroughly practical, aiming at a clear understanding and mastery of all mechanical principles and devices. Practice in the Mechanical Laboratory is counted as one of the studies of the course, and is combined with the theoretical training.

PLAN OF INSTRUCTION.

Instruction in this school is two-fold: First, principles; and second, practice.

The instruction in principles is imparted by lectures, and recitations from text books, combined with the use of plates and illustrative models. Numerous examples are also given, showing the application of the theories and principles taught. Experiments in the testing of machines and motors are also undertaken by the student.

The practical instruction consists mainly in the execution of projects, in which the student is required to produce machines, or parts thereof, of his own designing, and from his own working drawings. The students, in class exercises, use the machinery and tools of the machine and pattern shops and foundry, under the eye of a competent teacher, and according to the most approved methods of machine shop practice. (See details of projects below.)

The practical instruction is not intended to teach the trade merely, but is added as a neeessary adjunct of the theoretical training.

COURSE OF STUDIES.

The course is given by the year and term in the tabular view of the several courses of the college. The order of the studies there indicated should be followed as closely as possible, that the student may avoid confliction in the times of recitation.

The following is a detailed view, by branches, of the technical studies of the course:

PURE MATHEMATICS.—See department of Pure Mathematics as far as Calculus of Variations.

APPLIED MATHEMATICS.—*Cinematics, and Principles of Mechanism.*—Relative motion of points in any system of connected lines or pieces; motion considered independent of force; velocity-ratio; investigation of the motion of different elementary parts of machines, such as friction and curve wheels in rolling contact, cams and curves in sliding contact; correct working gear teeth; gearing chains; escapement link-work. *Analytical Mechanics*—Equations of equilibrium; movements; virtual velocities, center of gravity; mechanical powers; friction; relation of motion, force and mass. *Hydraulics.*—Amount and center of pressure upon submerged surfaces; flow of liquids through orifices, weirs, pipes and channels, distribution of water in cities. *Thermodynamics.*—Thermal, and thermometric units; sensible, specific and latent heat; expansive action of heat in fluids and solids; absolute temperature; laws of thermodynamics; thermal lines; change of temperature and pressure attending sudden expansion or compression of gases; convertibility of heat and work; internal and external work accompanying changes of state and condition of fluids. *Pneumatics.*—Flow of gases through orifices and pipes; density and inertia of gases; distribution of street gas in cities.

NATURAL SCIENCE.—*Physics.*—See department of physics and astronomy. *Chemistry.*—Inorganic chemistry and qualitative chemical analysis. *Geology.*—Elements of physiographic, lithological, historical and dynamical geology. *Descriptive Astronomy.*—See department of physics and astronomy.

DRAWING.—*Projection Drawing.*—Use of drawing instruments in the application of the elements of descriptive geometry to the representation of objects on paper; use of water colors in giving actual external appearance; isometrical drawing; determination of shade lines and shadows, finished perspective, or pictures. *Free-Hand Drawing.*—Sketches of machinery; ornamental forms; lettering. *Machine Drawing.*—Working drawings of original design, the same completely finished in water colors and in line shading, and detailed for the work shop, as is done in the leading manufactories of the country.

ENGINEERING.—*Projects.*—The proportions, dimensions and customary forms of machinery; designing and detailing; constructions of machines from working drawings in the mechanical laboratory. *Resistance of Materials.*—See school of civil engineering. *Prime Movers.*—Work developed by water-wheels wind-wheels, steam, hot air and electric engines; their economy and efficiency. *Mill-work and Machinery.*—Principles of mechanism applied in determining the correct forms of the moving parts of machines; machinery of transmission; manufacturers' machinery; engineers' machinery; elastic and ultimate strength, and stability of heavy machinery.

PROJECTS AND THESIS.

The Designing, Drawing and Shop Practice will always have a definite practical purpose. The students under the immediate direction of teachers, carefully determine the dimensions and shapes best suited for all the parts of some machine assigned as a subject, and reduce them to neat and accurate working drawings. In the fourth year, the drawings will be completely finished with shading and colors, and detailed according to the best methods in the practice of modern engineers. Tracings of these will be taken for shop use, and finally left for the further use of the school. No student is expected to commence his shop practice without his working drawings. The designs are intended to be such as require execution in iron, brass and wood, for the purpose o giving some breadth of practice. The student is required to make the

patterns and castings, finish the parts and pnt them together in accordance with the working drawings. He thus performs the difficult as well as the easy portions of the work, often repeating pieces several times until up to the required standard of workmanship.

The practical instruction will acquaint the student with the manner in which the mechanical engineer carries his designs into execution, and teach him to so shape, proportion and dispose all the parts of a machine as to secure the greatest economy in construction, and durability in use.

Experiment in the testing of prime movers and other machines will be undertaken by the classes. Every class in prime movers will take indicator diagrams from the engine of the mechanical laboratory, and determine from them the power developed by the steam while working with different degrees of expansion.

Journals of Travel are required to be kept during the summer vacations by those students who complete the course of studies of the school. Entries should be made as often as once a week, and consist of notices of manufactories; and especially of their peculiar mechanical methods, or peculiar machines employed or produced. Dimensions of large or otherwise important machinery, such as large stationary engines of water-works, blowing or hoisting engines, and machinery in use in mining or other operations, may also form the subject of record. The journals of the first vacation are to be read and discussed in connection with the class of Designing and Shop Practice; and those of the second vacation in connection with the class of Cinematics and Principles of Mechanism.

Reports or Memoirs upon visits and observations of the third vacation will be expected instead of journals, to be read in the class of Machine Drawing during the middle term of the fourth year. These reports should be made upon rare and interesting mechanical operations or machinery, such as making gas pipe; spinning of zinc, copper and brass ware; manufacture of saws, etc. These reports will be placed on file, or bound for use in the library of the school. They should, therefore, be illustrated by ample sketches and drawings. The journals should also be illustrated by sketches reproduced upon the blackboard when the journal is read.

A Thesis will be required at the end of the fourth year, of those who complete the studies of the course. It will consist of a written memoir or discussion, illustrated by drawings, when necessary, upon some allowed subject of mechanical engineering. The thesis is to be read and defended by the student before the class.

MECHANICAL LABORATORY.

The plan* shows the arrangement of the Mechanical Laboratory, its rooms, machinery, tool cases, benches, etc. The draughting and class room is in the lower story of the tower; O O, small rooms for the storage and safe keeping of bench and hand tools; R in the paint room is a small room for paints, oils, etc.

In the Boiler Room, T is a Root's sectional safety boiler of 33 horse power, which supplies steam for the engine, and for warming the whole building. The forge and furnaces U U are in this room, and also a moulder's bench with sand and the appliances for making brass, iron and other castings. At Z are the pumps, and Stilwell heater and lime extractor for supplying the boiler with water.

In the Machine Shop, A is the engine, of 16 nominal horse power, but capable of working to 30 horse power. It is regulated by a variable cut-off, of entirely new design by Professor Robinson, and very simple construction; one eccentric giving positive movements, without noise, to two valves by means of a link and two valve rods. It was made entirely by the students of the University, with the exception of the balance wheel. A Richard's indicator, of the most approved construction, is fitted for attachment at any time to the cylinder.

The main line of shafting is cold-rolled iron, 72 feet long, and furnished with the best iron pulleys and hangers. At B is a Putnam engine lathe, of 20 inches swing, by 10 feet bed. At D is an Ames lathe, of fifteen inches swing, by 6 feet bed. At C is a Putnam planer for Iron, planing 5 feet long. At E E are two hand lathes, swinging about 10 inches by 4 feet, which were made by students. At F F F is a stretch of about 100 feet of 4 by 18 inches oak plank benches, fitted up with vises, drawers, tool cases, etc. The steam heating coils of this room are under the benches, extending their whole length. At G is the grindstone.

In the Pattern Shop are four complete sets of tools, benches and vises, each sufficient for any pattern maker. This room has also a small buzz-saw for the light work of the pattern room.

In the Carpenters' and Wood Workers' room, H is a Whitney planer, I a moulding machine, J a tenoning machine, M a jig-saw, O a cutting-off-saw, S a buzz-saw. There is also a mortising machine, a turning lathe, and about 10 work benches and vises.

APPARATUS.

This school is provided with plates and a cabinet of models for illustrating mechanical movements and elementary combinations of mechanism. This collection is rapidly increasing by our own manufacture, and

* The cut for this place should have appeared here, but was not furnished the printer.

by purchases from abroad. A supply of Riggs' models has lately been added, and more are ordered from the celebrated model manufactory of J. Schroder, of Darmstadt, Germany. About two hundred valuable models have lately been received from the U. S. Patent Office.

SCHOOL OF CIVIL ENGINEERING.

Those who desire a preparation for this profession, at once broad and thorough, and who are willing to make persevering efforts to obtain it, are cordially invited to connect themselves with this school.

PLAN OF INSTRUCTION.

It is desired that the student lay a broad foundation in general and disciplinary culture, which will enable him to pursue his professional studies with greater ease and advantage. With this view the studies peculiar to the course are not commenced until the second year.

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

GENERAL VIEW OF THE COURSE.

The complete course occupies four years. The studies of the first three will prepare a student for undertaking many engineering operations, such as the building of railroads, canals, embankments, etc. The fourth year is intended for those who wish to fit themselves for the higher engineering constructions, such as building of arches, trussed bridges, and supporting-frames of all kinds.

Each year consists of thirty-six working weeks, divided into Fall, Winter and Spring Terms. The time is divided among the different branches nearly as follows:

Languages	6	Terms,	1 Recitation daily.
Pure Mathematics	6	"	1 " "
Drawing of all kinds	7	"	2 hours "
Special Engineering lectures, with Mathematical Analysis	3	"	1 lecture "
Surveying	2	"	8 hours weekly.
Physics, Mechanics, Hydraulics, Astronomy, Geology, Chemistry, Mental Philosophy, Logic, Political Economy, History; each	1	"	
Journals of Vacation, Pursuits and Travels	3	"	
Memoirs of Engineering subjects	2	"	
Projects in Engineering Construction	2	"	
Thesis at close of course.			

COURSE OF STUDIES.

A tabular view of the course is given on page 32.

The following is a view in detail of the technical branches of study in the course of the School of Civil Engineering :

PURE MATHEMATICS.—For details see the Department of Pure Mathematics to the end of the Integral Calculus.

APPLIED MATHEMATICS:—*Descriptive Geometry.*—Problems on the point, right line, and plane; angles, curved lines and surfaces; tangent lines and planes; intersections; spherical projections; spherical triangles; warped surfaces; parallel and true perspectives; shades and shadows; practical problems and applications. *Analytical Mechanics* and *Hydraulics.*—See Department on Mechanical Engineering. *Practical Astronomy.*—The observatory; equatorial telescope; transit instrument; altitude and Azimuth instrument; sextant; micrometer; astronomical clock, and chronometer; chronograph; adjustments of the instruments; determination of time, latitude and longitude by various approved methods; practical exercises in the use of instruments and reduction of the observations. *Geodesy.*—Determination of the figure of the earth; methods of entended surveys of the earth's surface; ordinary methods of measuring base lines; methods of the United States surveys for bases, parallels and meridians. Surveying calculation of areas and inaccesible distances; supplying omissions; correcting measurements; standard units of measure; metrical system of weights and measures; barometric measurement of altitudes; refraction; curvature of the earth; theory of the compass; plane table; transit; theodolite, level, stadia, etc.; adjustment of the instruments; simple, compound, reversed and parabolic railroad curves; turnouts; crossings; passing obstructions; setting slope stakes; calculation of earth work by various methods; grades; curvature of rails; coning of wheels; calculation and use of tables.

DRAWINGS.—*Projection Drawing.*—Elementary Problems in Descriptive Geometry applied to the Projection of Objects; Use of Drawing Instruments and Water Colors; Isometric Drawing; Parallel Perspective; Projection of Shades and Shadows, Finished Drawings in Colors; Drawings of Bridges; Right and Oblique Arches. *Free-hand Drawing.*—Landscapes, Buildings, etc.; Course of Lettering and Ornamental Work. *Topographical Drawing.*—Sketching; Ink Drawings; Colored Drawings; Conventional Signs, etc. *Mapping.*—Railroad Mapping, Profiles, Alignments, Sketching, etc.; City and County Maps; Plats of Ground; Building Lots. *Architectural Drawing.*—Designing and Drawing of Engineering Structures. *Perspective Drawing.*

NATURAL SCIENCE.—*Physics.*—See Department of Physics and Astronomy. *Botany.*—See Department of Agriculture. *Chemistry.*—Principles of Inorganic Chemistry; Chemical Physics; Stoichiometry; Qualitative Analysis. *Geology.*—Elements of Physiographic, Lithological, Historic and Dynamical Geology. *Descriptive Astronomy.*—See Department of Physics; Astronomy.

ENGINEERING.—*Road Engineering.*—Location of Roads and Railroads; Dimensions; Materials; Pavements; Drainage; Grades; Gauges; Rails, Chairs, Frogs, Switches; Turn Tables, Tunnels, Rolling Stock, etc. *Resistance of Materials.*—Laws and Coefficients of Elasticity; Work of Elongation, and Time of Oscillation; Set; Viscosity; Modulus of Strength, Safe Limits; Tension and Compression; Strength of Columns; Theories of Flexure and Rupture, Neutral Axis; Shearing Stress; Flexure of Beams and Columns; Strength of Beams and Columns; Standard Beams; Tension; Shocks, Crystallization; Experiments; Practical Formulæ. *Stability of Frames.*—General Principles; Joints; Fastenings; Analysis of a variety of Roofs and Frames, with various Methods for obtaining the strains on the different Parts. *Bridge Construction.*—King and Queen Post Trusses; Warren's, Howe's, Long's, Pratt's, Linville's, Post's, Whipple's, Finck's, Bollman's, etc.; Trusses; Tubular Bridges; Suspension Bridges; Draws; Arches, etc.; *Building Materials and Masonry.*—Stone; Bricks; Limes, Cement, Mortars; Metals; Coverings, Foundations; Retaining Walls; Relieving Arches; Settling; Temperature. *Projects.*—See School of Civil Engineering.

VACATION WORK.

A journal is required to be kept by each student during vacation. It must be written as often as once a week, and will contain an account of his travels and occupations, with special reference to matters pertaining to his chosen profession, and general attention to all scientific and industrial facts. It will be presented at the opening of the Fall Term,

and will be examined, interesting facts discussed, and marked and credited as a study of the course.

It is recommended that students employ their vacations in engineering practice. To facilitate this important part of their preparation, students of creditable standing, at the end of the second and third years of their courses, can obtain certificates to this effect from the Professor in charge.

PROJECTS, MEMOIRS AND THESIS.

Projects. During the Spring Term of the second year, an accurate Topographical Survey of a locality is made by the class, with reference to the execution of a project in Railroad Engineering, which is then given to the class for consideration and discussion, but which is executed in the Fall Term of the next year.

The Project consists of—

I. Memoir; II. Location; III. Drawings; IV. Estimates.

I. The Memoir will propose a location for a railroad to fulfill certain exact requirements, and will state the reasons for the choice, with the necessary calculations and estimates. It will be presented at the opening of the Fall Term. Different memoirs will be compared, and one or two routes decided upon for the class to work up.

II. The Location will consist in running the line over the routes decided upon, with all the necessary measurements and calculations for establishing the grade, setting slope stakes, determining the amount of earthwork, designing the buildings, bridges, culverts, etc.

III. The drawings will include—

I. Alignment; II. Profile; III. Plans of Structures.

IV. The Estimates will give the cost of ground, earthwork, structures, rolling stock, etc; expenses of operating the line, and estimated income.

A Memoir will also be required at the opening of the fourth year upon an allowed subject, and

A Project in Engineering construction will be executed during the year.

A Thesis upon an approved subject, either separate or in allowed connection with the fourth year project, will be required at the close of the course.

APPARATUS.

The school is provided with both English and American instruments for the different branches of Engineering Practice, and for the Astronomical work of Higher Surveying. It has numerous models for illustration of its specialties and access to the cabinets of the other departments. To facilitate the practice in Trigonometrical and Land Surveying, it has a specially prepared area, in which the difficulties of plain surveying are presented to the beginner as he is able to meet them, and

where he is taught practical methods of overcoming them. This area is subdivided by a large number of lines, the positions of which are accurately known, but not by the student. He is then required to determine the positions of the "corners" by various methods, and to calculate the inclosed area. Other problems are given in determining inaccessible distances, passing obstacles, avoiding local attraction, etc., for which the ground is prepared. The number of divisions is so large, that no two students need have the same problem, and so accurately laid out that the correctness of the student's work can at once be determined.

SCHOOL OF ARCHITECTURE.

This school is designed for those who desire to fit themselves for the profession of architect and builder.

The specialties of the course are taught upon the same general plan as in the European art schools, by a graduate of the national school of architecture of Norway, and a state scholar of the Berlin school of architects. Students of architecture will find rare advantages here.

APPARATUS.

Besides the use of apparatus connected with other schools, the school of architecture has a fine set of one hundred and fifty plaster casts, embracing copies from the antique, statuary, capitals and architectural ornaments, from the celebrated establishment of Christian Lehr, of Berlin, to be used as drawing models, and a numerous and costly collection of German and French plates, as copies in all departments of architectural and landscape drawing and coloring. It is provided also with a large number of the best books on architecture and of the best periodical publications, American, English, French and German, illustrating the progress of architecture at home and abroad.

COURSE OF STUDIES.

The course for the first year agrees with that of the school of civil engineering. In the other years there will be found the following special studies:

DRAWING.—*Projection Drawing.—Free-hand Drawing.*—Landscapes, ornamention, the human figure in pencil and crayon. Drawing from casts and models.—*Architectural Drawing.*—Elements of the Greek, Roman and Gothic styles, drawing of buildings in the principal styles, with plans, elevations, sections and details. Exercises in original design, embracing problems in architecture, architectural details and ornamentation. Working drawings for stone cutters, masons and carpenters. *Perspective Drawing.*—Drawing of perspective from orthographic projections and objects. Finished drawings, with the pen and in color.

ARCHITECTURE.—*Resistance of Materials, Stability of Frames and Building Materials and Masonry.*—See civil engineering. The history of architecture is taught by lectures during the second and third years, and will be arranged so as to give carpenters, builders and masons, not able to take a full architectural course, the opportunity of getting the whole history of architecture in one year, besides instruction in architectural drawing. The principles of the different styles of architecture will be taught partly by lectures, but chiefly by drawing exercises.

The course will also embrace practical exercises in making estimates for buildings; in the preparation of full and accurate specifications; instruction in the form of builders' contracts; and in the legal liabilities and rights of builders and mechanics.

The full course of recommended studies for this school will be found in the tabular view of courses for the several schools in the college of engineering.

VACATION WORK.

Three vacation journals, and two memoirs upon architectural subjects will be expected of each student during his course. These should be accompanied with sketches or drawings of the objects mentioned in them.

SCHOOL OF MINING.

This school is intended to qualify the student for undertaking mining operations of all kinds. Its instruction consists of a thorough training in the principles of theoretical and applied chemistry; of chemical and blowpipe analysis; of assaying and metallurgy; and of the engineering operations of mining.

The course is the same as for civil engineering, for the first two years. Afterwards, the following specialties are introduced. *Qualitative and Quantitative, Chemical and Blowpipe Analysis. Assaying and Metallurgy.* —Lectures on the process in use in this and other countries. Laboratory practice with the ores of various metals. *Geology of Mining Districts.* Theory of mineral veins and seams. Deposits of gold, silver, copper, iron and other metals, and of coal, peat, petroleum, salt, cements, etc. *Drawing.*—Sections of strata; of mines, showing the galleries, winzes, workings and machinery; of shafts lined with stone, wood and metal tubing. *Engineering Operations.*—Determination of the dip and position of veins and seams, by trenches and borings; boring and drilling tools; blasting with powder and nitro-glycerine; use of compressed air in subterranean workings; methods of exploitation of working out mineral deposits of all kinds; sinking of shafts and winzes; running of levels and adits.

Journals of travel, projects and thesis upon mining topics, will be required of those who complete the course, similar to those in the other schools of this college.

Models, apparatus and plates are used in the lectures, for illustrating to the eye the principles and methods taught. Engineering instruments are used for ideal mine surveys, and results calculated from observed data.

The cabinet already contains a quantity of mining models, and about $2,000 worth in addition have been lately ordered from Europe.

COLLEGE OF NATURAL SCIENCE.

FACULTY.

THE REGENT.
A. P. S. STUART, Professor of Analytical Chemistry.
T. J. BURRILL, Professor of Botany.
D. C. TAFT, Professor of Geology and Zoology.

This college embraces the following Schools:

1. *The Schools of Chemistry.*
2. *The Schools of Natural History.*

ADMISSION.

The terms for admission are the same as those in the College of Agriculture.

In 1873 the requirements will be advanced to include the elements of Natural Philosophy, Botany, Zoology, Human Anatomy and Physiology. It will also be found advantages to secure some knowledge of the Latin and Greek languages, as the nomenclature of the Natural Sciences is so largely borrowed from these languages.

SCHOOL OF CHEMISTRY.

The object of this school is to impart such theoretical and practical knowledge of Chemistry as will enable the sudent to apply successfully the principles of the science to any of the related arts, and to fit him for the more difficult but not less attractive field of original research.

Each student who takes a complete course in this school is expected, in connection with other studies, to work two hours daily in the laboratory, five days in the week, during four years, beginning with the second term of the first year. Students who pursue chemistry only as a part of other courses, will find it to their advantage to work at least two consecutive hours daily during such time as their speciality may require.

RECOMMENDED COURSE OF STUDY.

SCHOOL OF NATURAL HISTORY.

FIRST YEAR.—*First Term.* Chemistry and Chemical Physics, Geometry; U. S. History, English or Latin. *Second Term.* Botany; U. S. History, Solid Geometry, and Advanced Algebra, English or Latin. *Third Term.* Botany, Trigonometry, English or Latin.

SECOND YEAR.—*First Term.* Cryptogamic Botany, Anatomy and Physiology, French. *Second Term.* Zoology, Analytical Chemistry, French; Drawing. *Third Term.* Special Entomology, Analytical Chemistry, French; Drawing.

THIRD YEAR.—*First Term.* Comparative Anatomy, Mineralogy, German. *Second Term.* Geology, Physics, Medical History or German. *Third Term.* Lithographic Geology, Discriminating Astronomy, Modern History or German.

FOURTH YEAR—*Frst Term.* History or Geology, Practical Astronomy, Mental Philosophy. *Second Term.* Meteorology; Metallurgy, Physical Geography, History of Civilization. *Third Term.* Geology of Illinois, Excursions, Political Economy, Logic.

SCHOOL OF CHEMISTRY.

FIRST YEAR.—*First Term.* Plane Geometry, Inorganic Chemistry and Chemical Physics, English. *Second Term.* Solid Geometry and Advanced Algebra, Organic Chemistry and Algebraic Chemistry, English; Laboratory practice. *Third Term.* Trigonometry, Crystallography and Mineralogy.

SECOND YEAR.—*First Term.* Anatomy and Physiology, Analytical Chemistry; German, Determin- Mineralogy. *Second Term.* Analytical Geometry, Analytical Chemistry; German, Botany. *Third Term.* Entomology or Calculus, Analytical Chemistry, Botany; German.

THIRD YEAR.—*First Term.* Comparative Anatomy, Practical Chemistry; French, Vegetable Physiology. *Second Term.* Physics, Practical Chemistry, French or Medical History. *Third Term.* Geology Practical Chemistry, French or Modern History.

FOURTH YEAR.—*First Term.* Geology, Practical Chemistry, Mental Philosophy. *Second Term* Palæontology, Practical Chemistry, History of Civilization. *Third Term.* Geology of Illinois, Theme, Political Economy.

APPARATUS.

The facilities here for obtaining a practical knowledge of Chemistry are confidently believed to be unsurpassed by those of any other institution in the West. In addition to the usual apparatus found in every laboratory, is an extensive series of instruments recently purchased in Europe, including a large platinum retort for the preparation of hydrofluoric acid; a Dove's Polarizer, with a complete suite of accompanying apparatus; a Geissler's Mercurial Air Pump; a so-called Hoffman's

apparatus for illustrating in the lecture room the composition of compound gases; a Soliel, Sheibler's Saccharometer of the most recent and approved construction; an excellent set of Areometers; a Haeuy's Goniometer; a camera with Ross' lenses; a Ruhmkorff's Coil; galvanic batteries of Grove and Bunsen; also, a potassium dichromate battery, a galvanometer and a thermo-electric pile; a spectroscope and a large binocular microscope; two additional chemical balances, peculiar in the shortness of their beams and remarkable for the accuracy and rapidity with which weighing can be executed with them.

A Natterer's carbon dioxide condenser, and an extensive set of metallurgical apparatus, consisting of models of furnaces, etc., have been ordered, and are expected at an early date.

In addition, should also be mentioned, complete sets of standard scientific works, with which the library of the school has recently been enriched; among which are the Annalen der Chemie und Pharmcie; the Jahresbericht uber die Fortschritte der Chemie; Dingler's Polytechnic Journal; the Handworterbuch der Chemie; Percy's Metallurgy; Silliman's Journal, and many other smaller works. Various foreign journals are also taken, giving the student access to the most recent discoveries and views in this department of science.

TEXT BOOKS.—Roscoe's Chemistry; Wills' Outlines of Chemical Analysis; Fresenius' Analysis; Miller's Chemistry; Rose's Analysis.

BOOKS OF REFERENCE.—Gmelin's Handbook of Chemistry; Graham—Otto's Ausfuhrliches Lehrbuch der Chemie; Watt's Dictionary of Chemistry; Lehmann's Physiological Chemistry; Percy's Metallurgy; Mitchell's Practical Assaying.

SCHOOL OF NATURAL HISTORY.

The aim of this school is to afford a thorough education and preparation for practical geologists, collectors and curators of cabinets and museums of Natural History, and for superintendents of scientific explorations and surveys.

The several departments are being rapidly provided with illustrative collections and other apparatus. The Botanical department has a large Herbarium of dried plants, collected by the Powell expeditions, which has been largely increased from other sources. It has a Lignarium, exhibiting woods in section, also *papier mache* flowers, and fruits of gigantic size, made by the celebrated Auzoux, of Paris, a pink, a papillonaceus flower, a cherry, a strawberry, a pea pod with peas, a vetch legume, a grain of wheat, etc. These gigantic specimens are dissected

so as to exhibit clearly even the most minute organs and tissues. The Green Houses and the Aboretum and Botanical Garden, for which preparations are already made, afford also opportunities for examining the living plants in process of growth.

The Zoological department has a human skeleton, purchased in Paris; a manakin made by Dr. Auzoux; skeletons of a cow and other mammals and birds; stuffed preparations of a large number of birds, mammals, fishes, reptiles, etc., embracing bears, wolves, foxes, beavers, wolverines, prairie dogs, etc., birds of prey, songsters, etc.; a dissected horse's leg and hoof, a dissected eye, a trachea and vocal apparatus, in *papier mache*, with numerous French anatomical plates of great beauty. It has also collections of shells, fossils and insects, and a full suit of Entomological specimens is in preparation by Dr. Le Baron, the State Entomologist, who is required by the law of the State to make such collections for the University.

The Geology is illustrated by a full suite of specimens from the State Geological Survey. It has still larger collections in Mineralogy and Palæontology, etc., received or purchased from several sources, with preparations of ores, etc.

The college has also a large double camera, or magic lantern, with apparatus for dissolving views, with a large collection of fine paintings for the illustration of Astronomy, Geology, Zoology and History. The collections and apparatus are constantly increasing by purchases, donations and manufacture.

VACATION WORK.

Besides excursions made under the charge of the Professors, Journals and Memoirs of observation will be required as in the other colleges.

COLLEGE OF LITERATURE AND SCIENCE.

FACULTY.

THE REGENT, Professor of Philosophy and History.
WM. M. BAKER, Professor of English Language and Literature.
EDWARD SNYDER, Professor of German Language.
J. F. CAREY, Professor of Ancient Language and History.
A. P. S. STUART, Professor of Chemistry.
T. J. BURRILL, Professor of Botany.
S. W. SHATTUCK, Professor of Mathematics.
DON CARLOS TAFT, Professor of Geology and Zoology.
I. D. FOULON, Instructor in French.

The college comprises at present two schools:

1. *The School of English and Modern Languages.*
2. *The School of Ancient Language and Literature.*

ADMISSION.

Candidates for admission to either of these schools must have the qualifications prescribed under the college of agriculture. They must also be prepared to sustain an examination in plane geometry (the first five books of Legendre).

For the school of ancient language, in addition to the above, candidates will be examined in Latin grammar, elementary Latin prose composition (Harkness or Arnold); four books of Cæsar's Commentaries; six Orations of Cicero; and six books of the Œneid, or other selections from the same or other author of equal amount and like character. In Greek, grammar, Xenophen's Anabasis (3 books,) and Arnold's Greek prose composition (24 exercises).

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

Students in the agricultural and other technic schools often desire to educate themselves as teachers, writers and professors in their special departments, and require a knowledge of the ancient as well as the modern languages to give them full command of all the instruments and facilities required for the highest proficiency in their studies and proposed work. The University seeks through these schools to provide for this important part of its mission—the furnishing of teachers to the industrial schools of the country, and investigators and writers for the arts. The large liberty allowed in the selection of the special studies of his course will permit the student to give such direction to his education as will fit him fully for any chosen sphere or pursuit.

The library is well supplied with works illustrating the several periods of English and American literature.

A monthly paper—THE STUDENT—is edited and published by the students of the several colleges, each of which is appropriately represented in its columns.

A printing office has been provided for in the new mechanical building, and a press with the requisite supply of type is expected this summer.

INSTRUCTION.

The plan of instruction embraces besides the ordinary text book study, lectures and practical exercises, in all the departments, including original researches, essays, criticism, reviews, proof reading, and other work intended to illustrate the studies and exercise the students' own powers. Voice culture, and a training in elocutionary practice are designed to be given to all students.

VACATION WORK.

Three vacation journals, with notices of readings, narratives of public events, and observations on the current literature and the progress of public affairs will be required; also a thesis on some philological subject.

RECOMMENDED COURSES OF STUDY.

SCHOOL OF ENGLISH AND MODERN LANGUAGES.

FIRST YEAR.—*First Term.*—Origin of English Language, Composition, Solid Geometry, Algebra, Chemistry, United States History, two lectures a week. *Second Term.* Advance Grammar, Philological Analysis, Algebra, Free-hand Drawing, Chemistry, United States History, two lectures a week. *Third Term.* Grammar and Study of Authors, etc., Trigonometry, or Chemistry, Botany, Book-keeping.

SECOND YEAR.—*First Term.*—English Literature, Authors, etc., French, Descriptive Geometry, Anatomy and Physiology. *Second Term.* EnglishLiteratue, Authors, etc., French, Zoology or Analytical Geometry. *Third Term.* History of English Literature, or Calculus, French, Mineralogy and Entomology.

THIRD YEAR.—*First Term.*—History of English and American Literature, German, Comparative Anatomy and Physiology, Ancient History and Drawing. *Second Term.* Rhetoric, German, Mediæval History or Geology. *Third Term.* Criticism, Principle of Taste, German, Geology or Modern History.

SCHOOL OF LATIN AND GREEK LANGUAGES.

FIRST YEAR.—*First Term.*—Cicero de Amicitia, Solid Geometry, Algebra, Anabasis (4th Book) or Chemistry, Latin and Greek Prose Composition. *Second Term.* Livy and Roman History, Advanced Algebra, Herodotus or Chemistry, Latin and Greek Composition continued. *Third Term.* Horace (odes), Prosody, Roman History, Trigonometry or Chemistry, Thucydides or Botany.

SECOND YEAR.—*First Term.*—Horace (Satires and Ars. Poetry), Descriptive Geometry or Anatomy and Physiology, Iliad and Greek Prosody. *Second Term.* Juvenal, Analytical Geometry, or Zoology, Iliad. *Third Term.* Quintilian, Calculus or Mineralogy, Entomology, Demosthenes de Corona.

THIRD YEAR.—*First Term.*—Cicero de Officiis. Ancient History or Comparative Anatomy and Physiology, Selections from Greek Tragedy. *Second Term.* Tacitus, Medieval History or Geology, Zenophon's Memorabila. *Third Term.* Tacitus, Geology or Modern History, Plato and Greek Philosophy.

FOURTH YEAR.—Same in both Schools.—*First Term.*—Mental Science, Constitutional History or Geology, Practical Astronomy. *Second Term.* Moral Philosophy, Logic, Physical Geography, or Physics, History of Civilization and the arts. *Third Term.* History of Philosophy, Logic, Political Economy. Constitutional Law of Physics.

SCHOOL OF MILITARY SCIENCE.

The teaching of military tactics is required of the University both by the law of Congress and by the State law. No complete course of related studies has yet been adopted, as the aim of the school is not to make professional soldiers, but simply to teach to all students the tactics, and to such as desire it, the leading principles of military science.

The apparatus of instruction includes the drill hall, 124 x 75 feet, 350 rifle muskets, ranged in racks around the hall, cavalry swords, fencing swords and muskets, an armory with a growing collection of arms, models of arms and projectiles for the purpose of practical instruction. The library includes quite a number of books on military science, military history and engineering.

For the present the course is confined to two years instruction, until further facilities and teaching force can be obtained.

The trustees have adopted the rule, that all students shall, unless excused for sufficient cause, take part in military exercise, as aggregation of numbers is a paramount necessity to render such instruction effective.

The instruction in this department will be given in two sub-divisions, arranged as follows:

1. Practical instruction in military tactics (for the present confined to the infantry arm), to all able-bodied students of the University, comprising the following branches:

Manual of arms; squad and company drill; bayonet exercise; skirmish drill; battalion drill; guard and picket duty; evolutions of the brigade; target practice.

The exercises are confined to three hours' drill and instruction per week.

2. Military Science. There will be taught a class in military science and art, as far as it is necessary for duties as officers of the line. Students will be admitted into this class after having participated at least two terms in the geneal military exercises, and shown such proficiency and ability as may secure a utilization of the instruction thus received

The instruction, theoretical and practical, is to occupy not to exceed five hours each week, and is so arranged as not to interfere with any courses of study, making it possible for the member of any other course to engage in it as an optional study.

The members of this class will officer the companies, and act as drill sergeants and instructors for the lower classes.

FIRST YEAR.—*First Term.*—School of the Company; bayonet fencing. *Second Term.*—Battalion and skirmish drill; bayonet fencing. *Third Term.*—Brigade and division evolutions; target practice and theoretical instruction on fire arms.

SECOND YEAR.—*First Term.*—Military administration; reports and returns; army regulations and military laws; sword fencing. *Second Term.*—Outpost and picket duty (Mahon's); sword fencing. *Third Term.*—Art of war; strategy and grand tactics; organization of armies.

THIRD YEAR.—*First Term.*—Artillery practice; field artillery; drill at the cannon. *Second Term.*—Military engineering; cavalry tactics, theoretical. *Third Term.*—Military fortifications; field and permanent bridges and roads; military history and statistics.

There is formed now a battalion of six companies, officered by the students of the military class, and battalion and skirmish drill, also bayonet exercises are practiced.

SCHOOL OF COMMERCE.

Candidates for this school must pass the examinations required for admission to the College of Agriculture.

The course in this school will occupy one year, the first term of which will be occupied in teaching the principles of book-keeping in general; the second, their application to special lines of business, general business forms and papers; and the third, to the higher operations of a counting house, commercial law and political economy. Students who wish to prepare for a commercial career, and also acquire a general education, may extend this course through two or more years, by taking such collateral studies as their contemplated vocation may render desirable.

Studies recommended for this purpose, would be: The English and German Languages, Mathematics, one or two terms of Chemistry (for druggists, etc.), and History, Political Economy and Commercial Law.

First Term.—Book-keeping, by single and double entry; theory of mercantile accounts, and the several principal and auxiliary books. Penmanship; commercial calculations.

Second Term.—Partnership accounts; commission and shipping; farm books; business forms and papers; notes, drafts, exchange, endorsements; bills of lading; accounts current; account sales; inventories, invoices, etc. Commercial correspondence.

SCHOOL OF DOMESTIC SCIENCE AND ART.

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

laws of heating and ventilation; the principles of physiology and hygiene, as applied to the sick and well; the nature, uses, preservation and preparation of food, animal and vegetable, for the healthful and for invalids; the chemistry of cooking; the uses, construction, materials and hygiene of dress; the principles of taste, as applied to ornamentation, furniture, clothing and landscapes; horticulture and culture of both house and garden plants; the laws of markets; and the usages of society and laws of etiquette and social life.

It is intended eventually to develop the course to cover all the topics named, and whatever else may pertain to domestic economy.

The instruction in this school will begin with the next college year, and will be developed as fast as practicable. The full course will very nearly correspond with that in the School of English and Modern Languages, except that in the second and third years lectures on the foregoing topics of domestic economy will take the place of the mathematical studies.

Other schools, especially adapted to the wants of women, will be opened as fast as the means in the possession of the University will permit. Young ladies have free access to all the colleges and schools in the University, and several are already pursuing studies in the Schools of Chemistry, Horticulture, Architecture and Commerce.

Schools of Wood Engraving, Printing, Telegraphing, Photography and of Designing, it is hoped, will be added at an early day.

Drawing, both free hand and projection, is now taught by a master of great excellence, and painting and music will be provided for those who desire them, at a reasonable extra charge.

DEPARTMENT OF STUDY.

A department of study embraces a single branch of learning, and is designed to show the course and extent of the instruction given at the University in that branch. Students desiring to pursue any branch of learning further than is provided for in the courses in the several colleges, will consult the course laid down under the following exhibit of the departments:

AGRICULTURE.

This Department embraces a thorough course of instruction in the theory and practice of land culture and cropping in its several vareities; Animal Husbandry, including stock and dairy farming; Sheep and

Swine husbandry and the principles of stock breeding. It includes also the principles of amelioration of soil, veterinary science, and the general management of farming estates. For a statement of the full course of science involved in Agriculture, see the article headed "College of Agriculture." The years in this department coincide with the three years of the course in the College of Agriculture.

FIRST YEAR—*The Farm.*—Its measurements, and mapping; subdivisions—meadows; pastures, orchards, woodlands, gardens, etc.; fences, hedges, soil—chemical elements and chemical treatment, classification and mechanical treatment, plowing, etc. *Fertilizers.*—composition, manufacture, preservation application. Drainage. *Plant Culture*—structure and physiology of plants; classes of useful plants, their characteristics, varieties and values. Wheat culture, maize, grass and root culture. Insects injurious to vegetation.

SECOND YEAR—*The Farm.*—Farm implements—principles of structure and use. Road making. *Animal Husbandry*—breeds and varieties of neat cattle, horses, sheep and swine; principles of breeding, rearing, training, fattening, etc.; chemical composition of food, and preparation of the several varieties. Poultry. Bees. Veterinary surgery and medicine. Fruit growing. Agricultural book-keeping—Farm book, herd book, etc. *Rural Law*—of tenures and conveyances of land, of highways, of cattle, of fences, of noxious weeds, etc. Laying out estates.

THIRD YEAR—*Agricultural Economy.*—The relation of agriculture to the other industries and to commerce. The several branches of agriculture. Farm buildings. Climate; influence of light, heat and electricity on soils and vegetable growth. Foreign and ancient farming. Dairy farming and general farm manufactures—cheese, butter, cider, vinegar, etc. History and literature of agriculture.

The instruction will be aided and illustrated with practical exercises on the experimental and stock farms, and in the management of fine and graded stock of several varieties. But it must be fully understood that it is no part of the business of the department to teach the mere manual process of ploughing, hoeing, harvesting, etc.; these can be learned in the employ of some good practical farmer, such as may be found in every township.

HORTICULTURE.

The studies in this department will include the formation, management and care of gardens, hot-beds, propagating houses, green houses, nurseries, orchards, tree plantations and ornamental grounds. The instruction will be from text-books and by lectures in the class room, together with illustrations and applications in the propagating and green houses, botanical garden and arboretum, and upon the vegetable and fruit grounds.

FIRST YEAR.—Composition and classes of soils, with reference to their uses; fertilizers, vegetable physiology, and laws of growth of plants. Chemical treatment of soils; manufacture and application of manure; laying out and mapping of grounds. Mechanical treatment of soils. Drainage. Insects injurious to vegetation.

SECOND YEAR.—Fruit growing. Planting and treatment of orchards. Forest culture. Management of nurseries. Propagating, grafting, etc. Plans of orchards, gardens, etc. Records. Management of market and vegetable gardens. Small fruit culture.

THIRD YEAR.—Care of hot and green houses; propagating house; conservatories; floriculture; garden architecture; ornamentation; green house work; landscape gardening; ancient and foreign horticulture.

MECHANICAL SCIENCE, CIVIL ENGINEERING, ARCHITECTURE, AND MINING.

The specialties in these departments have already been fully detailed under the several schools in the College of Engineering.

CHEMISTRY.

To accommodate those who have a special object in view, this department has three special courses of Laboratory work arranged.

1. *Agriculture.*

FIRST YEAR.—Inorganic, Organic, and Agricultural Chemistry; Qualitative and Quantitative Analysis of Salts; Chemical Physics.

SECOND YEAR—Analysis of Clays, Marls, Mineral Waters, Manures, Soils and Vegetable Products.

THIRD YEAR.—Isolation of Organic Acids and Bases; Estimation of Hydrogen, Carbon, Sulphur, etc., Sugar, Tannin, etc.

FOURTH YEAR.—Analysis of Air, Illuminating Gas, etc., and the Study of Poisons.

2. *Technical and Pharmaceutical.*

FIRST YEAR.—The same as AGRICULTURAL, except Agricultural Chemistry.

SECOND YEAR.—Quantitative Analysis of Dolomite, Marl, Silicates and Ores; Preparation of Acids, Alkalies and Salts.

THIRD YEAR.—The same as in AGRICULTURAL, with Electroplating, Bleaching, Dyeing, Tanning and Assaying.

FOURTH YEAR.—Same as in AGRICULTURAL, with Photography.

3. *Metallurgical.*

FIRST YEAR.—Inorganic Chemistry; Chemical Physics; Qualitative and Blowpipe Analysis of Alloys, etc.

SECOND YEAR.—Analysis of Gold, Silver, Copper and other Ores; also, Slags of Furnaces; Assays of Bullion, and Ores of Zinc, Antimony, Tin, etc.

THIRD YEAR.—Analysis of Iron, Steel, Nickel, Cobalt, etc., Fuel; Electro-Metallurgy; Preservation of Wood, Lime, Mortar and Cement.

FOURTH YEAR.—Same as in AGRICULTURAL.

NATURAL HISTORY.

The studies in this important department of science extend through nearly four years, beginning with the second term of the first year in the Colleges of Natural Science and Agriculture. The increased prominence given to this class of studies by the new school laws of the State, will be met by increased efforts to make the instruction as thorough and practical as possible.

The following is an exhibit of the special studies of the department:

FIRST YEAR.—*Botany.*—Beginning with the opening of the winter term in January, the different essential parts of plants, and their various modifications to form the root, stem, leaves, flowers, fruits, etc., will be studied, together with the laws of morphology and required terminology. During the year, structural, physiologic, and systematic botany, will receive careful attention, so as to acquaint

students with microscopic vegetable anatomy, with the life-work of plants and with the classification, distribution and names of the flowering plants. Each student is expected to present a certain number of named plants to the University cabinets.

SECOND YEAR.—During the first term of this year, the study of the flowerless plants will be prominent. and special attention will be given to such as illustrate the anatomy and physiology of the higher plants and those causing injury and disease, as the Fungi. Lectures upon vegetable physiology continued. Practical work with microscopes continued through the term; constant reference is made throughout the study to living and dried plants, and to drawings and plates. Lectures introductory to the study of Natural History, illustrating the connection of the sciences, means of study, habits of observation, etc. The principles of Human Anatomy and Physiology will be taught and applied to the preservation and promotion of health; this subject will be illustrated by skeleton and manakin. Systematic Zoology. Principles of Classification; Characteristics of Departments, Classes, Orders, etc. Special Entomology will have reference to those insects which are particularly injurious or beneficial.

THIRD YEAR.—*Comparative Anatomy.*—This subject is designed to illustrate the modification of plan by which animals are adapted to the various conditions of existence, in repect to respiration, circulation, embryology, peculiar modes of reproduction and development, geological and geographical distribution, etc.

Geology will commence with those forces known to produce observed phenomena in the crust of the earth; proceeding with the characteristics of the rocks, stratified and unstratified, constituent elements, crystalline structure, etc. This will be followed by a discussion of the Historic Development of the Earth, as revealed by Palæontology, or the entombed Fossils of the primeval inhabitants.

FOURTH YEAR.—*Lectures.*—History of the origin and progressive phases of Geological Science.

Physical Geography and Meteorology.—These point out and explain the principles that underlie the phenomena manifest in the Life of the Earth, or in the Earth's Physiology. The Topography and Geology of Illinois, with excursions for observation and practical work.

Specimens for Museum.—The University would respectfully solicit of all students, and all friends of Natural History, specimens for this department, embracing good specimens of Rocks, Concretions, Fossils, animal and vegetable. All rare and curious birds, mammals, reptiles and fishes. All rare plants and insects. Anything that will illustrate the Science of Natural History. Indian implements and relics are solicted for the cabinet.

ENGLISH LANGUAGE AND LITERATURE.

In the arrangement of the studies in this department, the endeavor is to present a thorough and extended drill in grammatical and philological study, and in the authors and history of the English Language, affording a training equivalent to the ordinary studies of classical languages.

The course extends through three years, but may be shortened according to the ability and preparation of the student.

Instruction is given by the aid of text-books, and by lectures. Weekly essays, forensics, plans and criticisms are required.

FIRST YEAR.—Sources of History of the English Language; Punctuation, Use of Capitals, Principles of Composition, Primary Rhetoric, Advanced Grammar, Philological and Grammatical Analysis of Authors, History of their times and Contemporaries.

SECOND YEAR.—Reading and Analysis of Shakspeare and the early Dramatists, Spencer, Chaucer, Gower, etc. History of their times and Contemporaries; Chronological History of English Literature begun.

THIRD YEAR.—History of English and American Literature; Rhetoric; Elements of Criticism; Principles of Taste; Methods of Philological Study, etc

Instruction in Anglo-Saxon will be given to those that desire.

GERMAN LANGUAGE AND LITERATURE.

This language being of quite practical value to the farmer and artisan of this country, will be taught thoroughly in a two years' course. The first year aims to enable a student to read such German scientific works as his course demands. The second year completes the course, and makes the student thoroughly accquainted with the language.

FIRST YEAR.—Worman's complete German Grammar, to lesson 28. Etymology completed; Conversational Reader commenced. Syntax; Reader completed.

SECOND YEAR.—Review of Etymology, Classic Reader. Review of Syntax; Schiller's "Jungfrau von Orleans;" Goethe's "Iphigenia." Heise's Leitfaden der Deutschen Sprache (in German), German Composition and Conversation. Lectures on the German Language and Literature. Reading of German Papers through the second and third terms of this year.

Whenever demand may arise a third year of German Rhetoric and Composition, Literature and History will be added to this course.

Books of reference: Becker's Deutsche Grammatik; Grimm's Deutsche Sprache; Grimm's and Sander's Dictionaries.

FRENCH LANGUAGE AND LITERATURE.

The course of instruction in French will extend through two years, but students who desire to pursue the language only far enough to enable them to read the scientific works which they may find it necessary to consult, are expected to acquire sufficient for this in a single year. The reading room is well supplied with French Agricultural and Scientific journals, and much of the best French literature.

FIRST YEAR.—Etymology. Oral exercises in French pronunciation; written exercises in translating English into French. Select readings. Syntax. Translating; French composition; *Conversazioni*, weekly.

SECOND YEAR.—Review of Grammar; classic French Literature. Modern French Literature, novels comedies, etc.; composition. History of French Literature; written criticisms of the French authors by the class weekly. *Conversazioni*, weekly.

LATIN LANGUAGE AND LITERATURE.

Students will not be admitted to this department who are not prepared to enter at once upon the reading of Cicero.

FIRST YEAR.—Orations of Cicero; Latin prose composition begun and continued through the course; selections from Virgil; Latin prosody.

SECOND YEAR.—Selections from Livy; Horace; Juvenal.

THIRD YEAR.—Cicero de Officiis; Cicero de Oratore; lectures on the origin and structure of the Latin Language; Frieze's Quintilian. Other authors will occasionally be substituted in the place of some of the above.

GREEK LANGUAGE AND LITERATURE.

This course will resemble that in the Department of Latin.

FIRST YEAR.—First three books of Xenophon's Anabasis; Herodotus; Greek prose composition begun and continued throughout the course.

SECOND YEAR.—Demosthenes; Thucydides; Homer's Iliad.

THIRD YEAR.—Xenophon's Memorabilia of Socrates. Selections from Plato and the Greek poets.

Select portions of Smith's History of Greece will be read in course, and lectures given on Greek history and philosophy.

HISTORY AND SOCIAL SCIENCE.

The studies in this department are designed to afford a general view of the history of mankind, and of the phenomena of the social organization and progress of the race. They will also embrace the history of the Arts and Sciences, of Civilization, the principles of civil polity and law, the philosophy of history, and the principles of political economy and constitutional law.

The instruction is given chiefly by the lectures with systematic readings of specified authors, connected with the study of historical geography and chronology.

The course will occupy eight terms, two in the first year, and three each for the third and fourth years of the course.

FIRST YEAR.—*First Term.*—Discovery, settlement and colonial history of the United States, with notices of other American States; American geography. Two lectures (or lessons) a week. *Second Term.* History of the United States from the time of the Revolution. Two lectures (or lessons) a week.

SECOND YEAR.—History is intermitted this year in the college courses.

THIRD YEAR.—Ancient history of Greece and Rome, with notices of other ancient nations; ancient geography. Mediaeval history. Modern history; general European history; European geography.

FOURTH YEAR.—Constitutional history of England, and of the United States. Two lectures a week. History of Civilization; analysis of historical forces and phenomena: notices of the history of the arts and of the inductive sciences. Constitutional and international law. Political economy.

PHILOSOPHY AND LOGIC.

The studies of this department extend through the last year of the full courses, and are taught chiefly by lectures, with readings of specified authors and written essays. The course is as follows:

First Term.—Mental Philosophy. Analysis and classification of mental phenomena. Theories of Perception; Imagination, Memory, Judgment Reason, Intuition. The œsthetic. Phenomena of dreaming, Clairvoyance, and insanity. Doctrines of the absolute and the unconditioned. The philosophy of education.

Second Term.—Moral Philosophy (three lectures a week. Theory of conscience; nature of moral obligation; moral feeling; the Right; the Good. Practical ethics; Duties. Formation of character. Logic formal and inductive (two lectures a week, alternating with Moral Philosophy).

Third Term.—History of philosophy. Ancient schools of philosophy; Scholasticism; Modern schools of philosophy; Influence of philosophy on the progress of civilization, and on modern sciences and arts. Inductive logic.

PURE MATHEMATICS.

The studies in this department are as follows:

FIRST YEAR.—*Geometry.*—Elementary principles, circle and measurement of angles, measurement and properties of polygons and the area of the circle, planes, polyedral angles, the prism, pyramid, cone and sphere, area of a spherical polygod of a lune, measurement of spherical angles.

Higher Algebra.—Formation of powers, binomial theorem, extraction of roots of any degree, radicals of any degree, properties and summation of series, exponantial quantities, logarithms, general theory of equations.

Trigonometry.—Plane, spherical and analytical, formation and use of tables, solution of right angled and oblique angled triangles, relation between the circular functions of any arc.

SECOND YEAR.—Analytical geometry; geometrical construction; point and right line on a plane; properties and measurement of the circle, ellipse, parabola and hyberbola; higher plane curves; the cycloid, cissoid of diocles, etc. Differential calculus; differentials of algebraic functions of a single variable; MacLaren's theorem; Taylor's theorem; differentials of transcental functions; maxima and minima of functions of a single variable; equations of tangent and normal; expressions for sub-tangent, sub-normal, etc.; differentials of an arc, plane area surface and volume of revolution. Integral calculus; integration of monomials of particular binomials of rational fractions; applications in the rectification and quadrature of curves, in the quadrature of surfaces of revolution, and in the cubature of volumes of revolution.

THIRD YEAR.—Analytical geometry, curves in space; discussion of the surfaces of the second order. Differential calculus; differentials of functions of two or more variables; maxima and minima of functions of two or more variables; tendency of curves to coincide; osculatory curves; radius of curvature; evolutes and involutes; envelopes; construction and discussion of algebraic curves; the logarithmic curve, the cycloid, spirals; general surfaces; equations of a tangent plane and a normal line; partial differentials of a surface and of a volume. Integral calculus; integration of the differentials of circular functions and of circular arcs; of certain irrational differentials; of differentials containing transcendental quantities; of the differentials of the higher orders and of differential equations; rectification and quadrature of curves; cubature of volumes in general. Calculus of variations. Method of least squares.

PHYSICS AND ASTRONOMY.

These important branches of science are taught by lectures and text books, and fully illustrated by a fine set of valuable apparatus. The following are the chief topics of the course:

Physics.—Properties of matter; liquids and gases; laws of falling bodies; Atwood's machine; weight in different latitudes; molecular forces; elasticity and compressibility; theory of undulations and vibrations: musical instruments; light; solar spectrum and mode of ascertaining the composition of the sun, stars and nebulæ. Correction of the aberration of lenses for microscopes, telescopes and other optical instruments.

Heat.—Intensity, quantity and effects; latent and specific heat; steam heating apparatus; ventilation and warming of buildings; heating power of fuel; mechanical equivalent of heat. Magnetic dip, declination, variation, intensity, etc.; convertibility of magnetism and electricity; identity of lightning and the electric spark; proper form of lightning rods; electric telegraph.

Descriptive Astronomy.—Relative size and position of the earth as compared with other heavenly bodies, and its movements among them; relative mass and density of the different bodies of the solar system; parallax aberration and velocity of light; precession nutation; physical constitution of the sun, planets, comets, stars, nebulæ, etc.

A special course of lectures on chemical physics is given to the students of chemistry by the professor in that department.

CERTIFICATES AND DIPLOMAS.

Under the law, any student who remains a year at the University, and maintains a satisfactory standing in his studies and in character, is entitled, on leaving the University, to a certificate of studies and standing.

The full diploma of the University will be given only to those who have satisfactorily completed a *four years* course in some one of the colleges. Each diploma will state the college and course pursued, the actual studies taken, and the number of terms and standing in each, marked on a scale of 100. Hence, each diploma will have just so much value as the student shall have given it by a more or less thorough mastery of his studies.

EXAMINATIONS.

Frequent examinations will be held to test progress in study, and to determine each student's fitness to remain in the classes. The University will insist on thoroughness in its own proper studies.

A regular examination of all the classes is made at the close of each term. A record is kept of the standing of each student at all the examinations, and from this his final certificate of graduation is made up.

UNIVERSITY UNIFORMS.

Under the authority of the act of incorporation, the Trustees have prescribed that *all* the male students, *after their first term*, shall wear the University uniform. The *University cap is to be worn from the first.* This uniform consists of a suit of cadet gray mixed cloth, of the same color and quality as that worn at West Point, and manufactured by the same establishment. Students can procure them ready made on their arrival here. The University cap is of dark blue cloth, and ornamented with the initials I. I. U., surrounded by a silver wreath in front. Students will wear their uniform always on parade, but in their rooms and at recitation may wear other clothing.

DORMITORIES AND BOARD.

There are in the University building about seventy private rooms, which are rented to the students who first apply. Each room is designed for two students. These rooms, fourteen feet long and ten feet wide, are without furniture, it being deemed best that the students shall provide their own furniture.

Private boarding houses are springing up around the University, where either day board, or board and rooms can be obtained, with the advantages of the family circle. Boarding clubs are maintained by the students, which furnish meals at a cost of $1 50 to $2 50 per week. Coal is purchased at wholesale, and furnished to students at cost.

HOW TO ENTER THE UNIVERSITY.

In answer to the questions often received, the following explicit directions are given to those wishing to enter the University:

1. You must be over fifteen years of age, and of good moral habits. If unknown to the faculty, you should bring a certificate of character.

2. You must possess a thorough knowledge of the common school branches, arithmetic, grammar, geography, history of the United States,

and algebra to equations of the second degree, and such other studies as you find marked under qualifications for "admission," under the college you wish to enter.

3. You shall enter at the beginning of the year; but you may enter at any other time, if prepared to pass an examination upon the studies of the classes you wish to enter.

LADIES' BOARDING HALL.

It is expected that the old University building will be thoroughly refitted and devoted to the use of lady students, and to the Schools of Domestic Science and other schools for women, when the new building is fully prepared and occupied. But a year must elapse before the transfer can be effected. To meet the demand for a boarding house, where young ladies may find suitable accommodations and care, arrangements are in progress to open near the University a large Boarding Hall, which will afford good rooms for about forty students, with parlor, dining room, kitchen, laundry and music room. The whole to be under the charge of a competent Steward and Matron.

The boarders will share the expense of the povisions, as in the young men's boarding clubs, and, under the direction of the Matron, will perform the labors of the house, thus receiving valuable lessons in domestic arts, and diminishing their expenses.

The private rooms, designed for two students each, will be furnished with a bedstead, wardrobe, wash-stand, table and stove. All other furniture must be provided by the occupant. It can be procured at reasonable rates in the towns.

The charges and average expenses for room and board will be nearly as follows for each student:

Room rent, per week, (according to size of room)	65c to 85c
Table expense, for provisions	75c to $1 25
Fuel and lights	20c to 40c
Services of Steward and Matron	50c to 50c
Total per week	$2 10 to 3 00
Total per year	$75 00 to 108 00

Payment must be made monthly *in advance, in all cases.*

As the number who can be accommodated is limited, all who desire rooms should apply early to the Regent. No rooms will be reserved after the opening of the term.

LABOR.

Labor is not compulsory, but is furnished as far as possible to all who desire it. The labor is classified into educational labor and remunerative labor.

Educational labor is designed as practical instruction, and constitutes a part of the course in the several schools. Students are credited with their proficiency in it as in other studies. Nothing is paid for this class of labor, the instruction given being regarded as a full compensation.

Remunerative labor is such as is prosecuted for its products, and is paid for at rates proportioned to the skill, fidelity and efficiency of the laborers. The maximum rate of wages on the farm and garden, and in the shops, is *ten cents per hour*. The maximum rate about the buildings and ornamental grounds is *eight cents per hour*. Students of superior skill and previous practice are allowed work by the piece, and may thus by diligence secure larger rates.

Students desiring work are required to join the *Labor Classes*, which go out to labor four hours each alternate day. Students can often obtain labor for extra hours, if found faithful and efficient as workers.

Some students who have the requisite skill, industry and economy, pay their entire expenses by their labor; but, in general, young men *cannot count upon paying more than one-half their expenses by working*, and even this will require *much economy* in the use of money. If the student can find profitable employment during his vacations, he can often supply all the lack, and provide for his clothing.

CALENDAR.

The University year is divided into three terms, the first of which is fourteen weeks, and the other two of eleven weeks each.

Students are expected in all cases to be present on the first day of the term. Those unavoidably delayed will be required to make up all lessons which their classes have passed over in their absence.

Examination for admission	January 2, 1872
Winter term opens	January 3, 1872
Examination for admission	March 26, 1872
Winter term closes	March 27, 1872
Spring term opens	March 28, 1872
Spring term closes	June 6, 1872
Commencement	June 6, 1872

SUMMER VACATION.

Examination for admission	Sept. 10, 1872
Opening of fall term	Sept. 11, 1872
Fall term closes	Dec. 18, 1872

VACATION OF TWO WEEKS.

Examination for admission	January 1, 1873
Opening of winter term	January 2, 1873

EXPENSES.

Tuition free in all departments.

Term fee, $5. Room rent in University building, for each student, per term, $4.

Each student is required to pay a matriculation fee of $10 on first entering the institution. This entitles him to a membership till he completes his studies.

All bills due the University must be paid, and the Treasurer's receipt be shown to the Regent, before the student can enter the classes.

The annual expense of a residence at the University, exclusive of books and clothing, will be nearly as follows:

Room rent and term fee	$27 00 to $27 00
Board, from	54 00 to 180 00
Fuel and lights, from	10 00 to 15 00
Washing, 75 cents per dozen	10 00 to 15 00
Total	$101 00 to $237 00

BY-LAWS OF THE UNIVERSITY.

PERSONAL CONDUCT.

1. Every student entering the University will be regarded as pledged to obey its officers, laws and regulations.

2. Each student, as a member of the University, is expected to show a proper interest in its prosperity, and is bound, in honor, to promote, in all suitable ways, its interests and success.

3. Every student will be expected to treat instructors and fellow students with courtesy and due respect, and, by a faithful discharge of duty and by a considerate and kind behavior to contribute to the general well being.

4. Unusual and all unnecessary noise in the halls and other public rooms will be counted as a breach of proper decorum, and as a violation of the rights of the University.

5. All use of alcoholic drinks, and all visiting of drinking shops or saloons, and of billiard and gambling houses, are strictly forbidden as disgraceful, and destructive to the best interests of the student and of the University.

CARE OF PROPERTY.

1. Each student is expected to have a careful regard to the general neatness and good order of the buildings, and to avoid all markings or carvings on walls, floors or other parts of the buildings, or upon the furniture or fences of the University.

2. All property of the University is to be carefully preserved from injury, and every student carelessly or willfully injuring the same, is expected to pay for the replacement or repairs.

ATTENDANCE.

1. Prompt and regular attendance at all general and class exercises is a cardinal duty, which every student owes to the University, to teachers and class mates.

2. Students desiring to be absent from any University or class exercise, shall secure permission beforehand for such absence, and when circumstances prevent application for such permission, they shall offer excuse for their absence immediately on their return to the University or to the class from which they have been absent.

3. Six absences during any one term from any University or class exercise, which the student is required to attend, without a good and sufficient excuse for such absences promptly presented by the student and approved by the proper officer, shall suspend the delinquent from all privileges of the University, till duly restored by the Faculty.

ADMISSION AND DISMISSION.

1. No student will be admitted but on the examinations required by law, and such additional examinations as may be required by candidates for advanced standing, or for any higher course of study.

2. Every student shall, when required, present testimonials of good moral character, or, if from another college or university, a certificate of honorable dismission.

3. Students desiring to be absent from the University for one or more terms, or for any part of a term, must apply to the Regent for leave of absence, to be granted by the Faculty.

4. Students in good standing, and who have paid all their University dues, may at any time request and receive an honorable dismission.

Students who have attended the University for one year or more, are, on leaving, entitled to certificates stating the studies pursued and the standing attained. And students who shall have completed satisfactorily the studies of any of the courses of the University, shall be entitled to the full graduation certificate of that course, such certificates being granted in accordance with section 10 of the law for the organization of the University.

STUDENTS' ROOMS IN THE UNIVERSITY BUILDING.

1. The regular time for selection of rooms for the year shall be at the close of the spring term, and all transfers of property or furniture consequent upon a change of room shall be made at that time. Students expecting to room in the building will draw lots for choice, in the order

of seniority of classes: *Provided*, that any student who has, with the consent of the Professor in charge, fitted up a room with more than ordinary furniture or fixtures, may retain it and decline drawing for a new choice. Students entering at other times may select any room which may be vacant.

2. Students engaging rooms and failing to secure the same by prepayment of rent, will be considered to have relinquished their claims, if not present on the first day of the following term.

3. In choice of rooms, two room-mates shall have preference over single students of the same grade.

4. Any student occupying a room singly may be required to receive a room-mate: *Provided*, there are no vacant rooms for applicants.

5. Occupants will be chargeable with any damage done to the room beyond the ordinary wear.

6. Students on renting a room will each deposit with the book-keeper $2, to be refunded at close of occupancy, if the room is left in good condition: *Provided*, that the whole or a part of the sum may not be used to pay for repairs and cleaning.

7. All putting on of locks, or other alterations or repairs of room, shall be done by the University carpenter, or under his direction, and no student shall be entitled to remove a lock, even though owning the same.

8. At the end of the term, or whenever a student is leaving the University for a vacation or other protracted absence, the keys of the room occupied shall be deposited with the Professor in charge.

9. No more than two students shall occupy any room, except by permission of the Regent or Professor in charge, given in case of the larger rooms.

10. No room shall be used for any other purpose than as an ordinary dormitory and study room, except by special permission of the Faculty.

11. The occupants of any room shall keep the same at all times in neat and orderly condition, and shall not keep on hand any powder or other explosive material, nor shall any pail or bucket of hot ashes be at any time left standing in the room or halls. *Students violating this rule, or Rule* 4, *under "Personal Conduct," will forfeit the privilege of rooming in the University building.*

UNIVERSITY UNIFORM.

Under the authority of the act of incorporation, the Trustees have prescribed that all the students, after their first term, shall wear the University uniform. The University cap is to be worn from the first.

FOUR YEAR STUDENTS,

And others receiving certificates, with thier average scholarship, 1872.

Names.	Residence.	Scholarship per cent.
John J. Davis	Freeport	86
Alfred M. Flagg	Rochelle	96
Cyrus D. Fry, (partial course)		84
James N. Mathews	Mason	86
Samuel M. Newbury, (partial course)	Mooresville, Indiana	79
Willis A. Reiss	Belleville	82
Stephen A. Reynolds	Belvidere	88
Chas. W. Rolfe	Oswego	83
Riley Swisher (partial course)		81
Alonzo L. Whitcomb	Urbana	90

LIST OF STUDENTS,

Who at the close of Spring Term of 1872, *had finished their four year course at the Illinois Industrial University, with present and intended employment.*

Names.	Present employment.	Intended employment.
Burwash, M. B.	Farming	Farming
Davis, J. J.	"	"
Drewry, H. N.	"	"
Flagg, A. M.	"	Law
Hatch, M. F.	"	Engineering
Hill, E. L.	Studying	Farming
Lyman, G. H.	Engineering	Engineering
Matthews, J. N.	Editor	Editorial
Parker, C. E.	Farming	Farming
Porterfield, C. N.	Studying	Farming and engineering
Reiss, W. A.	Engineering	Engineering
Reynolds, S. A.	Editor	Law
Rickard, T. D.	Farming	Farming
Ricker, N. C.	Studying and assistant	Architecture
Rolfe, C. W.	Assistant in natural history	Farming and natural his.
Silver, Howard	Studying	Farming
Silver, Chas. W	Studying and ass't in chem.	Chemistry and farming
Wharton, J. N.	Studying	Mechanical engineering
Whitcomb, A.	Teaching	Medicine
Wood, R. O.	Farming	Farming

EXERCISES OF COMMENCEMENT WEEK, 1872.

SUNDAY, JUNE 2.

BACCALAUREATE ADDRESS, by the Regent, at Drill Hall, at 3:30 P. M.

MONDAY, JUNE 3.

EXAMINATIONS, from 8 A. M. to 5 P. M.

TUESDAY, JUNE 4.

EXAMINATIONS, from 8 A. M. to 5 P. M. *Evening,* 7:30. Address, by Professor Rodney Welch, of the *Prairie Farmer.*

WEDNESDAY, JUNE 5.

EXAMINATIONS, from 8 A. M. to 12 M. *Evening.* Address before the Societies, by Dr. Edwards, President of Normal University.

THURSDAY, JUNE 6—9 A. M.

MUSIC—*University Band.*

PRAYER.....By the Regent.
MUSIC—"Greeting Glee.".....Double Quartette.
ORATION—"Where are we."....John J. Davis, Freeport.
ORATION—"Civil Engineering."....Willis A. Reiss, Belleville.

MUSIC—*University Band.*

ORATION—"Progress."....Alonzo L. Whitcomb, Urbana.
ORATION—"American Peculiarities."....Alfred M. Flagg, Rochelle.
MUSIC—"Fairy Queen."....Double Quartette.
ORATION—"The Practical."....Stephen A. Reynolds, Belvidere.
ORATION—"Genius of Alfred Tennyson."....James N. Matthews, Mason.

MUSIC—*University Band.*

ORATION—"Our Future."....Charles W. Rolfe, Montgomery.
MUSIC—"Patriotic Glee."....Double Quartette.
PRESENTATION OF CERTIFICATES....By the Regent.
MUSIC—"1876."....Chorus.
BENEDICTION.

2 O'CLOCK P. M.

MUSIC—*University Band.*

ADDRESS before the University.

3;30 O'CLOCK P. M.

MUSIC—*University Band.*

DRILL.....By the Students.

SIXTH ANNUAL MEETING OF THE BOARD OF TRUSTEES.

The Board of Trustees of the Illinois Industrial University met on Tuesday, March 12, 1872, at four o'clock P. M., in the University Building, the Regent in the chair.

After the meeting was called to order by the Regent, and the scriptures read and prayer offered by him, the roll was called, the following gentlemen answering to their names:

Messrs. Blackburn, Brown of Pulaski, Brown of Sangamon, Cunningham, Goltra, Hayes, Harrington, Mahan, McMurray, Pearson, Pickard, Pickrell, Pullen, Scott, Slade, Van Osdel, Wright and the Regent—18.

Absent:—Messrs. Anderson, Bowen, Bateman, Brayman, Cobb, Edwards, Galusha, Greenleaf, Griggs, Johnson, Lawrence, Scroggs, Wagner and the Governor.

The Regent stated that letters had been received from Messrs. Brayman, Bowen, Cobb, Edwards, Galusha and Judge Lawrence, regretting their inability to attend this meeting of the Board, and giving the respects and good wishes to the gentlemen of the Board.

On motion, the reading of the minutes of last meeting was dispensed with.

The Regent then proceeded to read his report:

ANNUAL REPORT OF REGENT.

To the Board of Trustees of Illinois Industrial University:

GENTLEMEN:—Four years have now elapsed since the University first opened its doors to students. These years, through the good providence of God, have been years of prosperity and rapid growth, and the University has now reached a position which fully justifies your plans, and affords a most brilliant promise for its future. In tendering you this annual report, I am no longer offering you a scheme for a doubtful experiment, but the yearly record of a great and prosperous institution—an institution which, while rooted in the hearts of thousands of warm and active friends at home, has already won a name across the Atlantic and in distant States. But while it thus repays your care in the past, it will still demand new and not less wise and earnest care for the future. Its progress must orever tax the best thought and the noblest efforts of its officers and trustees.

REPORT OF EXECUTIVE COMMITTEE.

The Executive Committee has held meetings nearly every month of the year. The reports of it proceedings have been published, and furnished each month to the Trustees. The record is herewith again placed before you for your information and approval. The great building enterprises in which we have been engaged, heav received the close and careful attention of the Committee, and have con-

stituted a large share of their work. I believe that especial thanks are due to these gentlemen for the large amount of valuable time and attention they have given to this public work.

ATTENDANCE.

The entire attendance for the last year, ending June 7, 1871, was 277. The attendance thus far during the current year is 365. This will probably be considerably increased before the close of the year. The number in the several colleges or courses, is as follows:

In the College of Agriculture and Horticulture	68
" " Mechanical Science and Engineering	37
" " Literature and Arts	20
" School of Mechanical Engineers	37
" " Civil "	54
" " Mining "	4
" " Architectural "	4
" " Analytical Chemistry	12
" " Military Tactics	62
" Eclectic Courses, and Unassigned	74

Most of the students in the Military course are also pursuing other courses.

The numbers pursuing the several branches of study, were as follows:

Agriculture, Practical, (seniors)	26
Analytical Mechanics	7
Algebra	76
Anatomy, Comparative	9
Astronomy, Descriptive	3
" Practical	2
Botany	81
Book-keeping	120
Commercial Law	60
Chemistry	107
Chemical Physics	67
Chemical Laboratory Practice	70
Calculus	13
Drawing	85
English Literature	192
Entomology	8
Fruit Growing	17
French	51
German	99
Geometry	129
" Descriptive	27
" Analytical	33
Geology	28
Greek	3
Geography, Physical	5
History, Constitutional and Ancient	10
Hydraulics	2
Latin	
Logic	9
Mineralogy	28
Mental Philosophy	9
Military Science	86
Moral Science	7
Principles of Mechanism	11
Physics	13
Philosophy, Natural	37
Roads and Railroads	8
Surveying and Leveling	23
Strength of Materials	2
Soils and Fertilizers	7
Shop Practice	35

Trigonometry	25
Veterinary Science	9
Zoology	16

Our plan of freedom of studies has produced no large amount of such mischievous consequences as its opponent fear. Doubtless some have been fickle and changed their studies to their hurt, but they are mainly those who would have pursued a set course with but little earnestness or success. Whatever disadvantage may have resulted to this class from the free choice allowed them, this freedom has been of great advantage to the many, enabling them to take the studies for which they felt a special need or had a special aptitude, and these studies have been pursued with a far greater earnestness than would have been given to any enforced course. The general and unusual interest in study exhibited by the students of this University is no light testimony in favor of the liberty allowed here.

The courses marked out by the Faculty and offered as their recommendation, are largely followed, and counsel is freely asked and freely given, in the case of those who wish to take other studies than their respective courses provide. And so the students are never left without guidance, as it is sometimes unfairly assumed they must be left, where freedom of choice is allowed them.

FINANCES.

The total expenditures of the year, for all purposes whatever, including State appropriations for new buildings, etc., are $166, 917 72. Of this sum, $98, 357 69 were paid directly from the State Treasury, on vouchers signed by a majority of the Trustees, as provided by law. The remaining $68, 560 13 were paid on warrants, a list of which will accompany this report. The Treasurer's report will exhibit the receipts of the year, and the balance now on hand. The income of the year has been increased, as you will notice, by large collections by freights on our building materials. This will not occur again, and our income must be counted on the ordinary basis. The expenditures for the coming year will doubtless exceed those of the year just closed. The proper growth of the institution necessarily increases the expense, and this increase must go on till all the departments of your work are fully developed and supplied with a full corps of instructors. To furnish the best facilities for education—such facilities as are furnished by the better class of universities and industrial schools—we must count on meeting a much larger expenditure than we have thus far encountered. To meet this successfully will require us not only to economize our funds to the utmost, but to seek every opportunity to increase them. I recommend that we take measures:

1st. To sell at once the 25,000 acres of scrip still remaining, and invest the same in good county bonds.

2d. To sell our wild lands as fast as a minimum price of four or five dollars an acre can be realized for them. This will stop taxes and increase income.

3d. To exchange our State six per cent. bonds for county nine or ten per cent. as soon as practicable. We have been losing about $3000 annually, by reason of our failure to make this exchange. If practicable, we must avoid this loss for the future.

4th. Inasmuch as our contemplated entry next fall into our new building will entail upon us much larger current expenses, I recommend that the incidental fee of $2 50 a term, now charged each student, be increased from and after this college year to $5 a term. This amount will be but a small matter to each student, but to the University it is a large and important resource. On a similar occasion the Cornell University increased its term tax to $15, with the just remark that it was better for the student to pay something and have large advantages in return, than to pay nothing and get but poor facilities and instruction. We must either make this change or lessen the advantages already provided.

It may help us to understand the extent of our prospective needs, to note the expense of similar institutions elsewhere. Michigan University has an annual income of about $100,000, and the income of Cornell University is nearly $110,000, and yet both of these institutions complain of the inadequacy of their means for their work. The range of our work, though differing in some departments, is fully as extensive as theirs, and our numbers in attendance will soon be as large.

I call attention to our plans not to indulge ourselves in visions of the prospective magnitude and magnificence of our work, but that we may order our present economies with a wise reference to the large and certain needs of the future. The teaching force of the University will need to be doubled ere all the departments of science are properly represented, and several of these professorships must be filled at an early day. Our library and cabinets are yet in their infancy, and though they are costly and valuable, the University can only keep abreast of its work by constant and costly additions; $100,000 could be expended at once, with great profit, in increasing the scientific books and apparatus. A new Chemical Laboratory must be built within three or four years, large enough for three or four distinct departments of Chemistry and its applications to the arts. A Physical Laboratory will also be needed, furnished with apparatus still more costly than that required in Chemistry, and the schools of Mining and Architecture will each require much more ample outfits than we can yet give them. I say

nothing here of the other departments o earning and of art, which will also be knocking at our doors, ere long, for representation here, nor of the new features which all our departments will develop by their own natural growth. Such an institution can never safely pause in its progress and development. It is not the dead past, but the living present, with which we have always to keep in active sympathy and mutual support.

I have given to the Committee on Finance the items of estimates for the coming year, and this committee will report the same with such modifications as your actions may require.

THE FACULTY AND INSTRUCTORS.

The number of Professors and assistant teachers now employed in the University is seventeen, viz: The Regent and ten Professors; two Lecturers; two Instructors; and two assistants in the Laboratory. There have been added to the Faculty during the year, Prof. D. C. Taft, Professor of Geology and Zoology; Prof. J. F. Carey, Professor of Ancient Language and Ancient History; Prof. J. B. Webb, Professor of Civil Engineering; Mr. Harold Hanson, Instructor in Architectural and Free-Hand Drawing; Mr. Thomas Meehan, of the *Gardeners' Monthly*, was employed for a course of lectures in Horticulture; and Judge J. O. Cunningham is, by my request, delivering the lectures on Commercial and Constitutional Law.

Some further additions to the Board of Instruction will be needed for the coming year, as soon as proper persons can be found to fill the places. Among these we ask the early appointment of a Professor of Agricultural Chemistry. The Department of Chemistry in such an institution is too large, and involves altogether too much labor for one man; and the best interests of this College of Agriculture demand that this chair shall be filled, if possible, by the opening of the next year. No one has yet been found to fill the chair of History and Social Science, provided for at the last annual meeting; but it is hoped the place may be filled during the coming summer. The instruction in Book-keeping and Commercial Science has thus far been given by the Professor of German and Military Tactics. The labor is too much for one man, and cannot be performed in the best manner without more time than can be given to it by one so loaded with other duties. The classes in Book-keeping are large, and it is desirable that all students of both sexes shall learn this practical and useful art. Several assistant teachers will be needed for various departments.

It is recommended that the salaries of those Professors now receiving only $1800 a year. be raised to $2000. I make this recommendation because I believe it just to these gentlemen, and yet with some degree of hesitancy, knowing the too narrow limits of our funds. It is obvious, that till some considerable increase in our income can be secured, we cannot make any general increase in salaries, and it has never been found feasible to maintain an equality of salaries in any such institution. The salaries now paid here, are higher than those paid at the Agricultnral Colleges of Kentucky, Tennessee, Michigan and Wisconsin. They are about the same as those paid in Iowa and Minnesota, and less than the highest salaries paid at Michigan University, Cornell University, and the Agricultural Colleges and Universities generally in the East. I know your generosity as well as your sense of justice will prompt you to give all that the funds committed to your care will permit.

It is with sincere pleasure that I testify to the fidelity and ability which have been exhibited by the entire corps of instructors. Their work, though often excessive in amount, has been done with cheerfulness and with a steady zeal for the success of their classes and the University itself. It would seem invidious to single out any one, where so much praise is due to all.

THE COLLEGE OF AGRICULTURE.

This College embraces the schools of Agriculture proper and of Horticulture and Fruit Growing. The instruction has embraced courses of lectures on soils and on fruit growing by Prof. Burrill, on Agricultural Chemistry by Prof. Stuart: on Theory and Practice of Agriculture and Stock Breeding, etc., by Dr. Miles: on Veterinary, by Dr. Detmers, and on Gardening, by Thomas Meehan, Esq., of Philadelphia. The students in these courses have also pursued by regular class work, Botany, Zoology, Geology, Chemistry and other studies pertaining to their work. The work of the practical department of these schools will be fully shown by the reports of Prof. Burrill for the Horticultural, of Mr. Lawrence for the Stock Farm, and of Mr. Flagg for the Experimental Farm.

The Horticultural Department, under the chief charge of Prof. Burrill, assisted by Mr. Vickroy as Orchardist, and Mr. Franks as Florist, has made valuable progress, although the season was most unfriendly by reason of the severe drought and the insect depredators which swarmed through our grouuds,

An arrangement similar to that which has worked so well on the stock farm has been made with Mr. Vickroy, under which he is to be paid a minimum salary of $1000 a year, with the promise of a maximum of $1500, provided the net income of the gardens and other horticultural grounds will pay it. An arrangement somewhat similar to this is proposed for the Florist. If this proposition is adopted

he will be required to take the entire care of the green houses and grounds of the present campus; to perform all the needful work thereon; to make such improvements as may be req and to keep the grounds well supplied with annuals and bedding plants, equal to the supply in past years. For this he will receive $50 a month and the net income of the green houses till he reaches a maximum salary of $1000 a year.

The Horticultural Grounds, now occupying about 130 acres, exclusive of the campus and parade ground, have made very marked progress, as the reports of Prof. Burrill and his assistants will show. The forest plantations, for which we have been gathering trees for the past year or two, are begun; twelve species of forest trees are already in place, and others are ready to follow. The Nurseries, though suffering from the drought, are exhibiting good results, and the young orchards maintain the thrifty appearance they have shown from the outset. The Horticultural classes have been employed during the winter in root grafting and will soon set their grafts in the nurseries. New hot beds warmed by flues, have been constructed and are about to be put in operation. The underdraining has been continued and over five acres have been added to our thoroughly underdrained grounds.

A beautuful plan for our Arboretum and ornamental grounds about the new building has been prepared by our teacher of Architectural Drawing, and the plantation of trees will be commenced as soon as the weather will permit. The green houses and grounds about this building have been objects of increasing interest, and are of great value in teaching the finer parts of Horticultural Art. The heating apparatus of the new green house has been found expensive and inadequate from the poor character of the boiler. An appropriation will be needed to replace this with a bettsr one.

The Stock Farm has been enriched during the year by the purchase of a male and female of each o the following breeds of cattle: the Short Horn, the Hereford, the Ayrshire and the Jersey. All these are young and choice animals of excellent pedigree and from celebrated families of stock. There has also been purchased a Devon Heifer of rare beauty, and a Devon Bull has been donated by Hon. W. C. Flagg, so that we have now five of the leading breeds of neat cattle to illustrate this important branch of agriculture. There have also been purchased two pure bred Berkshire Swine and three Southdown Ewes, and we have received, by donation, from J. H. Pickrell, Esq., two Berkshire Sows and a South. down Buck, and from Dr. Miles two Essex Pigs. The reports of the Head Farmer show some interesting results in the feeding of the cattle.

The Barn has just been supplied with a steam boiler and engine, with machinery for cutting and grinding feed, affording us now the means to begin our experiments with cooked food. Some steaming tubs or tanks will be needed.

The stock of fatting steers having all been sold off, it is desirable that a new stock be at once purchased, even if they must be sold again within the year, in order to reimburse the funds.

The plan on which the farm has been managed during the year has been satisfactory beyond all former experience, and the balance sheet presented by the Farmer, gained in the face of heavy losses by the fall in prices of stock and grain, is full of promise for the coming year. The Farm still needs some additions to its buildings and machinery, which may be met perhaps from its own income.

The Experimental Farm, of about 80 acres, has been under the care of Hon. W. C. Flagg, who, with the aid of the State appropriations, has inaugurated a somewhat full set of experiments in three departments, viz: 1st, in fertilizers; 2d, in methods in cultivation, and 3d, in varieties of seed and species. He has also prepared for some experiments in stock feeding. His report on these several classes of experiments is not yet in hand, but will be included in the printed volume for this year.

The work has necessarily been partly preparatory, and a series of years must elapse ere any ripe results can be reached. I hope the valuable services of Mr. Flagg may be secured for the coming year to carry on what he has so well begun.

THE COLLEGE OF MECHANICAL SCIENCE AND ENGINEERING.

This College, as now organized, embraces the subordinate schools of Mechanical Engineering, of Civil Engineering, of Mining and of Architecture. There are large classes in the two former, and smaller ones in the latter. The work of the year has shown the increasing popularity and utility of all these courses.

The Mechanical building provided for by the Legislative appropriation of last winter, was erected during the summer and autumn, and is now fully occupied. A new steam engine of 20 horse power, made by students, is daily at work running the lathes, planer and other machinery of the several shops. Over $7000 worth of new machines and tools have been added to the outfit of the several shops, and when fully set up will furnish facilities for a great variety of profitable labor.

Over five hundred models were received during the year from the patent office, furnishing illustrations of great value to the student, of mechanical devices and their endless applications. A set of models. manufactured by Mr. Riggs, of Chester, England, purchased from the maker, and are in the cases Besides these, several fine models have been constructed by the students as shop practice. With the

facilities thus multiplying, this department cannot fail to be of great public value. Not only students from the schools but young mechanics from the shops and manufactories are coming here to take courses of study in scientific principles relating to their arts. This is a most encouraging fact. Those who have already attained practical skill have great advantage in the acquisition of principles, and will doubtless make our best mechanical engineers.

QUALIFICATIONS FOR ADMISSION.

The University has now reached a point in its career when it may wisely raise the standard of qualifications for admission to its several colleges. Under the rule now prevailing, many students enter who not only are not prepared to prosecute successfully the studies, but who have not fairly tested their power to study, nor the genuineness of their desire for education. They often struggle on a term or two with little profit to themselves, and with real injury to the University, and then suddenly leave us, concluding wisely, though late, that they have mistaken their minds.

I am aware that many friends of the University have desired to see it remain accessible to young men and women from the rural districts, who, having in their own neighborhoods nothing but schools of low grade, are unable to gain there any but the most common literary entertainments. I confess myself to have deeply sympathized with this desire. It has seemed hard to refuse admission to young men of mature age, who, awakening thus late to their need of education, have sought the University, and found themselves unprepared to meet its requirements and to keep pace with its classes. But their misfortune, either in the lack of good opportunities or in the misimprovement of these opportunities, can be remedied as well by a resort to a good public high school as by lowering our standard of admission here. To consume the resources of the University, and use up the time and strength of its teachers in doing this mere elementary work, would simply prove a futile, if not foolish attempt to meet the lower wants of our school system, the want of more high schools by the sacrifice of the highest need—the need of a great university devoted to the highest education for industrial arts. If we succeeded we should but add one more high school to our system—an expensive State high school—and students that did not choose to go to the high schools in their own county, would come here to get high school studies at State expense. But where, then, would those students of the high schools, who have by patient study fitted themselves for university work, look for proper university instruction? If the teachers here must consume their time and strength in teaching the mere elements of the sciences, who shall teach those sciences in their higher forms and in their manifold and grand applications in the great fields of human art and industry? Some few ambitious young men would learn their algebra and geometry, their elementary botany and zoology in a university, so called, rather than in a high school. But the State would look here in vain for its thoroughly educated, scientific agriculturists, engineers and mechanicians—for its broad-breasted, liberally educated men to lead its gigantic industries.

Thus far the University, in its infancy has found the great mass of its students in the lower classes, and the faculty, not yet loaded with the higher work, have willingly and wisely given their toil and strength to the more elementary part of their work, but the time has come when we must choose between the two classes of work. Our teaching force is wholly insufficient to take care of all the higher grades of instruction, if we are to remain loaded with the lower.

The natural and reasonable remedy is to raise the standard of qualifications for admission. This need not be done by any great and violent step, but by small degrees, properly advertised a year or two in advance.

I recommend that the executive committee be instructed to prepare and advertise at an early day a scheme for admission to the several colleges and schools of the University, increasing the required qualifications, by successive steps, to take effect in successive years.

These new requirements should be in the direction in which the public schools themselves are moving; so that the University, which is in a sense the head of the common school system, may be kept as closely as possible in connection and sympathy with the entire system.

The new school law recognizes the "elements of the natural sciences" as common school studies, and requires that henceforth, teachers in the common schools shall have passed an examination in those sciences. Now, these are the very studies which furnish the fit preparation for our college of agriculture. Our charter already requires that students shall come prepared to pass examination in the common school studies, and it is therefore imperative that these new studies must now be added to our requirements for admission. As this is fixed by law simply as the lowest limit of qualifications, the trustees may add others, in their discretion, for any of the colleges as need requires.

THE LABOR SYSTEM.

The labor system still costs us much care. Its importance, still felt, forbids its discontinuance, though the large increase in the number of our students puts it out of our power to furnish profitable labor to all that desire it.

Much of the difficulty attending an educational labor system comes from the diversity of aims involved in it.

1st. The labor is designed, first and foremost, to aid the instruction, to give practical exercises which may illustrate principles, and make the student familiar with the facts and forces with which his studies are concerned.

2d. To provide this practical instruction we must have farms, gardens and shops, and having these, all the work must be done which is necessary to carry them on effectively. So we are at once put in position of employers who must get a certain amount of labor.

3d. But with many of the students who are depending on their wages for their support, the pay and not the instruction becomes the main aim, and they are naturally anxious to get the highest wages, instead of the most information.

These several aims are not altogether incompatible with each other, but, to prevent disagreements it is important to fix carefully the rate of compensation, and this must be fixed so low that our business departments, hampered as they are with their educational work, shall not become a burden on our resources. I recommend that the maximum rate of wages henceforward be as follows: On the farms and gardens, ten cents an hour; in the shops, ten cents an hour; on the ornamental grounds, eight cents an hour.

These rates, though somewhat lower than those we have heretofore paid, are still higher than those paid at other institutions of this character. To compensate those who shall attain high skill and show great fidelity and efficiency, I recommend that the superintendents be allowed to give piece-work to such as they deem worthy.

All students in the technical courses are required to take a certain amount of shop or field practice, as a part of their course, and are not entitled to any compensation for this. Other students desiring work in the shops, are required to serve a short apprenticeship before they are entitled to any pay, unless they have learned their trade before entering.

THE NEW GRANT OF LANDS.

It has already, doubtless, met your notice that a bill is now pending before Congress for a further grant of lands for the more adequate endowment of the Colleges of Agriculture and the Mechanic Arts, founded under the grant of 1862. This movement originated in the Agricultural Convention lately held in the City of Washington. The conviction seems nearly universal among the friends and officers of the industrial colleges and universities, that a much larger endowment is absolutely required to carry out successfully the great work of technical education. Certainly our experience here fully confirms this view, and the necessity of this grant ought to be urged upon Congress by all the arguments we can offer.

THE COLLEGE OF CHEMISTRY.

A report is expected from Prof. Stuart, which will give the work of this College during the year. The number of students who are pursuing chemistry with reference to agriculture and other arts, has rapidly increased. Our laboratory, wholly insufficent for a University of the character of this, has tables for only thirty-four students to work at once. It has, this year, been crowded to the overflow two sets of students succeding each other at the same tables. The number of special students of chemistry as a profession, is not large, only fourteen being enrolled in the course, but there is a growing comprehension of its value and an imperative demand will soon come for ample accommodations.

A large addition has been made during the year to its valuable apparatus and its means of illustration and work are already noteworthy. If the present building shall be surrendered to the uses I have elsewhere described, it will be necessary to transfer the laboratory, temporarily, to the basement rooms of the new building till a new laboratory can be built.

COLLEGE OF NATURAL HISTORY.

The course of studies in this College is attracting increased attention. Rich additions have been made to our library in all the branches of Natural History, and some additions have accrued to the cabinets. But the latter need large reinforcement at an early day. The collections heretofore purchased are rich in valuable duplicates, and with a moderate fund devoted to this purpose, exchanges could be made which would be of great benefit.

COLLEGE OF LITERATURE, SCIENCE AND ART.

The practical aim in this College is to fit students for literary pursuits, as writers, editors, teachers, etc. It affords, also, to the students in Agriculture and Mechanical sciences, the literary side of their education. Its course embraces the modern and ancient languages, English language and literature, Historical Science, Mathematics, Natural History, Chemistry and Philosophy. Only twenty are enrolled

as intending to take this course, but nearly all the students are receiving instructions in some of its classes. The English and other modern languages are much more largely pursued than the ancient and are taught with a gratifying success.

I append a report from Prof. Baker on the classes in English Literature, giving an account of the important work being done in that most useful department of study. This report urges the importance of a printing press, to give a more practical value and character to this work, and conveys the pleasant information that a press has been promised us, by a member of the board. The instruction in ancient languages has now been committed to very competent hands, and the sciences of nature are receiving a degree of attention not often given to them in colleges. Historical Science, from its importance to the intelligent citizen and statesman, has been assigned a liberal place in the course, and has been pursued in part by a large number of students.

LIBRARY.

There have been expended during the year in the purchase of new books, $5,420.67. The number of bound volumes now in the library is 7,307. Besides these are valuable collections of unbound books and phamplets.

The library, instead of being locked away in some remote hall, to be opened only once or twice a week to permit the drawing and return of books, occupies the most central and accessible of all our rooms. The spacious library hall is fitted up with reading tables and seats, and is warmed by steam and lighted with gas, With the first hour of our work it is thrown open to all who wish to read. Librarians are constantly in attendance till the closing evening hour, and every facility is furnished the student who wishes to consult its volumes. It is in constant use and furnishes one of the most potential of the educational influences presented by the University.

THE LECTURE COURSES AND FARMERS' INSTITUTE.

Five public courses of lectures, for the benefit of farmers and fruit-growers have been given during the year. The first was at the University, in January, and lasted one week. The others were held respectively at Dixon, at Avon, at Pontiac and at Pittsfield. The attendance at most of these Farmers' Institutes, as they were called, was in most cases larger than at any former series, and the expressions of public appreciation were frequent and gratifying. The number of applications for such institutes the coming year will be larger than we can meet.

The report of the Regent was referred to the standing committees, as the different parts may concern them; so much thereof as relates to the fitting up of the old University building to the exclusive use of female students, was referred to a special committee, to be appointed by the chair. Messrs. Pickard, Cunningham, Slade, Blackburn and Wright were so appointed. The oath of office was then administered to the new member, Mr. R. B. Harrington, of Pontiac. The reports of Mr. E. L. Lawrence, the Farm Superintendent, and Prof. T. J. Burrill, of the Horticultural Department, were read and referred to the committees of their respective departments.

REPORT OF THE FARM SUPERINTENDENT.

To the Regent of the Illinois Industrial University:

I entered upon the duties of Head Farmer on the stock farm of the University on the 1st day of March, 1871, and now, at the close of my first year's service, I herewith present my report of the transactions of the year.

Immediately on my arrival on the farm, an invoice of property likely to be disposed of was made, as follows:

5 fat hogs	$80 00
12 stock hogs, 2,640 lbs., 7c	184 80
4 breeding sows	72 70
4 pigs	28 00
60 steers	3,475 00
425 bushels corn, 40c	170 00

2,320 bushels oats, 35c	$812 00
255 " " 65c	165 70
60 " " 50c	30 00
75 tons hay	375 00
2 two-year old colts	180 00
1 one-year old colt	45 00
3 barrels cider	18 00
Total	$5,626 20

The tools and machinery on the place was invoiced at $1,517.

The teams were estimated to be worth $1,000.

The invoice of oats was made on the statement of the former manager of the place. When the oats were disposed of I found that they fell short 725 bushels of the amount stated. On referring to the books kept at the time of threshing I found that the amount threshed and the amount disposed of by my account corresponded, and this difference of 725 bushels was made by allowing 40 pounds to the bushel, machine measure. As the oats were very wet at the time of threshing, they would do well to hold out. With these facts in view, I have corrected the invoice in my account by deducting that amount at 40 cents per bushel (the average price), making $290. I have added to the invoice $44 10 for corn that was in crib at the horticultural barn and overlooked. After these changes the invoice stands $5,380 30.

I have invoiced the property on hand as follows:

52 stock hogs, 7,280 lbs., 3¾c	$273 00
1 three-year old colt	135 00
1 two-year old colt	80 0
1 one-year old colt	40 00
30 tons hay, $10	300 00
1 cow	65 00
1,600 bushels corn, 25c	400 00
800 bushels oats, 25c	200 00
Shock corn	20 00
4 barrels cider	24 00
Grass seed, just bought	78 34
Fine stock, at cost	2,614 48
Total	$4,225 82

The tools and machinery I have invoiced at $1,391. For details see "Invoice of tools," herewith presented. Quite a large share of the tools have not been in use the past year. The Johnson reaper, Cycloid and Bucyrus mowers were used but very little. Any machine in this line that is not sold and extras kept by a local agent, and it is necessary to send to Chicago for repairs, is dear as a gift, especially so when such machine becomes worn. Although the old tools are put in about 50 per cent. lower than last year, I cannot do justice to myself and put them at a higher figure.

The tools received are, on the whole, about the same as last year, except the ordinary wear. The plows are better than when they came into my hands.

The teams are about the same as when received. One mare was sold for $100, and that amount paid for a riding horse.

The crops raised on the place the last year consisted of 85 acres of corn, 45 bushels per acre, 3,825 bushels; 35 acres of rye, 16 bushels per acre, 555 bushels; 45 acres of oats, 20 bu, hels per acre, 900 bushels; 110 acres of hay, yield 112 tons; 80 bushels potatoes and about 400 bushels apples were raised.

The corn is accounted for as follows:

Fed to fattening cattle	740 bushels.
" young cattle	140 "
" cow	30 "
" teams	300 "
" hogs	845 "
Sold	55 "
On hand	1,675 "

Of the rye, 535 bushels sold at 60c, $321; used for seed, 12 bushels; fed 8 bushels. The field of rye last spring should have been invoiced. I have now to show, to balance the rye, 10 acres rye, 9 acres wheat (probably killed), and 50 acres fall plowing, of which there were none last year.

One hundred bushels of oats have been fed, and 800 bushels now on hand.

Hay has been sold of the new crop to the amount of $458 42. 30 tons now on hand; the rest has been fed.

Potatoes sold for $48 75; a few bushels were buried for seed.

Fruit was sold to the amount of $177 67.

The sixty steers were disposed of as follows:

31	sold in August, $5 30 per hundred		$2,260 55
16	" December 29, $4 90	"	1,177 45
11	" in January, $4 85	"	790 75
1	" February, $4	"	51 00
1	was killed for his hide		4 70

Hogs have been sold for $490 98, averaging about 4 cents per pound.

The total receipts of the year amount to $7,934 45. See statement marked "A."

The total expenses of the year amount to $6,726 72. See statement marked "B."

The item of labor is for all labor done on the place, mechanical or otherwise. 580 rods of fence have been made, including 280 rods temporary fence for protection of hedges, and 60 rods to fence off a part of the pasture for mowing, 920 rods have been made—nearly three miles. See statement marked "C."

Early in the season the discovery was made that we were likely to be short of water, a well was dug and a wind-mill put up, which has performed well. I purchased one of L. H. Wheeler's mills, manufactured at Beloit, Wis.; $65 discount was made on the mill. I think no better investment could have been made. For expense of mill, well tank, etc., see statement marked "D."

Eighty rods of new hedge were set and tended; the old hedge was filled up and tended, and 280 rods fence made for protection. See statement marked "E."

A hog pen was built, costing, in labor and material, $37 04.

In anticipation of feeding cattle as an experiment, I arranged cattle stalls in the barn for that purpose. On account of the delay in getting the engine and boiler repaired and in position, this had to be deferred. The cost of stalls and other improvements on the barn, including glass for the doors below, door latches, etc., amounted to $34 53.

I have expended on the farm, under the head of general improvements, $47 28. $5 of this was for maple trees, the rest for labor.

A bill was presented by S. A. Hutchinson, amounting to $37 50, for breeding mares in 1869–70. Also, one by Mr. Chas. Ells, for breeding sows in January, 1871. After satisfying myself of their correctness, they were paid, and are accounted for as old debts paid. Accounts that came over from last year, amounting to $112 62, were on the bookkeeper's book, which will be found in my statement. For statement of all extraordinary expenses, see paper marked "F."

Donations to the farm have been made to the amount of $504 98. See statement "G." Donations have not been added to the profits of the farm in the final statement.

Four hundred and twenty-one dollars is charged for "Care and feed of fine stock." See statement "H." The item of $210 is for all care of fine stock, cattle, hogs and sheep, time of getting them to the farm, etc., including time of two trips to Chicago.

For a showing of the weights of the cattle at different times and comparative feed of grain, see paper marked "J." Although this paper may be somewhat instructive, it would not be safe to "jump at any conclusions." There are so many circumstances that enter into an experiment of this kind, which, to give in detail, would require too much space for this report, that it would be necessary to continue such weighing with different animals for a series of years before definite conclusions could be reached.

There has been hauled out on the land during the year, 368 loads of manure. All the manure made during the winter has been hauled out, as well as that made the winter previous, and the remains of straw stacks found at different points on the place.

Of the amount paid for labor during the year, $287 68 was paid to students of the University. This amount was profitably expended, and I think the wages paid has been satisfactory to those employed.

The season has been an exceedingly dry one, yet I am not prepared to say that we could have made a better showing had we had all the rain we might have asked for. The poorest cultivation may bring good crops and produce profits, when all things are favorable. It seems to me that good tillage should produce favorable results under unfavorable circumstances. What has tended most to make a poor showing of profits is the low price received for farm products, and the high price allowed for the same on articles invoiced one year ago. By the average of profits made by cattle-feeding in the last ten years, we should have cleared at least $1,000 on the cattle that have been kept on the place. Instead of that I have to report a loss. Hogs for which I was charged 7½ cents per pound one year ago, were sold in the fall for 4 cents, and six months' feeding entirely lost. The hogs raised on the place and bought through the season, helped to cancel the loss. The oats that I sowed last spring were invoiced

at 65 cents per bushel, while the product on hand is put at 25 cents. Corn on hand last spring cost me 40 cents. 1,675 bushels, now in crib, is put in at 25 cents.

Comparing the present invoice with that of one year ago, and the total receipts with total expenditures, I find a balance of receipts of $210 27. Giving the farm credit for permanent improvements and new tools purchased, which amounts to $1,266 46, gives us a total balance of $1,477 83. See statement marked "K."

For statement of loss and gain, see paper marked "L." This had to be partly estimated, as the showing of the cost and value of crops, etc., and the real profits and losses did not correspond, and the difference had to be made up to make this showing.

The first few months of the year were exceedingly trying and laborious, and I was convinced of the truth of the saying, that "Eternal vigilance is the price of success."

It would have been a satisfaction to have seen another thousand dollars added to the balance in this report; yet on the whole, taking all things into consideration, I am gratified with the result of our labors, and hope it may be satisfactory to yourselt and the Board of Trustees.

In closing this report I tender you my sincere thanks for the interest you have taken in "The Stock Farm," and also to the Executive Committee for the readiness with which they have met my requests for the means and material necessary to forward our labors.

Respectfully submitted,

E. L. LAWRENCE,
Head Farmer I. I. U.

STATEMENT A.—FARM RECEIPTS.

From sales of old hay	$444 93
" new hay	458 42
" corn	15 86
" rye	321 00
" oats	670 55
" cattle	4,284 45
" fruit	177 67
" straw	51 25
" hogs	490 98
" potatoes	48 75
From sale of mare	100 00
" colt	125 00
" grass seed	17 50
" unenumerated articles	23 37
From receipts for pasture	85 61
" cash for freight on cattle sold	100 00
For work done off the farm	97 96
" care and feed of fine stock	421 05
	$7,934 45

STATEMENT "B."—EXPENSES.

Head Farmer's salary	$720 00
Paid for farm and all labor on place	1,046 29
Board of hands	528 70
Cultivator	41 00
Reaper and mower and extra knife	196 00
Wind-mill	50 00
Hay carrier, power and freight	11 86
Horse rake	40 00
Well, brick, curb circles and pump	34 41
Hay fork and rope	19 25
Check rower and freight	12 00
Hardware bills	51 11
Blacksmith bills	28 02
Paints, oils and druggists bills	24 86
Hogs bought	126 70
Paid for grinding corn	7 25
Seed of all kinds purchased	117 27
Hedge plants purchased	7 75
Lumber and wire	275 47
Expenses to Chicago twice for cattle	36 05
Old debts paid	53 00
Paid for horse	100 00
Express charges on pigs	16 00
Paid for salt	5 55
Harness, repairs, etc	15 60
Freight paid 4 cars cattle, 3 hay, 10 oats, etc	278 23
Horticultural department account	62 15

EXPENSES—*Continued.*

Carpt. department account	$23 54
Mechanical department account	66
Lightning rod for barn	16 00
Paid for fence posts	87 63
Old account paid	112 62
Paid for cow	65 00
First cost of fine stock (less expense)	2,493 50
Unenumerated articles	13 35
Total year's expense	$6,726 72

STATEMENT "C."—COST OF FENCE.

30 rods front yard fence, painted	
50 " 5 board fence	
200 " 4 "	
100 " 6 wire fence	
80 " 4 "	
120 " rail fence made	
Total cost as shown by accounts, including material and labor	$500 16
This should be increased by adding:	
Freight on two cars lumber	50 00
1,000 feet lumber purchased here	22 00
65 cedar posts	13 00
This should have been charged to the Stock Farm, but has been accounted for in some other way, and is not allowed on either side in the statement of expenses and receipts. This would make the total expense of fence	$585 16

STATEMENT "D."

Paid for wind-mill	$50 00
" freight on same	5 45
" lumber for derrick	20 00
" curb and circles for well	8 00
" brick	18 00
" pump	8 00
" digging well	22 50
Cost of setting up mill, hauling, etc., etc.	22 00
" tank	23 54
" painting derrick and tank	13 00
" hauling and setting up tank	5 00
	$195 49

STATEMENT "E."—HEDGES.

3,100 plants	$7 75
Setting 80 rods new and filling up old	6 00
Making 280 rods protection fence	35 00
Work, hoeing and plowing	8 50
	$57 25

STATEMENT "F."—EXTRAORDINARY EXPENSES.

Paid for small tools	$5 70
" reaper and mower and extra knife	196 00
" cultivator and freight	44 85
" horse hay rake	40 00
" check rower and freight	12 00
" hay fork and rope	19 25
" lightning rod	16 00
" harrow	11 00
Paid old debts	45 50
" last year's accounts	112 62
Total expense of hay carrier power and track	31 91
" two hay racks	18 00
" well, wind mill, etc	195 49
" fencing	500 16
" hedges	57 25
" hog pens	37 04
Expense of work, etc., on barn	34 53
" improvements	47 28
Total	$1, 424 58

STATEMENT "G."—DONATIONS TO FARM.

J. H. Pickrell, discount on bill	$200 00
" 1 Southdown buck	25 00
" 2 Berkshire pigs	100 00
Dr. Miles, 2 Essex pigs	40 00
Hayworth & Co., discount on check rower	20 00
Angle & Sabin, " reaper	35 00
O. B. Olmsted, " wind-mill	65 00
Wm. Loudon, " hay carrier	6 66
" " elevating power	13 32
	$504 98

STATEMENT "H."—CARE AND FEED OF FINE STOCK.

Wages and board of men, 6 months	$210 00
10 tons hay, $12	120 00
140 bushels corn, 30c (for cattle)	42 00
60 bushels corn, 30c (for hogs)	18 00
8 bushels rye	4 80
10 bushels oats	3 00
Straw for littering	6 00
Feed for sheep	10 00
Paid for grinding corn	7 25
	$421 05

STATEMENT "J."—CARE AND FEED OF FINE STOCK.

Animals.	Age, Sept. 1st.		When received.		Dec. 1st.		Jan. 1st.			Feb. 1st.			March 1st.			Total gain.....	Total time—days.....	Gain per day.	Since 1st Dec., took—lbs. meal to make 1 lb. growth.....	Average feed since Dec. 1st.
	Mo's.	Days.	Date.	Wei't	Wei't	Gain.	Wei't	Feed.	Gain.	Wei't	Feed.	Gain.	Wei't	Feed.	Gain or loss					
1 Short Horn Bull.....	7	7	Oct. 12	730	848	118	900	5	52	925	6	25	1030	7	105	300	139	2.16	4.7	6
2 Short Horn Heifer.....	16	25	Sept. 10	990	1120	130	1140	4	20	1180	4	40	1195	4	15	205	171	1.20	6.1	4
3 Hereford Bull.....	8	17	Aug. 21	790*	814	24	854	5	40	894	6	40	965	7	71	171	120	1.41	5.7	6
4 Hereford Heifer.....	16	19	Aug. 21	800*	840	40	900	4	60	938	4	38	935	2	—3	135	120	1.11	5.1	3
5 Ayrshire Bull.....	4	.....	Oct. 12	560*	566	6	616	4	50	670	5	54	730	2	60	170	120	1.40	3.0	3
6 Ayrshire Heifer.....	15	19	Oct. 12	700*	774	74	794	4	20	820	4	26	815	2	—5	115	120	.95	11.7	3
7 Jersey Bull.....	12	22	Nov. 27	258	258	.....	275	2	17	315	2	40	360	2	45	102	93	1.10	2.8	2
8 Jersey Heifer.....	14	25	Nov. 27	482	482	.....	550	4	68	590	4	40	634	2	44	152	93	1.63	5.7	3
9 Devon Heifer.....	13	8	Nov. 4	630	636	6	674	4	38	724	4	50	720	2	—4	90	116	.78	14.3	3

* Numbers 3, 4, 5 and 6, first weight, Nov. 1st. In the column marked "feed," the figures show the relative feed of grain for the month previous. The hay was fed the same to all, what they could eat.

STATEMENT "K."

1872.	March 1	By sales of the year	$7,415 34
	" 1	By work done off the farm	97 96
	" 1	By care and feed of fine stock	421 15
	" 1	By fine stock, at cost, including freight, etc	2,614 48
	" 1	By old debts paid	45 50
	" 1	By accounts from last year	112 62
	" 1	By present invoice	1,611 34
	" 1	By permanent improvements and tools	1,266 46
			$13,584 85
		CONTRA.	
1872.	March 1	To expenses of the year	$6,726 72
	" 1	To invoice, March 1, 1871	5,380 30
	" 1	Balance found	1,477 83
			$13,584 85

NOTE.—Since the first of March there has been an account of $31.15 paid for transportation of Hereford cattle Also, an account of $145 for repairs on boiler, which is not here shown, but will be in the report of the book keeper.

STATEMENT "L."—LOSS AND GAIN.

March 1	Profit on 85 acres corn	$520 00
" 1	Profit on 35 acres rye	66 00
" 1	Profit on 110 acres meadow	605 00
" 1	Profit by care of fine stock	40 00
" 1	Profit by outside labor	42 00
" 1	Profit on fruit	90 00
" 1	Profit on pasture, and after feed	355 00
		$1,718 00
March 1	Loss on cattle	$75 00
" 1	Loss on hogs	85 00
" 1	Loss on 45 acres oats	81 00
" 1	Balance found	1,477 00
		$1,718 00

ESTIMATE OF AMOUNT OF MONEY REQUIRED FOR EXPENSES ETC. OF THE STOCK FARM ILLINOIS INDUSTRIAL UNIVERSITY.

For labor, and boarding hands	$1,500 00
" wear and tear	200 00
" steam engine	500 00
" ditching and tile draining	200 00
" trees and shrubbery	100 00
" tools, straw-cutter, corn-sheller, and perhaps corn cultivator	120 00
" salary of head farmer	720 00

INVOICE OF TOOLS AND MACHINERY.

One Cycloid mower	$25 00
One Bucyrus mower	25 00
One lumber wagon	45 00
" " "	30 00
One spring wagon	125 00
Three sets harness	50 00
One roller	95 00
One Skinner gang plow*	80 00
Five plows	60 00
One Scotch harrow	10 00

INVOICE OF STOCK AND MACHINERY—*Continued.*

One new harrow		$12 00
One sod harrow		20 00
One Thomas harrow*		.....
One Hoosier cultivator		10 00
One Bradley cultivator (no good) *		.....
One Cravuth cultivator (in fragments)*		.....
One drill		70 00
One Gopher cultivator*		10 00
One broadcast seeder		40 00
One shovel plow*		5 00
One double-shovel plow		4 00
One Johnston reaper, transferred*		.....
One Fairbanks scales		100 00
One revolving horse rake*		2 00
One horse hay fork, Randall's*		6 00
One fanning mill*		10 00
Three sets plow whiffletrees		6 00
Two three-horse clevises*		7 00
One three-horse whiffletree*		5 00
One Van Derno corn planter		45 00
One hay press		40 00
One saddle and bridle		10 00
Three hoes		1 51
Three spades		2 50
Two shovels		1 50
Four hand rakes (new)		75
Two spading forks		1 50
Two bush hooks		3 00
One scythe and snath		1 50
Brushes, cards and curry combs		3 00
Four hay forks (two new)		3 00
One manure fork		1 00
Three planes		2 50
One hammer (new)		1 00
Two hatchets		1 00
Four saws		4 00
Bit stalk and bits		3 00
Two augers		1 50
One iron square (new)		50
One crow bar (new)		2 00
One ax (new)		1 25
One Champion reaper and mower (new)		190 00
One horse rake (new)		40 00
One Bertrand & Sames cultivator (new)		45 00
Horse power, fork and rope pulleys, etc., for unloading hay (new)		50 00
One revolving harrow*		.....
Three sets fly nets		12 00
Fragments of an old set of harness*		.....
Two chisels		1 00
One Frazier cultivator		5 00
Check rower for corn planter (new)		25 00
One draw shave		50
One grub hoe		1 50
One saw set		50
One cold chisel		50
Three monkey wrenches		2 00
One grindstone		3 00
Two sickle grinders (broken)*		.....
One try square		25
One bevil rule		25
One scoop shovel		1 00
One grain cradle*		.....
One log chain		1 00
One hand corn planter		5 00
Two post mauls		1 00
Three corn knives		1 50
One hand straw cutter		5 00
One corn grinder*		30 00
One sub-soil plow (lifter)*		.....
Two hay racks (new)		18 00
		$1,391 00
Teams—1 pair mules	$300 00	
6 horses (plugs)	450 00	
		$750 00

NOTE.—Tools marked with a * have not been used in the last year.

REPORT FROM DEPARTMENT OF HORTICULTURE.

ILLINOIS INDUSTRIAL UNIVERSITY,
MARCH 8, 1872.

J. M. GREGORY, *Regent Illinois Industrial University:*

SIR: I respectfully submit the following report of the operations in and the condition of the Horticultural Department for the year now ending:

DROUGHT.

The summer of 1871 was remarkable for its excessive and prolonged drought. Very little rain fell after e first of March, and in consequence many of our plants and crops suffered severely. However, the little rain that did fall came in such good time that, in numerous instances, a fair growth was made, and reasonable harvests obtained. Newly planted trees suffered most. The Scotch and Austrian pine, planted in the timber lot, nearly all died, and some of the ash did not leaf out; but, curiously enough, remained green, and will probably grow this year. Seed corn lay in the ground over two weeks without germinating; yet, after a slight shower, soon appeared. But the dry season afforded an excellent opportunity for the destruction of weeds, and was thoroughly improved.

INSECTS.

Of the insect scourges, none were so devastating as the Cinch-bug (*Rhyparochromus leucopterous*) and the Colorado Potato-beetle (*Drophora decemliniata*). The former appeared on and after the —— day of ——, in the air, myriads in number, and settled down upon the fields of grain. All of the spring wheat, most of the oats, and much of the corn and broom corn in the vicinity were destroyed. Even the grass upon some of the lawns was completely killed. They do not ordinarily attack corn until about the wheat harvest time, when they migrate from the stubble to adjoining fields, but it was observed as a fact new to the writer, that hosts of the insects bred in the corn fields, and to a greater extent in the broom corn. There were two broods, the second appearing in swarms about the middle of July. The pests belong to the Hemipterous insects, true bugs, all of which are provided with sucking beaks, with which they pierce tissues and obtain their juices, hence no means of poisoning can be of any avail. The last brood creep under and into the crevices of corn stalks and other rubbish, and live in the adult state over winter, so that burning or burying with the plow all such things affording shelter must destroy multitudes. There is every indication of their numerous appearance again this year.

The Colorado Potato-beetles made their first appearance with us in 1870, but did little damage that year. Before any, except the very earliest, potatoes had been planted in 1871, the beetles came from the ground in great numbers, and their attacks upon every green thing of the potato and tomato kind foretold at once their great ravages during the summer. We tried hand picking, sometimes gathering a half-bushel at a time, poisoning with Paris green and with arsenic, and scalding with hot water—all of which were more or less successful, but for ease and effectiveness, poisoning proved best. Paris green sometimes seemed preferable; however, arsenic did nearly as well, and was certainly much cheaper. Flour was found best of many things tried for reducing the strength of the poison, ten parts to one; this applied when the leaves were wet, formed a paste that did not readily blow off. As the season advanced, insect enemies of the beetles nearly relieved us of our part of the warfare. The "Lady Bugs" (*Coccinella*) fed upon the eggs, and the "Soldier Bug" (*Arma spinosa*) upon the larvæ. The ground proved too dry for the transformations of the larvæ, and many perished for this reason. Upon the whole, little fear is felt for the coming season, although continued warfare will doubtless be necessary. Machines are coming into use that will materially aid in their destruction.

The White Grub (*Lachnostema fusca*) was everywhere destructive; the nursery, the forest plantation, the gardens and the fields were all subject to their devastations. The roots of the grass upon the Campus lawn were eaten off an inch or two below the surface, so that the dead turf could be rolled up like a carpet. Many of the ornamental plants were likewise attacked. For these no adequate remedy is known.

EXPERIMENTS.

The location of the new University building in the midst of the garden brought to an untimely end the experiments attempted with many garden and nursery plants. Special attention is asked to the experiments with different kinds of root grafts found elsewhere. (See paper A.) About 400 varieties of pear cions were received as a donation from Chas. Downing, Esq., of Newburgh, N. Y. These were grafted in the best manner upon pear stocks, and a large proportion are now living, but they made very little growth. Others from the same source are promised the coming year. The accompanying

statements, by Mr. Vickroy, will show the fruits and orchard trees now upon the grounds of the Department (Paper B), and the ornamental plants are catalogues by Mr. Franks (Paper C). For forest Tree Record, see Paper D.; for Experimental Apple Orchard, see Paper E.

An attempt was made at canning tomatoes for market, and although at first we partially failed, progress was made towards perfecting the process, and I am confident we can, at another trial, do the work as well as the best. From our inquiries during the summer, we found the canning establishments in existence were jealous of their skill, making it hard for any one to obtain the desired information. Should we fully succeed, it seems to me much good would be done in disseminating important knowledge, and in providing a market for crops upon which students would find labor. The Alden process of drying fruits and vegetables is worth investigation, and may prove a valuable aid in providing labor for students, and securing a market for nearly all our horticultural products.

During the summer vacation, I spent some time at Cobden, Ill., making microscopical observations upon the fire and leaf blight of the pear, the twig blight of the apple, and the rotting of grapes and stone fruits. The latter only is here reported. It has been evident enough that the decay of these fruits, especially peaches and plums, and a mould-like fungus, accompanied each other, but whether the latter was the cause or consequence of the former has not been well understood. To my mind it became certain that the fungus *caused* the disease, being sometimes, but not always, aided by the punctures of insects. When one peach of a cluster rots the others are sure to follow, and plainly take the disease from the first; when a decaying one is above others, those below, if whole, remain sound till a shower of rain occurs, and then speedily rot; when the dusty mass (spores) from a decaying fruit is placed by hand upon the whole and dry surface of healthy ones, no change is observed, but if the skin is broken or sufficiently moistened, decay rapidly ensues, and upon examination I repeatedly found the thread (mycelium) of the fungus in the substance of the flesh before any indications of decay was observed on the outside. In a short time, however, the tissues were destroyed, and soon after the masses of spores burst from the surface, as in nature. As a practical demonstration that these spores cause the disease, Col. Forbes and others found the decay of the fruit could be almost entirely prevented by carefully removing from the first all rotting specimens. Each pustule, the size of a pin's head, is made up of numberless bead-like chains of spores, attached end to end, but readily separating when mature, and flying off as dust. When wet, they would not float in the air, hence during rain, only the fruit so situated as to have the spores *washed* down upon them would be affected. Punctured fruit would likely be attacked in any situation when decaying ones were permitted to remain in the orchard. The same fungus attacks all the stone fruits. It is doubtless closely allied to the vine fungus of Europe, and the rose mildew with us, both belonging to the old genus oidium; but as all these parasites have a second kind of fruit by which they are specifically identified, and not having yet seen this, I cannot name the destroyer. It doubtless works upon the leaves of tender varieties, and may here perfect its fruit.

STUDENT LABOR.

The subject of student labor has received a good deal of attention, and upon the whole, I think considerable advance has been made in the Horticultural Department during the year. The difficulty of supplying work, however, increases as the permanent improvements, draining, fencing, etc., grow less. During the planting season considerable hand labor is required, but otherwise the greater part of our work can be better done by teams and machinery. To render student labor effective, much more and closer supervision is necessary than is needed by permanent workmen. The question of dollars and cents must, almost of necessity, go against the employment of students, or any other workmen, for a few hours at a time. But for the good of the students themselves, and for the true interests of the Universlty as a whole, I see nothing against and everything in favor of providing for and employing in some useful way all students who wish to labor. With us I think eight cents per hour should be fixed upon as the standard price, leaving any sum above this, up to ten cents per hour, as a premium in cases of special skill or of diligence and faithfulness. The Horticultural class have each grafted this winter 1,000 apple cions in roots, and each will have the planting and care of his grafts during the year. No pay is given for this. Some have, however, besides the above, grafted for pay at the common rates.

VEGETABLE GARDEN.

The location of the new University building rendered it necessary to choose another site for the garden, and four acres immediately south of the barn on the experimental farm has been selected and partially underdrained. This is intended for the main crops of vegetables, the experimental plats being nearer the school buildings. During the remarkably dry weather of the season little difference could be perceived between the drained and undrained land; but, in the spring, that underdrained could be worked much earlier. The work of tile draining should go on as rapidly as the funds will admit.

ARBORETUM.

The arboretum has received due attention, but no planting has yet been done. Most of the land is now in readiness, and quite a number of trees are also ready. Planting should begin this spring.

ORNAMENTAL GROUNDS AND GREEN HOUSE.

The ornamental grounds, notwithstanding the difficulties previously mentioned, presented a good appearance during the summer, and were much admired by visitors and others. The University has achieved quite a name for its display in this direction, and is by example as well as by precept, accomplishing a needed good. The green house plants have been considerably increased since last year, and the whole are now in good condition. Arrangements are also in progress for further increasing the stock by way of exchange.

TILE DRAINING.

About five acres of land south of the new University building, and three acres south of the barn have been underdrained since the last meeting of the Board. These drains are placed forty feet apart in the direction of greatest descent, and from three to four feet deep, mains being usually run in the depressions forming the natural water courses. The manner of conducting the work has received much study, and our experience has been instructive. The books in many instances recommend beginning at the lower end and laying the tile as fast as the excavation is made, thus avoiding an accumulation of water so as to impede the work, and this latter is the only advantage claimed. When the ground is dry, there can be no difference in this respect, which was the case during our fall work, but in the spring it is a matter of great importance. Attempting to follow out the above advice, we were repeatedly obliged to take up all that had been laid and clean out the mud that had settled in the tile from the work above. Even mains having good descent, and well laid and provided with silt basins choked up when laying laterals opening into them.

We afterwards dug the mains and left them open till the laterals were laid, and each of these was completely opened and leveled, then tile laid, beginning at the upper end. When the excavating had been done with sufficient care, never exceeding the required depth, the running water proved an advantage instead of a hindrance, showing accurately the required level. In cases where the mains had been previously laid, not nearly so much silt washed in when the work of tile-laying began above and progressed downward.

Most of the tile has been laid with nothing but clay pressed down upon the joints, and are working well; yet, for further security, some drains are laid with scraps of tin, and others with paper over the joints. Two-inch tile is used for the lateral drains, increasing in size for the mains according to the amount of water they are to carry. Through a natural water course south of the new University building, where there has been in spring-time a large amount of running water, two five-inch tile are laid side by side in the same trench; these will doubtless avoid the necessity of the open ditch heretofore existing.

The cost has not been far from forty dollars ($40) per acre. Students dug the trenches by the rod at twenty cents, and averaged about their usual pay per hour, the trenches being about three and a half (3½) feet in depth. This is as low as the work upon our soil can be done by hand. The use of a team and proper implements might, perhaps, reduce the cost somewhat. The laying of the tile and the filling of the ditches can be done for from five to ten cents per rod, the team and scraper being used for the latter. Two-inch tile at the best manufactories of Illinois are about fifteen dollars ($15) per thousand, upon which some discount has usually been allowed to the University. Delivered upon the ground, their cost is about two cents per running foot, or say thirty cents per rod, making from fifty-five to sixty cents per rod for total cost. In some localities the cost of the tile would be more and in other places less than the above amount, but the total cost upon prairie lands, not remote from railway stations, will probably be not less than fifty cents, and need not be more than seventy. With parallel drains forty feet apart, there are about sixty-five rods, running measure, to the acre; at sixty cents each, the cost per acre is thirty-nine dollars ($39), to which something must be added for the extra expense of the larger tile in the mains, and in some cases for angular spaces having more than one drain for each forty feet of width.

It is too early to speak confidently about the value of these drains as seen upon the University lands, excepting the advanced dryness observed in the spring and consequent early fitness for working. This has always been very noticeable, but observed difference is reported during the drought of the last season. A single drain runs from north to south on the east side of the present college grounds to the stream crossing the arboretum plot, and it is a marked fact that the teamsters crossing the low portion near the brook went out of their way some distance to the line of this drain, and there found much the best roadway during the wet spring time.

FOREMEN.

Mr. Vickroy as foreman of the orchards, and vegetable and fruit gardens, and Mr. Franks, as florist, have been faithful and efficient in their work, and as I believe, have been earnestly endeavoring to advance the interests of the University. Harmony and good will have prevailed during the year, and it is hoped some progress in the right direction has been accomplished.

DONATIONS.

One Kirby Two-wheeled Mower	D. M. Osborne & Co., Auburn, N. Y.
One Wier Corn Cultivator	Wier Plow Company, Monmouth, Ill.
One Corn Dodger Cultivator	Harper & Mitchell, El Paso, Ill.
One Champion Cultivator ($25 off)	King & Hamilton, Ottawa, Ill.
One Deere Cultivator ($18 off)	John Deere & Co., Moline, Ill.
One Patent Stirring and French Plow	Fleuner & Call, Urbana, Ill.
One Patent Harrow	S. Hutchinson, Griggsville, Ill.
Collection of small Fruits	A. S. Fuller, Ridgewood, N. J.
Turner's Seedling Raspberry	I. Baldwin, Jacksonville, Ill.
Collection Peach Buds	P. R. Wright, Cobden, Ill.
Collection Cherry Buds	Dr. E. S. Hull, Alton, Ill.

Very respectfully submitted,

T. J. BURRILL,
Prof. Botany and Horticulture.

PAPERS ACCOMPANYING REPORT OF PROF. BURRILL.

"A."—*Record of Experimental Grafts*, 1871.

	Per cent. living.	Av. growth in inches.
1st cut of root and 1st cut of cion	90	14 7-9
" " " " 2d " "	70	9 5-14
" " " " 3d " "	80	8 1-16
" " " " 4th " "	60	19 1-16
2d " " " 1st " "	70	14 8-14
" " " " 2d " "	80	15 13-16
" " " " 3d " "	30	8 1-2
3d " " " 1st " "	30	0
" " " " 2d " "	40	9 5-8
" " " " 3d " "	70	10 1-4
" " " " 4th " "	40	7
4th " " " 1st " "	30	11 2-3
" " " " 2d " "	none.	
" " " " 3d " "	40	12 1-8
" " " " 4th " "	20	8
6-inch root, 1st cut of root	80	22 9-16
6 " " 2d " "	50	8 2-15
4 " " 1st " "	80	16 1-8
4 " " 2d " "	70	19 1-7
2½ " " 1st " "	60	14 1-16
2½ " " 2d " "	20	9
2½ " " 3d " "	10	9
2½ " " 4th " "	30	12 2-3
1½ " " 1st " "	30	21
1½ " " 2d " "	10	23
1½ " " 3d " "	40	12 1-2
1½ " " 4th " "	30	17
2½ " " 1st " inverted	30	14 5-6
2½ " " 2d " "	30	14 1-4
2½ " " bottom cut inverted	none.	
1st cut of root 6 times larger than cion	80	21 3-4
" " " 4 " " " "	70	18 9-14

The above grafts were grafted February 8, 1871. using Ben. Davis cions, 10 each of the above list, wrapping the grafts with waxed thread, and packing them in moist saw dust. They were set in nursery April 8, 1871, all with the same care, and gave them the same attention and cultivation. The cions used for grafting the different lengths and sizes of roots were taken from the same part of different shoots as nearly as we could get them. Those making the most even growth, 1st and 2d cut of root, and the 2d cut of cions; 2d 6-inch roots, 1st cut of roots; 3d roots, 6 times larger than cions.

AVERAGES, PER CENT. AND GROWTH.

	Per cent. living.	Av. growth inches.
1st cut of root	72	12.81
2d " "	60	12.98
3d " "	45	8.96
4th " "	30	8.21
1st " of cion	52	12.51
2d " "	63	11.59
3d " "	55	9.63
4th " "	40	11.35

"B."

SMALL FRUITS.

We planted the following varieties for experiment, received from A. S. Fuller. N. Y.:

RASPBERRIES.—American White Cap, Canada Black Cap, Davidson's Thornless, Doolittle, Elsie, Fay's Thornless, Gardener, Garden, Mammoth Cluster, McCormick, Miami, Ohio Everbearing, Pearl, Purple Cane, Surprise, Summit, Seneca, Woodard's Monthly, Westchester, Arnold's No. 3, Arnold's Orange, Turner, Cattawisla, Corse's Seedling, Clarke, Ellisdale, Hornet, Prince of Wales, Imperial or Bristol, Philadelphia, Brinkle's Orange, Rivers' Black, Red Canada.

CURRANTS.—Downing Cluster, Missouri, White Goudoin, White Dutch, Variegated Leaf, Fertile de Patters, Cherry, Connecticut Sweet,Caucasian, Black Naples, Budden's Hillroth, Long-bunched Red, Bang up Black, Imperial, Native de Beston, Holland Long Grape, Hockroth's, Fertile de Anjers, Red Provens, Prince Albert, Ogden's Black Grape, May Victoria, Knight's Early Red.

BLACKBERRIES.—Claret, Crystal White, Dorchester, Halcomb, Kittatinny, Mason's Mountain, Sable Queen, Wilson.

GOOSEBERRIES.—Houghton, Mountain Seedling, Smith's Gooseberry, Transparent, Warrington.

These were not planted till quite late, and the dry weather killed quite a number of them.

SMALL FRUITS FOR PROFIT.

We planted three-fourths of an acre of Concord, Ives, Hartford and Clinton; mostly Concord. One fourth of an acre of Kittatinny blackberries, and two or three hundred raspberries.

The following varieties of grapes were planted for experiment, placing one Concord between each variety, to compare with two of each of the other varieties: Albey, Arnold's No. 1, Clinton, Cassady, Catawba, Creveling, Delaware, Eumelan, Gothe, Herbemont, Hartford, Ives, Isabella, Israella, Lyman, Lenoir, Norton's Virginia, Oporto, Salem, Tokalen Taylor, Telegraph, Union Village, Adirondac, Diana, Mary Ann, Martha, Maxatawney, Northern Muscadine.

"C."

NATURAL ORDERS; ORNAMENTAL PLANTS.

1. Begoniaceae.
2. Verbenaceae.
3. Labiatae.
4. Borraginaceae.
5. Polemoniaceae.
6. Convolunlaceae.
7. Solonaceae.
8. Apocynacea.
9. Asclepiadaceae.
10. Yasminaceae.
11. Araliaceae.
12. Caprifoliaceae.
13. Dipsaceae.
14. Compositae.
15. Lobeliaceae.
16. Primulaceae
17. Plumbaginaceae.
18. Begoniaceae.
19. Pedaliaceae.
20. Scrophulareacea.
21. Oleaceae.
22. Nyetaginaceae.
23. Phytolaccoceae.
24. Basellaceae.
25. Amarantaceae.
26. Geraniaceae.
27. Onagraceae.
28. Crassulaceae.
29. Sarcifragaceae.
30. Possifloriaceae.
31. Ruphorbiaceae.
32. Ulmaceae.
33. Artocarpaceae.
34. Urticaceae.
35. Platanaceae,
36. Peglanstaceae.
37. Cupuliferae.
38. Ranunculaceae.
39. Berboridaceae.
40. Papaveraceae.
41. Fumariacea.
42. Cruciferae.
43. Resedeacea.
44. Violaceae.
45. Caryophyllacea.
46. Porterlaceae.
47. Wesembryacea.
48. Malvaceae.
46. Camelliaceae.
50. Aurantaceae.
51. Linaceae.
52. Oxalidaceae.
53. Balsamnaceae.
54. Tropaedlaceae.

55. Rutaceae.
55. Anacardiaceae.
57. Pittosporaceae.
58. Auraceae,
59. Sapindaceae.
60. Celastraceae.
61. Vitaceae.
62. Leguminosae.
63. Rosaceae.
64. Myrtaceae.
65. Dethraceae.
66. Polygonaceae.
67. Acanthaceae.
68. Rubiaceae.
69. Liliaceae.
70. Commelynaceae.
71. Cyperaceae.
72. Gramineae.
73. Lycopodiaceae.
74. Filices.

CATALOGUE OF PLANTS, IN THE UNINERSITY GROUNDS AND GREEN-HOUSES.

Natural Order, BEGONIACEÆ.

Genera Begonia:
- Zebrina.
- Hydrocotilifolia,
- Lairusii.
- Ricinifolia,
- Agrostigma.
- Cocularis.
- Nidida.
- Semperflores.
- Sandersii.
- Parvifolia.
- Dragii.
- Odorata.
- Carnea.
- Fuchioides Alba.
- Hybrida Multiflora.
- Manicata.

Begonias (Rex varieties):
- Rex.
- Argentea.
- Queen of Hanover.
- Silver Chain.
- Estrella de Brazil.
- Picta.
- Queen of England.
- Silver Queen.
- Marshalii.

Natural Order, VERBENACEÆ.

Verbena Hybrida:
- Philadelphia.
- Flirt.
- Loyalty.
- Alexis.
- Imperatrice Elizabeth.
- Banner.
- Claret Queen.
- Monstrosa Superba.
- Acme.
- Alemna.
- Snowdrift.
- Ball of Fire.
- Waregan.
- William Dean.
- Harkaway.
- White Fawn.
- Jessie.
- Colfax.
- Carminata.
- Defiance.
- Annie.

Verbana Hybrida:
- Melville.
- Argus.
- Lord Carnarvon.
- Formosa.
- Vesta.
- Purpurea.
- Isoline,
- Romance.
- Fire-Fly.
- John Tulleys.
- Snowflake.

Latana Hybrida:
- Marcella.
- Adolphus Avas.
- Alba Multiflora.
- Multabilis.
- Grand Sultan.

Aloysia Citrodora.

Clerodendrum:
- Balfordii.
- Fragrance Flora Plena.

Natural Order, LABIATÆ.

Salvia:
- Coccinea.
- Leucanthea.
- Splendens.

Sylvia:
- Gordonii.
- Carnea.
- Patens.

NATUCAL ORDER, LABIATÆ,—*Continued.*

Coleus Verchafeltii:
Albert Victor.
Her Majesty.
Prince Arthur.
Officinalis.

Coleus Verchafeltii:
Setting Sun.
Maurettii
Bansuii.
Berkleyii.

NATURAL ORDER, BORRAGINACEÆ.

Heliotropium Peruvianum:
Triomphe de Leige.

Heliotropium Peruvianum:
Jersey Belle.

NATURAL ORDER, POLEMONIACEÆ.

Phlox:
Paniculata.
Drumondii.

Phlox:
Subulata.

NATURAL ORDER, CONVOLVULACEÆ.

Quamoclit.
Vulgaris.
Coccinea.
Batatas:
Edulis.

Pharbitis Nil.
Ipomea grandiflora.
Convolvulus:
Muritanicus.

NATURAL ORDER, SOLANACEÆ.

Solanum:
Jasmenoides.
Pseudo capsicum.
Capsicastitum.
Brugmansia:
Suavolens.
Petunia Hybrida:
General Grant, double.
Magnet, " "

Petunia Hybrida:
Gem, double.
Mrs. Parker, " "
Adriene, " "
Nierembergia:
Rivularis.
Gracillis.
Fabiana Imbricata.

NATURAL ORDER, APOCYNACEÆ.

Vinca:
Minor.
Major.
Varigata.
Rosea.
Alba.

Vinca:
Alba.
Nerum:
Oleander rosea.
Alba.
Aure.

NATURAL ORDER, ASCLEPIADACEÆ.

Hoya;
Canosa.

Hoya:
Bella.

NATURAL ORDER, JASMINACEÆ.

Genera Jasminum:
Fruticans.

Genera Jasminum:
Officinale.

NATURAL ORDER, ARLIACEÆ.

Genera Hedera Helix:
Variety Hibernica.

Genera Chinevesis.
Varigata.

NATURAL ORDER, CAPRIFOLIACEÆ.

Genera Symphoricarpus, (or Snowberry):
Racemosus.
Occidentalis.
Lonicera, or Honeysuckle:
Tartarica.
Japonica.

Genera Symphoricarpus, (or Snowberry):
Grata.
Viburnum or Snowball:
Opulus.
Tinus.

NATURAL ORDER, DIPSACEÆ OR TEASELWORTS.

Scabiosa:
Atropurpurea.

NATURAL ORDER, COMPOSITÆ OR ASTERWORTS.

(Tribe 2) Eupatoriacea:
Ageratum:
Mexicana.
Variety Wrex Alba.
" " Varigata.
Mikania Scandens:
Eupatorium:
Augustifolia.
(Tribe 3) Grandiflora:
Asteroideae.
Aster:
Chinensis.
Bellis or Garden Daisy:
Perennis.
Dahlia, (about30 varieties.)
(Tribe 4) Zinnea:
Elegans.
Achillea:
Millefolium.
Matricaria:
Parthenium.
Chrysanthemum.
Chrysanthemum:
Sinense.
Tanacetum:
Vulgare.
Artemisia:
Abrotauum.
Argentea.
Stellaris.
Helichrysum:
Bracteosum.
Cacalia:
Coccinea.
Cineraria:
Platanifolia.
Populifolia
(Tribe 5) Tagetes:
Patula.
Erecta.
Centaurea:
Candida.
Gymnocarpa.

NATURAL ORDER, LOBELIACEÆ.

Lobelia speciosa.

NATURAL ORDER, PREMULACEÆ.

Primula:
Sinensis rubra.
Alba.
Alba, fl. pl.
Cyclamen:
Persicum album.
Rubrum.
Lysimachia:
Nummularia.

NATURAL ORDER, PLUMBAGINACEÆ.

Plumbago: Capensis.

NATURAL ORDER, BEGNONIACEÆ.

Ticonia:
Radicans.
Catalpa:
Bignonioides.

NATURAL ORDER, PEDALIACEÆ.

Martynia: Proboscidea.

NATURAL ORDER, SCROPHULARIACEÆ.

Calceolaria:
Hybrida.
Linaria:
Vulgaris.
Antirrhinum:
Majus.
Maurandia:
Barklayana.
Lophospernum:
Scandens.
Penstemon:
Gentianoides.
Paulowni:
Imperialis.
Russelia:
Juncea.
Mimulus:
Lutens.
Moschatus.
Digitalis:
Hybrida.
Veronica:
Spicata.
Varigata.

NATURAL ORDER, OLEACEÆ.

Fraxinus:
- Americana.

Syringa:
- Vulgaris.
- Persica.

Forsythia:
- Veridissima.

Ligustrum:
- Vulgare.

Olea:
- Americana.

NATURAL ORDER, NYCTAGINACEÆ.

Mirabilis: Jalapa.

NATURAL ORDER, PHYTOLACCACEÆ.

Phytolacca:
- Decandra.

Rivina.

NATURAL ORDER, BASELLACEÆ.

Boussingaultia: Baselloides.

NATURAL ORDER, AMARANTACEÆ.

Amarantus:
- Paniculatus.
- Melancholicus.
- Tricolor.
- Salisifolia.

Celosia:
- Cristata.

Alternanthera:
- Versicolor.

Alternanthera:
- Parichoides.
- Amabilis.

Achyranthes:
- Gibsonii.
- Borbonica.
- Aurea reticulata.
- Lindenii.
- Verschafeltii.

NATURAL ORDER, GERANIACEÆ.

Pelargonium:
- Adoratissimum.
  - Nutmeg-scented.
  - Apple-scented.
- Zonale:
  - White Perfection.
  - Donald Beaton.
  - Mrs. Smith.
  - Bridesmaid.
  - Florie de Corbany.
  - Indian Yellow.
  - Stella.
  - Christiana.
  - Tom Thumb.
  - General Grant.
  - Queen of England.
  - Amy Hogg.
  - Bicolor.
  - Sheen Bird.
  - Snowball.
  - Luna.
  - Giganta.
  - Queen of the West.
  - M'lle Nillson.
  - Ephraim.
  - Mrs. W. Paul.
  - King of Scarlets.
  - President.
  - Glorie de Nancy—Wm. Phitzer.
  - Madam Lemoin—Triomphe de Loraine.

Pelargonium—
- Zonale marginata:
  - Manglesii.
  - Cloth of Gold.
  - Sunset.
  - Mrs. Pollock.
  - Burning Bush.
  - Mount of Snow.
  - Flower of the Day.
  - Golden Chain.
- Peltatum:
  - Elegans.
  - Fairy Belle.
  - L'Elegant.
- Quercifolium: Oak-leaf.
- Radula:
  - Peppermint-scented.
  - Spice-scented.
- Graveolens:
  - Lemon.
  - Rose-scented.
  - Dr. Livingstone.
  - Shrubland Pet.
  - Rose Balm.
  - Walnut-scented.
  - Lady Plymouth.
- Hybrida:
  - Mr. Beck.
  - General Taylor.
  - Masterpiece.

NATURAL ORDER, GERANIACEÆ—*Continued.*

Pelargonium—
Hybrida:
Madam Mullet.
Captivation.
Ignea.
Cardinal Richelieu.
Eleanor.
Carlos.
Child of Achilles.
Comptonian.

Pelargonium—
Hybrida:
Butterfly.
Plato.
Arabian.
General Hancock.
Lady Ulrice.
Brutus.
Souvenir.
Vesper.
Diadematum.

NATURAL ORDER, ONAGRACEÆ.

Centradenia:
Grandiflora.
Florabunda.
Rosea.
Clarkia:
Pulchella.
Fuchsia:
Coccinea.
Fairy.
Fulgens.
Hybrida:
Black Prince.
Annie.
White Perfection.
Madam Cornelisson.
Rose of Castelle.
La fu du Rhin.
Duchess of Lancaster.
Emperor of Fuchsias.
Little Bopeep.
Mastodon.

Fuchsia—
Hybrida:
Prince Imperial.
Schiller.
Albertus.
Meteor.
Marshall McMahan.
Elm City.
Madam Polk.
Speciosa.
Souvenir de Cheswick.
Day Dream.
White Lady.
Garabaldi.
Herculanum.
Puritain.
Weltshire Lass.
Margenata.
Lord of the Isle.
Beatrice.

NATURAL ORDER, PASSIFLORACEÆ.

Passiflora:
Decaisneana.
Alata.

Passiflora:
Trifaceata.
Incarnata.

NATURAL ORDER, CRASSULACEÆ.

Sedum:
Carneum.
Varigatum.
Seaboldii.
Varigata.

Sempervivum:
Tectorum.
Echeveria:
Secunda.
Rochea:
Coccinea.

NATURAL ORDER, SAXIFRAGACEÆ.

Hydrangea:
Hortensis.
Varigata.
Philadelphus:
Inodorus.

Philadelphus:
Grandiflorus.
Deutzia:
Gracilis.
Scabra.

NATURAL ORDER, EUPHORBIACEÆ.

Euphorbia:
- Splendens.
- Cyparissias.
- Marginata.

Poinsettia:
- Pulcherrima.

Ricinus:
- Communis.
  - Sanguinea.
  - Bourbonica.
  - Macrocarpus.
  - Giganteus.

Buscus:
- Sempervirens.
  - Varigata.

NATURAL ORDER, ULMACEÆ.

Ulmus:
- Americana.
- Racemosa.

Celtis:
- Occidentalis.

NATURAL ORDER, ARTOCARPACEÆ.

Maclura:
- Aurantiaca.

Ficus: Carica.

Ficus:
- Bengalensis.
- Nitida.

NATURAL ORDER, URTICACEÆ.

Pilea:
- Indica.

Boehmeria:
- Argentea.

NATURAL ORDER, PLATANACEÆ.

Platanus: Occidentalis.

NATURAL ORDER, JUGLANDACEÆ.

Juglands:
- Cinerea.
- Nigra.

Carya:
- Alba.

NATURAL ORDER, CUPULIFERÆ.

Castanea: Vesca.

NATURAL ORDER, RANUNCULACEÆ.

Clematis:
- Flammula.

Hepatica:
- Triloba.

Aquilegia:
- Vulgaris.

Delphinium:
- Consolida.
- Grandiflorum.

Pæonia:
- Officinalis.
- Albiflora.

Liriodendron:
- Tulipefera.

NATURAL ORDER, BERBERIDACEÆ.

Berberis:
- Vulgaris.
- Aquifolium.

Berberis:
- Purpurea.

NATURAL ORDER, PAPAVERACEÆ.

Bocconia:
- Japonica.

Papaver: Rhæas.

Eschscholtzia:
- Californica.

NATURAL ORDER, FUMARIACEÆ.

Dicentra: Spectablis.

NATURAL ORDER, CRUCIFERÆ.

Matthiola:
- Annuus.
- Incanus.

Arabis:
- Verna.

Cheiranthus: Cheri.

Alyssum:
- Maritimum.
  - Varigatum.

Iberis:
- Umbellata.

NATURAL ORDER, RESIDACEÆ.

Reseda:
- Adorata.

Reseda:
- Luteola.

NATURAL ORDER, VIOLACEA.

Viola:
- Odorata.

Viola:
- Tricolor.

NATURAL ORDER, CARYOPHYLLACEÆ.

Dianthus:
- Barbatus.
- Chinensis.
- Caryophyllus.

Dianthus:
- Plumarius.

Saponaria:
- Officinalis.

NATURAL ORDER, PORTULACACEÆ.

Portulaca: Grandiflora.

NATURAL ORDER, MESEMBRYACEÆ.

Mesembryanthemum:
- Crystallinum.

Mesembryanthemum:
- Grandiflorum.
- Spectablis.

NATURAL ORDER, MALVACEÆ.

Althea:
- Rosea.

Abutilon:
- Striatum.
- Thomsonii.
- Mesopotamicum.

Abutilon:
- Van Houtii.

Malviviscus:
- Floridana.

Hibiscus:
- Syriacus.

NATURAL ORDER, CAMELLIACEÆ.

Camellia: Japonica.

NATURAL ORDER, AURANTIACEÆ.

Citrus: Chinensis.

NATURAL ORDER, LINACEÆ.

Linum:
- Trigynum.

Linum:
- Grandiflorum.

NATURAL ORDER, OXALIDACEÆ.

Oxalis: Violacea.

NATURAL ORDER, BALSAMINACEÆ.

Impatiens: Balsamina.

NATURAL ORDER, TROPÆOLACEÆ.

Tropæolum:
- Majus.
  - Plena.

Tropæolum:
- Aduncum.

NATURAL ORDER, BUTACEÆ.

Mahernia:
- Odorata.

Ailantus:
- Glandulosa.

NATURAL ORDER, ANACARDIACEÆ.

Rhus: Cotinus.

NATURAL ORDER, PITTOSPORACEÆ.

Pittosporum: Tobira varigata.

NATURAL ORDER, ACERACEÆ.

Acer:
- Rubrum.
- Saccharinum.
- Platanoides.

Negundo:
- Aceroides.

NATURAL ORDER, SAPINDACEÆ.

Æsculess:
- Hippocastanum.

Cardiospermum:
- Haliacabum.

NATURAL ORDER, CELASTRACEÆ.

Euonymus:
- Americanus.
- Japonica.

Euonymus—Japonica:
- Varigata aurea.
- Argentea.

NATURAL ORDER, VITACEÆ.

Ampelopsis: Quinquefolia.

NATURAL ORDER, LEGUMINOSÆ.

Mimosa:
- Rudica.

Acacia:
- Armater.

Gymnocladus:
- Canadensis.

Cercis:
- Canadensis.

Swainsonia:
- Galegifolia.

Clianthus:
- Dampierii.

Lathyrus:
- Adoratus.
- Latyfolius.

Wistaria:
- Frutescens.

NATURAL ORDER, ROSACEÆ.

Amygdolus:
- Pumila.

Cydonia:
- Japonica.

Rosa:
- Getigera.
- Multiflora.
- Rubiginosa.
- Indica.
- Eglanteria.

Rubus:
- Alba-grandiflora-plenum.

Fragaria:
- Chinensis.

Spireaia:
- Hypericifolia.
- Ulmaria.
- Lobata.
- Prunifolia.

NATURAL ORDER, LYTHRACEÆ.

Lagerstrœmia:
- Indica.

Cuphia:
- Platzcentria.

NATURAL ORDER, POLYGONACEÆ.

Coccoloba: Indica.

NATURAL ORDER, ACANTHACEÆ.

Justicea:
- Nerosa.
- Carnosa.

Justicea:
- Pendiculata.

NATURAL ORDER, RUBIACEÆ.

Bouvardia:
Aurantacæ.
Hogarth.

Bouvardia:
Liantha.

NATURAL ORDER, MYRTACEÆ.

Myrtus:
Communis.
Romana.

Psidium:
Cattleianum.
Metrosideros:
Floribunda.

NATURAL ORDER, LILIACEÆ.

Tulipa:
Gesneriana.
Fritillaria:
Imperialis.
Dracæna:
Ferrea.
Confesta.
Terminalis.
Yucca:
Filamentosa.
Scilla:
Præcox.
Sibirica.
Convallaria:
Majalis.

Ayacinthus:
Orientalis.
Lachenalia:
Quadricolor.
Lilium:
Candidæm.
Lancifolium Album.
Rubrum.
Roseum.
Auratum.
Trigrinum.
Atrosanguineum.
Martagon.
Venustum.
Tritorna:
Uvaria.

"D."

Forest Record and Cost, so far—February 29, 1872.

Name of trees.	No. acrs	No. of trees.	Age of trees when plant'd.	Cost of trees.	Cost of planti'g	Cost of culti-vation.	Dis-tance plat'd	Per cent. living	Av. gro'th in feet and inch's	Total cost—so far.
Ash, Green	¼	1,360	3 ys.	$27 20	$6 95	$6 19½	2x4	.98	.6	$40 34½
Ash, White	2¾	14,974	2	149 74	35 63½	4 79	2x4	.95	.6	190 16½
Catalpa	¼	1,361	2	21 77	4 17½	2 53	2x4	100	1	28 47½
Chestnuts	¼	1,361	2	30 00	6 79½	3 95	2x4	.50	.6	40 74½
Elm, White	⅛	860	2	4 76	3 95	3 43	2x4	100	1	12 14
Larch, European	2	10,890	1	98 01	21 20½	8 50	2x4	.25	.6	127 71½
Maple, White	⅛	680	3	8 16	6 17½	3 89	2x4	.98	1	18 22½
Osage Orange	¼	1,361	2	5 44	4 78	1 30	2x4	.98	2	11 52
Pine, Austrian	¼	680	9 to 12 in	30 00	4 40	2 94	4x4	.2	.....	37 34
Pine, Scotch	¼	680	1 to 2 ft.	30 00	4 25	3 04	4x4	.2	.....	37 29
Walnuts, White	¼	1,361	2 ys.	20 40	3 43½	85	2x4	.99	.6	24 98½
Willow, White	¼	1,361	1	8 00	4 67	1 42	2x4	.98	2	14 09
Totals	7	36,749		$433 48	$106 72	$42 83½				583 03½

All the above trees looked fine the first part of the season, but the after part the White Grub (the larvæ of the May Beetle,) almost destroyed some of the varieties. They worked mostly on the European Lark and White Ash; in some instances girdling the roots entirely,

from one and a half inches below the surface, several inches down; and owing to the season being so dry, they could not repair the injury. White Ash two feet high were girdled in the same manner. In the case of the Austrian and Scotch Pines, we attribute it mostly to the dryness of the season in losing so many. The Scoth Pine were never transplanted before, which we think was one cause of so many dying. Chestnuts were injured somewhat by the grub.

"E."

The Experimental Apple Orchard.

The Experimental Apple Orchard was planted to corn, and kept well cultivated. The trees made an average growth of two and a half feet. The following varieties bore a few apples: Seedling of the Red Siberian Crab; very fine specimen, as large as the Transcendant; very dark red flush, in the sun; good to eat from the hand. This tree bore a few apples last year. Cooper's Early White bore two apples; Rambo, one; both proving true to name.

Insects were not quite so numerous in the orchards as last year. We had a few of the Tent and Datana Ministra Caterpillars. The Hammond leaf-tier was not so numerous as last season.

We planted, in orchard, 42 varieties of apple trees—two of each variety, received from Hon. W. C. Flagg, Alton, Illinois, as a donation.

We planted every tenth row througd the orchard, north and south, with Norway Spruce fifteen to eighteen inches, two feet apart, designing to thin out eight feet when necessary.

VARIETIES OF APPLES IN EXPERIMENTAL ORCHARD.

No.	Name.	Origin.	Season.
1	Aberdeen		
2	Abraham	Pennsylvania	
3	Adams	Pennsylvania	
4	Aisles	Pennsylvania	
5	Alabama Pippin	Pennsylvania	
6	Alleis	North Carolina	October and November
7	Alleis, Sweet	Massachusetts	
8	Alleghany Spot	Maryland	
9	Alleghany, Nickajack		
10	Alexander		October and December
11	Alluae	North Carolina	January and April
12	Alphian	Kentucky	
13	Amelia	Europe	January and February
14	American Beauty	Massachusetts	December and April
15	American Golden Pippin		November and February
16	American Maygold		November
17	American Nonpariel		August
18	American Pippin		Winter
19	American Summer Pearmain		
20	American Summer Pippin		
21	Amos Jackson	Pennsylvania	

Catalogue—Continued.

No.	Name.	Origin.	Season.
22	Anderson		
23	Andrew's Red		
24	Ananas Reinette		
25	Anjou Pippin		
26	Apple—resembling Nickajack		
27	Ashmore		October and November
28	Aucubifolia Crab		
29	Augusta Pippin		
30	Aunt Susan's Favorite	Missouri	August
31	Austin Pippin		
32	Autumn Bough		August and October
33	Autumn Sweet Bough		
34	Averill Bough		February and June
35	Baccalinus	Missouri	March
36	Baccatus Crab		
37	Baker	Connecticut	October and February
38	Balm	Vermont	October
39	Balsburg		
40	Bailey's Sweet, of Ind		November and March
41	Baltimore		December and April
42	Battlefield	North Carolina	
43	Bard		
44	Barrett	Connecticut	January and March
45	Bastard Janet		
46	Beachenwell	England	December and March
47	Beauty of Kent		October and March
48	Beauty of West		November and February
49	Belle, Southern		
50	Bell et Bonne	Connecticut	March
51	Belle des Jardus	France	November and January
52	Benjamite		
53	Benoni	Massachusetts	August
54	Bentley's Sweet	Virginia	
55	Bergner	Missouri	February and April
56	Berry		
57	Best		
58	Best Pool	England	November and March
59	Betsy		November and January
60	Betsy's Fancy		December and March
61	Betsy's Favorite		
62	Bevau's Favorite	New Jersey	
63	Beverly		
64	Bidit	France	December and February
65	Black Apple (Preble)		November and February
66	Black Apple (Teas)		
67	Blackburn	Kentucky	September and November
68	Black Coal		November and February
69	Black Detroit		September
70	Black Crab		
71	Black Gilliflower		November and February
72	Black Hawk		
73	Black Jack	Ohio	January and February
74	Black Warrior	Alabama	November and December
75	Black Annette		November and December
76	Blakesly Seek-no-further		
77	Blanche Precoce	France	June and August
78	Bledsoe	Kentucky	September and April
79	Bledsoe Pippin	Kentucky	December and April
80	Blinkbonny	Canada	September
81	Blockley	Pennsylvania	November and January
82	Blondin	Indiana	October and November
83	Blood Red Crab		
84	Blooming Orange	Pennsylvania	November and December
85	Blue Mountain		November and February
86	Bluff Pearmain	Indiana	
87	Boss	Pennsylvania	January and March
88	Bruner	North Carolina	November and December
89	Bruner, or Green Winter Sweet, of Ky		
90	Boran's Winter	Delaware	
91	Borsdorfor		November and January
92	Bough		July and August
93	Bouler's Favorite		
94	Brabant Belleflower	Holland	October and January
95	Brandywine	Delaware	January and February
96	Brenneman	Pennsylvania	August and September
97	Brewer	Mississippi	October and November

Catalogue—Continued.

No.	Name.	Origin.	Season.
98	Bristol	Connecticut.	January and March
99	Brittle Sweet		October and November
100	Brooks' Pippin	Virginia	November and March
101	Brown	Pennsylvania	October and November
102	Brown's Superior	Ohio	
103	Brown's Sweet	Indiana	
104	Bruce's Summer		
105	Bucks County Pippin	Pennsylvania	November and March
106	Buckram	Long Island	August
107	Buckingham	Virginia	November and February
108	Buel's Favorite		November
109	Buff	North Carolina	December and January
110	Bull Head		
111	Bullock's Pippin		
112	Burchardt	France	
113	Burley's Sweet		
114	Burman's Sweet		
115	Burrough's Greening	New York	January and February
116	Burr's Winter Sweet	Massachusetts	November and March
117	Bush	Pennsylvania	September
118	Bushwhacker	New Jersey	February and May
119	Butter, Ind	Indiana	
120	Byers		
121	Cabbage Head	New Jersey	December
122	Cabin		
123	Cable's Gilliflower		
124	Cache	Illinois	November
125	Camack's Sweet	North Carolina	February
126	Campbleite		
127	Campfield		April and May
128	Canada		
129	Canada Reinette		December and April
130	Cam		
131	Cannon Pearmain		December and March
132	Captain		December and March
133	Cardinal Red		January and February
134	Carolina Red	North Carolina	
135	Carolina Red Streak		
136	Caroline of W. J		December and March
137	Carpenter		January and March
138	Carpenter's Winter		
139	Carter of Ala	Alabama	November and March
140	Carter of Pa		
141	Carter of Miss		
142	Carver of N. Y		
143	Cathead		October and November
144	Cathead of Pa		
145	Cathead of Jones		Fall
146	Cedar Falls	North Carolina	November and February
147	Celestia	Ohio	September
148	Challenge	Ohio	October and June
149	Champagne	France	November
150	Chancelor of Oxford		
151	Chenango Strawberry	New York	September and October
152	Chester Red Streak	Pennsylvania	November and December
153	Chester, Spitzenberg	Pennsylvania	February and April
154	Cherokee Red		
155	Cheston		November and March
156	Cheoor (?)	North Carolina	
157	Chronical	Indiana	
158	Cider (not Smith's)	Wisconsin	Fall
159	Clapington		September
160	Clarke	New York	October and November
161	Clarkson	Michigan	
162	Clarke's Pearmain	North Carolina	December
163	Claude Provens	France	March and April
164	Cloth of Gold	Europe	Fall
165	Cloud, S. C		
166	Coe's Golden Drop		November and February
167	Coeur de Bouf	France	November and January
168	Cogswell	Connecticut	December and March
169	Cole's Quince	Maine	
170	Columbus Red		
171	Columbia		
172	Compte d'Orloff	Russia	
173	Compton		
174	Congress	Massachusetts	November and December
175	Conic June		

Catalogue—Continued.

No.	Names.	Origin.	Season.
177	Connecticut Red Sides		
178	Cook's Greening		
179	Cook's Red		
180	Coon's Red	Indiana	
181	Cooper		
182	Cooper's Early White	Illinois	September and October
183	Cooper's Russet	New Jersey	October and December
184	Cornell's Fancy	Pennsylvania	
185	Corse's Favorite	Canada	September
186	Country Sweet		
187	Cox's Orange Pippin		
188	Cranberry Pippin	New York	November and February
189	Crain's Spice	Illinois	
190	Crawford's Keeper	Ohio	January and March
191	Crimson Pippin		
192	Creek	Pennsylvania	December and March
193	Crooked Red		
194	Crooked Red, S. C		
195	Crow's Egg	Kentucky	October and November
196	Crow's Nest	Ohio	November and January
197	Cullasago	North Carolina	November and March
198	Cullasago, so called		
199	Cullawhee		December and March
200	Cumberland Seedling	Pennsylvania	October and December
201	Curtis' Sweet	Vermont	August and October
202	Curry's Striped Winter	North Carolina	January
203	Cushman's Black		November and February
204	Custard	New York	November and December
205	Daddy	Delaware	August and September
206	Dalongea		
207	Dana Greening		December and March
208	Dartsmouth Sweet	Massachusetts	October
209	Davis of Michigan	Michigan	April and May
210	Davis' White Belleflower		November and February
211	De Boutinge		November and March
212	De Gruchy	South	
213	Delasure		
214	Delight	Ohio	December and March
215	Des Feumes		November and December
216	Deterding's Early		
217	Dickskill		November and December
218	Dr. Fulcher	Kentucky	December and January
219	Dr. Whitset's Winter	Indiana	
220	Dodd Apple		
221	Dodd's Favorite		
222	Dominie		
223	Donahue's Late Blossom		
224	Doucklaer		
225	Dox d'Argent	France	December and January
226	Downing's Favorite		
227	Dpicen Sweet		
228	Drop d'Or		
229	Drumore		
230	Dubriel		
231	Ducket	South	
232	Dumelow of Wis		
233	Dumelow's Seedling		November and March
234	Dunlap Sweet		
235	Durable Keeper	Indiana	
236	Dutch Mignonne	Holland	February and May
237	Duchess of Oldenburg	Russia	September
238	Early Belleflower		
239	Early Joe	New York	August and September
240	Early Harvest		
241	Early Pennock		August and September
242	Early Rambo		
243	Early Red		
244	Early Ripe		
245	Early Strawberry	New York	
246	Easter Pippin		
247	Eggmont Calville		
248	Ellwell's Late		March
249	Emperor		
250	English Crab		January
251	English Golden Pippin		
252	English King		
253	English Red Streak		
254	English Russet of Western N. Y		
255	English Russet of England		

Catalogue—Continued.

No.	Names.	Origin.	Season.
256	Eptings' Premium		
257	Epting's Red		
258	Equinettee	Georgia	
259	Ernst Pippin		
260	Evening Party	Pennsylvania	December and January
261	Ewalt	Pennsylvania	November and March
262	Excel	Connecticut	December and February
263	Exquisite		September and October
264	Fallawater		November and February
265	Fall Beauty		
266	Fall Cheese		October and November
267	Fall Harvey	Massachusetts	October and November
268	Fall Orange	Massachusetts	October and November
269	Fall Pearmain	Connecticut	September and October
270	Fall Stripe		
271	Fall Wine		September and November
272	Fameuse		October and November
273	Fancy June		
274	Farley's Red	Kentucky	January and April
275	Father Abraham	Virginia	Spring
276	Favorite	Kentucky	November and January
277	Fay's Russet	Vermont	April and June
277½	Federal Late Keeper	New York	
278	Fenouillet de la Chine	France	
279	Ferris of Delaware		March and April
280	Fine Juicy Red, like Jeffries		
281	Fine Early		
282	Fink	Ohio	
283	Firm Walter		
284	Fisher's Fall Seedling	New Hampshire	October and November
285	Fleiner		October and November
286	Flora		August
287	Flower of Kent		October and January
288	For a Name		
289	For a Name		
290	For a Name		
291	Foster's Sweet		
292	Fourth of July	Ohio	
293	Foxly Crab		
294	Franklin		
295	Franklin's June		
296	French Apple		
297	From J. B. Proctor, Vt		
298	Fulton	Illinois	
299	Fulton's Summer		
300	Fulton Strawberry		September
301	Garden Royal	Massachusetts	August and September
302	Gardner's Swaar		
303	Gelbe Gestrust		
304	Genesee Chief		September
305	Geneva Pippin		
306	Gentler's Large Red		November
307	Germanite	Ohio	December and March
308	Gestreifter Sommer Zummet Apfel		August and September
309	Gerviss Good	Pennsylvania	December and February
310	Gilpin	Virginia	February and May
311	Gold Apple		
312	Golden Apple		
313	Golden Ball, of Maine	Connecticut	March
314	Golden Ball, of New York		
315	Golden Ball of Preble		
316	Golden Ball, of Downer		
317	Golden Pearmain		November
318	Golden Pippin (Carpenter)		
319	Golden Pippin (Corse & Son		
320	Golden Russet		
321	Golden Russet, of Mass		January and April
322	Golden Seedling	Missouri	February and May
323	Golden Sweet of Lawver		
324	Golden Sweet of Tenn		August and September
325	Golden Winter		
226	Gorden's Seedling	North Carolina	
327	Goudie of Ala		
328	Grab	Virginia	
329	Grafton Sweet		
330	Granny Spice		
331	Grantham		
332	Grantham (Evans)	Georgia	November and April
333	Gravenstein		September and October

Catalogue—Continued.

No.	Names.	Origin.	Season.
334	Great Keeper		
335	Green Belleflower		
336	Green's Choice	Pennsylvania	August and September
337	Green Crank	North Carolina	November and March
338	Green Limber Twig	South Carolina	
339	Green Mountain Russet		
340	Green Pippin	Virginia	Winter
341	Green of Va		Longkeeper
342	Green Winter Sweet		
343	Green Sweet	Pennsylvania	December and March
344	Greist's Fine Winter	Pennsylvania	December and February
345	Grey Apple		
346	Grey House		
347	Grey Vandevere	Indiana	December and April
348	Grimes' Golden	Virginia	March
349	Gross		December
350	Grosse Pigeonette		
351	Grosse Verte (E. B.)	France	Winter
352	Grosse Verte (Leroy)		
353	Gully	North Carolina	
354	Gully, true	Pennsylvania	August
355	Hague	Indiana	December and February
356	Hall	North Carolina	December and April
357	Hallock's Favorite		
358	Hancock	Pennsylvania	December and March
359	Hard Red		
360	Harris	North Carolina	September and November
361	Harrison	New Jersey	November
362	Hart's Pippin		
363	Harvest Red Streak		August and September
364	Hare Apple	Pennsylvania	
365	Hawthornden		
366	Hawley	New York	September
367	Hector	Pennsylvania	November and March
368	Heister	Pennsylvania	
369	Helper		
370	Hempstead		November and January
371	Henwood	Indiana	January and April
372	Henwood's Belleflower, No. 1	Indiana	
373	Henwood's Belleflower, No. 2	Indiana	
374	Herman of Pa	Pennsylvania	November and February
375	Herman of Mo	Missouri	December and May
376	Herr's Winter		
377	Hess	Pennsylvania	December and February
378	Hicks	Long Island	August
379	Higby's Sweet, of Cleveland	Ohio	November and January
380	Higby's Sweet (Davis)		
381	Higby's Sweet (Matteson)	New York	
382	Hightop Winter	Indiana	
383	Hightop Winter Sweet		
384	Hill's Favorite	Massachusetts	September
385	Hill's Long Stem		
386	Hinckley's Sweet		
387	Hislop Crab		
388	Hobb's Late Sweet	Pennsylvania	November
389	Hobb's Late Winter		
390	Hocking	Pennsylvania	August and September
391	Hocket's Sweet	North Carolina	December and March
392	Holdfast		
393	Holland Pippin		
394	Holland's Red Winter	Kentucky	
395	Hollis' Red		March
396	Holly	Georgia	November and March
397	Hominy		August and September
398	Honey Greening		November and February
399	Hooker	Connecticut	November and February
400	Hoops		
401	Hoops' New Pearmain		
402	Hoosier Red	Indiana	
403	Hoover	South Carolina	November and February
404	Hoover's June		
405	Hopkins' Red	Virginia	
406	Horn		December and March
407	Horse Apple		
408	House Apple		
409	Housom's Red	Pennsylvania	December and February
410	Howe's Russet		
411	Hubardston		
412	Hubardston's Nonesuch	Massachusetts	November and March

Catalogue—Continued.

No.	Names.	Origin.	Season.
413	Hughes' Virginia Crab		
414	Hulse's Sweet		
415	Hunge		September and October
416	Hurlburt	Connecticut	October and December
417	Hyatt's Wonderful	North Carolina	
418	Illinois Red		January and April
419	Imperial Gestriester		
420	Imperial Magnifique		October and November
421	Imperial Pearmain		
422	Indian	Pennsylvania	November and April
423	Indiana Winter		
424	Ingraham's Winter	North Carolina	January
425	Iola		
426	Irish Peach		August
427	Isle of Wight Pippin		January and February
428	Jacob Apple		
429	James Coal		
430	James River		
431	Jane	Pennsylvania	December and March
432	Janet of Muir		
433	Jarmine Ballard	Indiana	
434	Jarmonete	Ohio	December and March
435	Jersey Black		
436	Jersey Sweet		August
437	Jewett's Best	New York	December and February
438	Jewett's Fine Red	New Hampshire	November and February
439	John Stuart's Red		November and May
440	Johnson of Massac Co	Illinois	December and March
441	Johnson of Pa		
442	Johnson of Sharp		
443	Johnson of Va		
444	Johnson's Fine Winter	Pennsylvania	November and February
445	Jonathan of Buler		
446	Jonathan (black bark)		
447	Jonathan (red bark)		
448	Jones' Early Harvest		
449	Jones' Sweet		
450	Josephine	France	
451	Julian		July and August
452	Junaluskee	North Carolina	November and March
453	June Apple		
454	Keddleston Pippin		October and June
455	Keim	Pennsylvania	December and March
456	Kelsey	Pennsylvania	March
457	Kennedy Red	Pennsylvania	December and February
458	Kennedy Red	Georgia	November
459	Kentucky Cream	Kentucky	December and March
460	Kentucky King	Kentucky	December and February
461	Kentucky Long Keeper		
462	Kentucky Long Stem		
463	Kentucky Queen		
464	Kentucky Red		
465	Kentish Fill Basket		October and January
466	Keswick Codlin		August
467	Kikita		November and December
468	King Apple		
469	King, S. C	South Carolina	
470	King of Pippins		October and November
471	King's Pocket	Maine	
472	King Tom	North Carolina	August
473	Kingsley	New York	November and February
474	Kirkbridge White		August and September
475	Kleiner Bohn		
476	Knowle's Early	Pennsylvania	August
477	Krauser	Pennsylvania	December and March
478	Krauser's Pippin	Pennsylvania	December and March
479	Kyle's Winter	Kentucky	
480	Lady Apple	France	
481	Ladies Blush	Georgia	October and November
482	Lady Crab		
483	Ladies Favorite		
484	Lady Fitz Patrick	Mississippi	
485	Lady's Sweet		
486	LaFayette of Mass		December and February
487	Lake	Ohio	September and October
488	Lalle		
489	Lancaster Co		
490	Lancaster Greening	Pennsylvania	December and May
491	Lancaster of Ind		

Catalogue—Continued.

No.	Names.	Origin.	Season.
492	Lancaster of Jones	Indiana	
493	Large Fine Red		
494	Large May	Georgia	June
495	Large Never Fail	Illinois	
496	Large Rambo		August and December
497	Large Yellow Bough		
498	Late Strawberry		October and December
499	Ledge Sweet	New Hampshire	December and March
500	Leicester Sweet	Massachusetts	
501	Liberty	Ohio	December and May
502	Limber Twig (of Ring)	Illinois	
503	Limber Twig (Mathias)	Illinois	
504	Lincoln		
505	Lindenveld	New York	September
506	Locust Grove		
507	London Pippin		November and February
508	London Sweet	Ohio	November and February
509	Long Island Russet	New Jersey	October and February
510	Long Stem	Connecticut	September and January
511	Long Stem of Jones		
512	Louries	North Carolina	January
513	Lyon's Pippin		
514	McKoy's Pippin	Pennsylvania	October and December
515	McDowel's Sweet	North Carolina	October and December
516	McLean's Favorite		November and February
517	McLean's Winter Pippin		
518	McLean	Connecticut	December and March
519	Magnolia	Massachusetts	December and January
520	Magnum Bonum		
521	Maiden Apple		
522	Maiden's Blush	New Jersey	Fall
523	Maiden's Bosom	Alabama	July and August
524	Major	Pennsylvania	November and April
525	Mammoth June	Kentucky	July and August
526	Mangum		October and Novembor
527	Mann	New York	
528	Manington		
529	Manington's Pearman	England	October and December
530	Mansfield Russet	Massachusetts	
531	March's Red Seedling	Ohio	November and January
532	Marietta Russet		
533	Marietta Seek-no-further		Spring
534	Marshall of Maine	New Hampshire	April and May
535	Marshall's Sweet	Ohio	November and December
536	Marshall's Red Winter	New Hampshire	December and March
537	Maryland Beauty		October and November
538	Maryland Red Streak		
539	Mary Mayer	Georgia	October
540	Massac Pippin	Illinois	January and March
541	Masters' Seedling of New York	New York	December and March
542	Mattock's Summer		August
543	Mattamusket	North Carolina	December and March
544	Mavorack's Sweet	South Carolina	November and February
545	May of Adair		
546	May Queen		
547	Mead's Keeper	Virginia	November and June
548	Melon	New York	November and March
549	Melt-in-the-Mouth	Pennsylvania	November and December
550	Merwin		December and March
551	Mexico	Connecticut	September and October
552	Michael Henry Pippin	Ohio	November and March
553	Middle	New York	December and February
554	Milam		December
555	Minister	Massachusetts	October and February
556	Mishler's Sweet	Pennsylvania	October
557	Mississippi Red		October and January
558	Missouri Keeper		October and January
559	Missouri Pearmain		
560	Missouri Superior		
561	Monarch		September and October
562	Monk's Favorite	Indiana	November and December
563	Montalivet	France	January and February
564	Moore's Sweeting of Indiana		October and December
565	Morey's Melon		
566	Motes' Red Seedling		
567	Mother	Massachusetts	November and February
568	Mountain Belle	Georgia	November and May
569	Moultrie's Winter	Alabama	
570	Mountain Pippin		

Catalogue—Continued.

No.	Name.	Origin.	Season.
571	Mountain Sprout	North Carolina	December
572	Mountain Sprout of Tennessee	Tennessee	
573	Munson's Sweet	Massachusetts	September and February
574	Murphy's Red		
575	Myer's Nonpareil	Ohio	
576	Nautahatee	Alabama	July and August
577	Naig's August		
578	Neasly Belleflower	Ohio	December and March
579	Needles		December and January
580	Ned or Taylor	Pennsylvania	December and February
581	Nelson's Victory		May and July
582	Neversink	Pennsylvania	May and March
583	Newark King	New Jersey	November and February
584	Newcomer	Virginia	
585	New Hampshire Sweet		
586	Newtown Pippin		
587	Nickajack (Johnson Co.)	Illinois	December and April
588	Nickajack (Berckman's)	North Carolina	
589	Nine Partners		
590	Nix's Large Redstreak		November and May
591	Norfolk Beaufin		January and May
592	N. C. Baldwin		
593	North Carolina Red		
594	Nottingham	Pennsylvania	
595	Nourell's Imperial		
596	No. 55 of Morrison	Ohio	
597	No. 106 of Morrison		
598	No. 108 of Morrison		
599	Nursery		December and February
600	Oblong Crab		
601	Oconee Greening	Georgia	October and November
602	Ohio Limbertwig		
603	Ohio Limbertwig, Massac Co		
604	Ohio Nonpareil	Ohio	October and November
605	Ohio Red Cheek		
606	Orange Pippin	Normandy	October and January
607	Orange Red, Johnson Co		
608	Ortley		November and March
609	Ornament de Table	France	
610	Osborne's Cheese	Georgia	November and February
611	Osborne's Pippin	Georgia	November and February
612	Osceola	Indiana	January and March
613	Oskaloosa		November
614	Ox Sweet	Massachusetts	October and November
615	Panden Sweet		November
616	Paradise Striv d'Hivor	France	January and February
617	Parker		
618	Park's Spice	New York	December and March
619	Partnership		
620	Parmenties Reinette	France	March and May
621	Parrot Reinette		
622	Pasche		
623	Passe Letters		
624	Paulet Russet		
625	Pawpaw	Michigan	December and January
626	Peach		December and April
627	Peach of Kentucky		
628	Peach Pound Sweet	New York	September and November
629	Peak's Red	South Carolina	December
630	Peak's Red Winter	South Carolina	December
631	Pearmain Rouge d'Hivor		
632	Pearmain Russet		
633	Peck's Pleasant	Rhode Island	November and March
634	Pedrick's Mulberry	Indiana	
635	Pekin of Indiana, (Jones)		
636	Pennock	Pennsylvania	
637	People's Choice	Pennsylvania	December and March
638	Pekin d'Or de Large	France	February and March
639	Perkins	North Carolina	October and December
640	Perkins Winter		December
641	Perpetulle	France	
642	Philadelphia Queen		July
643	Phillips' Sweet	Ohio	December and March
644	Pickard's Reserve	Indiana	December and January
645	Pickman	Massachusetts	January and April
646	Pifer	Pennsylvania	January and July
647	Pigeon Blanc		August and September
648	Pigeonette Jerusalem	France	
649	Pine Apple Russet		September and October
650	Pippin, of Mosely	Illinois	

Catalogue—Continued.

No.	Name.	Origin.	Season.
651	Pittsburg	Pennsylvania	November and April
652	Pioneer		
653	Platte a Groose Queen	France	March and April
654	Pleasant Valley Pippin		October and November
655	Poeschell's Sweet	Missouri	
656	Poland Winter		
657	Pomaria Greening	South Carolina	December
658	Pomme de Grisse d'Or		
659	Pomme de Letters	France	
660	Poplar Bluff		
661	Porter Apple	Massachusetts	September
662	Pound Georgia		
663	Pound's July	Kentucky	July and August
664	Pound Pippin of Massac Co		
665	Pound Pippin, N. J		
666	Pound Royal	France	December and April
667	Pound Royal, of Michigan		August and September
668	Pound Royal, of Ohio		
669	Pound Royal, of Kentucky		
670	President	Indiana	February and June
671	President Ewing	Kentucky	February and April
672	Price	South Carolina	February
673	Pride of Richmond		
674	Priestly	Pennsylvania	December and March
675	Priestly Russeting		
676	Primate		August and October
677	Princely	Pennsylvania	October and January
678	Princesse Noble		November
679	Prince's Yellow Winter		November and April
680	Princeton		
681	Prior's Red		January and March
682	Prior's Red	Indiana	
683	Prize Sweet		
684	Prother's Winter	North Carolina	
685	Pum Water Sweet		
686	Pylas Winter		
687	Queen	Georgia	November and April
688	Ragan's Red Sweet	Indiana	October and November
689	Rambo	Delaware	Fall
690	Rambour France	France	September
691	Ramdell's Red Sweet		October and February
692	Rare Ripe		
693	Rare Ripe, (Maning, Ga.)		
694	Rasche of Maine	Maine	December and March
695	Rawle's Janet	Virginia	January and March
696	Rebecca	Delaware	August and September
697	Red Ashmore		
698	Red Astrachan		July and August
699	Red Bonum		
700	Red Cathead	Virginia	October and November
701	Red Cedar		
702	Red Detroit	Canada	Autumn
703	Red Fall Pippin		January and March
704	Red and Green Sweet		August and September
705	Red Jewel of Kentucky	Kentucky	December and January
706	Red Junating		
707	Red Oats	Pennsylvania	
708	Red Limbertwig		
709	Red May	North Carolina	June
710	Red Neverfail		
711	Red Ox	Tennessee	
712	Red Pawpaw		
713	Red Pippin, of Maryland		
714	Red Rance		December and February
715	Red Robinson	Maryland	
716	Red Russet	New Hampshire	January and April
717	Red Seek-no-further	Pennsylvania	December and January
718	Red Seek-no-further, Teas	Illinois	
719	Red Siberian Crab		September and October
720	Red Simmons		
721	Red Streak		Winter
722	Red Stripe, of Pennsylvania		August
723	Red Sheep Nose		
724	Red Sweet-for-a-name	Ohio	November and February
725	Red Sweet Pippin		
726	Red Sweet Pippin, of Indiana		
727	Red Winter Sweet, of Kentucky	Virginia, Maryland	December and February
728	Red Warrior	North Carolina	November and March
729	Refuge	Tennessee	

Catalogue—Continued.

No.	Name.	Origin.	Season.
730	Reinette		
731	Reinette Danil		November and February
732	Reinette d'Bretange	France	December
733	Reinette d'Canterbury		
734	Reinette d'Cheine		December and March
735	Reinette France	France	
736	Reinette de Madere		
737	Reinette des Reinettes	France	
738	Reinette de Thorn		
739	Reinette Dolbear		November and December
740	Reinette Doree		
741	Reinette de Vignan		December and March
742	Reinette Ette Konig	Holland	
743	Reinette Grisse d'Anjou		
744	Reinette Grisse Francaise		
745	Reinette Suisse		May and June
746	Reinette Ouze		December and March
747	Reinette Pepin	France	January and April
748	Relish		
749	Resembling Buckingham		
750	Ribston Pippin	England	November and March
751	Richmond	Ohio	October and February
752	Richmond of New York		
753	Richmond Sweet	Ohio	
754	Rich Spicy Longkeeper		
755	Ridge Pippin		March and April
756	Rijiner		
757	Riviere	France	
758	Roadstown Pippin	New Jersey	April and September
59	Robertson's Pearmain		
760	Robinson's Superb	Virginia	September and October
761	Robey's Limbertwig		
762	Robey's Seedling	Virginia	November
763	Rock	New Hampshire	September and October
764	Rock Pippin	Ohio	
765	Rock Sweet of Maine	Massachusetts	September
766	Rosea		
767	Roxbury Russet	Massachusetts	January and June
768	Royal Limbertwig	North Carolina	
769	Royal Pippin		
770	Russet Cider		
771	Russet Greening		
772	Russeting		
773	Rusty Coat		
774	Salem	Massachusetts	October and December
775	Sallie's Sweet		
776	Santouchee	North Carolina	November and February
777	Savannah Crab	Georgia	
778	Scarlet Golden Pippin		
779	Scarlet Pearmain		August and October
780	Scarlet Sweet		October and February
781	Schull		
782	Schroder's Black		
783	Schreen		October and December
784	Schribner's Spitzenburg		
785	Sear's Spice		
786	Sedgwick	Indiana	
787	Seedling of a large Red Apple		
788	Seedling of Northern of Spy		
789	Seedling of Johnson Co		
790	Seedling of Union Co		
791	Seedling Russet		
792	Seedling Siberian Crab	Illinois	September
793	Seek-no-further, of Pennsylvania	Pennsylvania	
794	Selma	Ohio	November and December
795	September	Pennsylvania	October
796	Shaker		
797	Shaker Greening	New Hampshire	November
798	Shannon	Ohio	November and January
799	Sharp Apple		
800	Sharp's Sweet		November and March
801	Sharp's Winter	North Carolina	
802	Sheepnose of Virginia		
803	Sheepnose		
804	Shippard's Sweet	Connecticut	October and November
805	Sheanasse Beauty	Michigan	October and January
806	Shiloh Pippin	Illinois	
807	Shipley Greening	Virginia	
808	Shipley Winter		

Catalogue—Continued.

No.	Name.	Origin.	Season.
809	Shipper's Russet	Pennsylvania	November and February
810	Shockley	Georgia	April and May
811	Sigler's Pound	France	January and March
812	Simmons' Winter	North Carolina	
813	Sine-qua-non	Long Island	August
814	Sink	Pennsylvania	September
815	Sloan's Seedling	Alabama	November and January
816	Small Red		
817	Small Red (Ring)	Illinois	
818	Small Red (Purdy)		
819	Smith's Cider	Pennsylvania	December and March
820	Snooky Twig		
821	Snedeker		December and February
822	Somerset	Maine	August and September
823	Sops of Wine		August and September
824	Southern Greening	South Carolina	November and March
825	Southern Pearmain		
826	Southean Pennock		
827	Southern Winter		
828	Southern Winter King		
829	Southern Queen		
830	Spafford Russet	Ohio	December and February
831	Sparhawk		
832	Spark's Late		
833	Spice Pippin		
834	Spice Russet		December and March
835	Spitzenburg	Long Island	October and February
836	Spreading Bough		
837	Springhill Spitzenburg	New York	
838	Springport Pippin		December and March
839	Sprouts from roots of Golden Sweet		
840	Spring Swaar	Illinois	
841	Stansill	North Carolina	January
842	Strawn's Seedling	Virginia	December and April
843	Stevenson's Winter	Michigan	January and April
844	Strawberry		
845	Streaked Pippin	Long Island	January
846	Stermer Pippin		January and May
847	Styx of Coxe		
848	Sudbury Sweet		
849	Sugar Loaf Pippin		July
850	Summer Belleflower	New York	August and September
851	Summer Janet		September
852	Summerour		
853	Summer Queen		August and September
854	Summer Rambo		September and October
855	Summer Rose		August
856	Summer Sweet Paradise	Pennsylvania	August
	Superior Early		
857	Superb	New York	November and December
858	Surprise		November and January
859	Susan's Spice	Pennsylvania	October
860	Sutton	Connecticut	
861	Swasey	Ohio	January
862	Sweet Beile et Bonne		October and December
863	Sweet Belleflower	Pennsylvania	October and November
864	Sweet Belleflower		Winter
865	Sweet Bough		July
866	Sweet Crab		
867	Sweet Doctor	Pennsylvania	November
868	Sweet Janet	Indiana	December and January
869	Sweet June	Massachusetts	August
870	Sweet King	Long Island	October and March
871	Sweet Meat		
872	Taunton	Alabama	September and October
873	Taylor's Harvest		
874	Terral's Late		October and November
875	Tetofsky	Russia	August
876	Tewbner's Cider		
877	Texan Red		
878	Thornbury		
879	Tillaqua	North Carolina	November and March
880	Titmouth Sweet		November and February
881	Trader's Red		
882	Trader's Fancy	Pennsylvania	January and May
883	Transparent de Rouen Crab		
284	Triumphant		August
885	Tufts	Massachusetts	September and October
886	Tulpehocken		
887	Turner's Greening		

Catalogue—Continued.

No.	Name.	Origin.	Season.
888	Turner's Seedling		
889	Turn of Lane	New Jersey	
890	Tuscaloosa	Alabama	October and February
891	Uchella		
892	Ulloa		
893	Uncle John	Pennsylvania	November and December
894	Union	Iowa	January
895	Union Crab	Illinois	
896	Unique	France	November and December
897	Unknown Crab		
898	Ulters	Wisconsin	
899	Vaughn's Winter	Kentucky	January and March
900	Vermont Beauty		
901	Vermont Pippin		
902	Vestal	Virginia	
903	Very Fine and Very Early		
904	Victuals		
905	Victuals and Drink		October and January
906	Virginia Cathead		
907	Virginia Greening		
908	Virginia July		
909	Virginia Red Pippin		
910	Virginia Red Streak		
911	Wagener	New York	November and February
912	Walkup Seedling	Ohio	
913	Wall		
914	Walpole	Massachusetts	August and September
915	Waltham Abbey		October and January
916	Ward's Late Seek-no-further		
917	Warfield	Iowa	September and October
918	Washington		
919	Washington Strawberry	New York	September and October
920	Washington Sweet	Massachusetts	October and November
921	Wautaugah		
922	Water	Pennsylvania	October and November
923	Waugh's Crab	Virginia	February and April
924	Wax Apple		December and February
925	Webb's Winter	Massachusetts	December and February
926	Weidner's Golden Reinette		
927	Weilburgen		
928	Welford's Yellow	Virginia	June
929	Well	New Jersey	
930	Wells of Ohio		
931	Western Beauty		
932	Western Spy	Ohio	October and June
933	West's Spitzenburg	Pennsylvania	December and April
934	Wetherill's White Sweet	New Jersey	Fall
935	White Pearmain		
936	White Rawle's Janet		
937	White Robinson		
938	White Spanish Reinette		
939	White Sweet	New Jersey	September and October
940	White Winter Pippin		
941	White's Long-keeper		
942	White's Winter	Pennsylvania	January and May
943	White's Zurdel		
944	Wiley's Greening	Illinois	
945	Wiley's Sweet		Fall
946	Wilfong	North Carolina	December and March
947	William's Prince		
948	Wille's Sweet	Long Island	August and September
949	Willow Leaf	Ohio	February and June
950	Willow		
951	Wilson's Large Red		
952	Wilson's Sweet		
953	Wilson's Summer	North Carolina	August and September
954	Wine Apple		
955	Wine of Kansas		
956	Winesap		
957	Winslow	Virginia	
958	Winter Buff		
959	Winter Beauty		
960	Winter Blush		
961	Winter Cheese		
962	Winter Green		
963	Winter Harvey		January and March
964	Winter King		
965	Winter Peach		
966	Winter Red		

Catalogue—Continued.

No.	Name.	Origin.	Season.
967	Winter Red (Hussman)		
968	Winter Redstreak		December and March
969	Winter Strawberry		December and January
970	Winter Spice	North Carolina	
971	Winter Sweet Bough		
972	Winter Sweet (Downer)		
973	Winthrop Greening	Maine	September
974	Winthrop Pearmain	Maine	September and January
975	Wood		
976	Wood's Sweet	Vermont	September and November
977	Wood's Winter		
978	Woodland		
979	World's Wonder		
980	Wonder		
981	Wright's Janet		January and June
982	Yacht	Pennsylvania	November and January
983	Yahoola	Georgia	September and January
984	Yates	Georgia	March and May
985	Yellow Crab		
986	Yellow Belleflower	New Jersey	
987	Yellow Bough		
988	Yellow June		June and July
989	Yellow May		
990	Yellow Newtown Pippin		February and May
991	Yellow Siberian Crab		
992	York's Imperial	Pennsylvania	November and February
993	Zawsen Von Welter		

It was moved and carried that the Finance Committee be filled up temporarily, until absent members may arrive. The following gentlemen were so appointed: Judge A. M. Brown, to serve as Chairman; Messrs. Pearson, Wright, and Brown, of Sangamon.

It was resolved that the Board take a recess at 3 o'clock P. M., to-morrow, to witness the drill of the University Battalion.

On motion, a recess was taken, to reassemble at 7:30 P. M.

EVENING SESSION.

The Board reassembled at the appointed time.

After considerable discussion on the State and the appropriation prospectus of the new University building, the Board adjourned for the work of committees, to meet again at 9:30 A. M., to-morrow.

SECOND DAY'S SESSION.

The Board met at 9:30 A. M., agreeable to adjournment.

Scriptures were read and prayer offered by Dr. J. M. Gregory.

Present—Messrs. Blackburn, Brown of Pulaski, Brown of Sangamon, Bateman, Cunningham, Goltra, Hayes, Harrington, Lawrence, Mahan,

McMurray, Pearson, Rickard, Pickrell, Pullen, Scott, Scroggs, Slade, Van Osdel, Wright, and the Regent—21.

Absent—Messrs. Anderson, Brown, Brayman, Cobb, Edwards, Galusha, Greenleaf, Griggs, Wagner, and the Governor—10.

The Treasurer, J. W. Bunn, Esq., then read the following report, which was accepted and referred to the Auditing Committee, together with the unaudited bills.

THE ILLINOIS INDUSTRIAL UNIVERSITY.

IN ACCOUNT WITH JOHN W. BUNN, TREASURER.

1872. March 1....	To board expense	$1,169 35	
" 1....	" salaries	23,473 58	
" 1....	" Agricultural Department	6,716 30	
" 1....	" Horticultural Department	6,854 86	
" 1....	" insurance	460 50	
" 1....	" taxes on lands	2,461 70	
" 1....	" building repairs	2,654 63	
" 1....	" fuel and lights	2,190 93	
" 1....	" printing, advertising and stationery	1,477 56	
" 1....	" incidental expenses	1,231 41	
" 1....	" library and cabinet	7,029 96	
" 1....	" safe	142 50	
" 1....	" Military Department	256 47	
" 1....	" Mechanical Department	4,487 99	
" 1....	" Chemical Department	3,077 60	
" 1....	" carpenter's account	1,725 70	
" 1....	" experiments and lectures	2,417 66	
" 1....	" unpaid bills—1870 and 1871	731 43	
			$68,560 13
" 1....	To balance		8,494 60
			$77,054 73
1871. March 1....	By balance from last report		$6,125 38
1872. March 1....	" am't received for interest on bonds	26,894 00	
" 1....	" " " on account 160 acres Griggs' farm sold	1,000 00	
" 1....	By am't received on account interest Griggs' farm	688 00	
" 1....	" " " " farm account	7,019 88	
" 1....	" " " " rent	1,423 59	
" 1....	" " " " Horticultural Department	1,338 52	
" 1....	" " " " Mechanical Department	1,763 07	
" 1....	" " " " carpentry	1,072 48	
" 1....	" " " " fees	5,043 50	
" 1....	" " " " fuel	689 74	
" 1....	" " " " advertisement in University paper, etc.	542 85	
" 1....	By am't received on account library	154 31	
" 1....	" " " " insurance	59 29	
" 1....	" " " " sundry items	24 39	
" 1....	" " for advances to State appropriation	96 85	
" 1....	By am't received for broom corn	76 48	
" 1....	" " " " Illinois Central Railroad Co. freight	10,541 40	
" 1....	By am't received on account State appropriations		58,429 35
" 1....			
" 1....	For Agricultural Department	3,000 00	
" 1....	" Horticultural "	1,750 00	
" 1....	" Chemical "	2,750 00	
" 1....	" apparatus and books	5,000 00	
			12,500 00
			$77,054 73

URBANA, *March* 13, 1872. JOHN W. BUNN.

A Committee on Nominations, of five, were appointed, consisting of Messrs. Lawrence, Slade, Mahan, Blackburn, and McMurray.

They asked and received leave for retiring.

The Corresponding Secretary then read a report on "Experiments, etc.," which was adopted, and referred to the Committee on Agriculture.

REPORT UPON EXPERIMENTS—1871.

The ground assigned for the purpose of agricultural experimentation, comprises an aggregate of a little over 95 acres, situated east of the road running from the new University building to the farm house on the Horticultural Farm. The tract measures 141 rods east and west, by 108 rods north and south. A road runs through the center east and west, dividing it into equal or nearly equal parts. The barn and other out-buildings of the Horticultural Department, occupy the northwest corner of the south half, and about 29 acres of the south end were appropriated to timber plantations. These, with roads and hedge rows, diminished the amount of land to be used for field experiments, to about 60 acres, in the midst of which lay from eight to ten acres of wet, undrainable land quite unfit for experimental purposes.

Before I was placed in charge, the plots running across the west end of the grounds were staked off 2x4 rods into 1-20th of an acre plots, and the 36 plots on the south end, sown at my suggestion, with grass and grain seeds, viz: Timothy, Redtop Orchard and Curled Dog Tail grasses, Lucerne, Alsike, Dutch, Mammoth and common Red Clover, Brewer's Delight, Barley, Surprise, Somerset, Black Swedish, White Schonen, Excelsior and Norway oats, and White and Red Australian Wheat—all sown April 12, 1871; but owing probably to the unremitting drought, all failed to produce any crop worth the saving, and the ground was plowed up for a fall sowing; but owing to the exigencies of the Horticultural Department, was turned over for its uses.

The 72 whole and 6 half plots lying on the north-west corner, were used as

EXPERIMENTAL CORN PLOTS.

(Comparative productiveness of adjacent plots.)

The ground on which this experiment was tried, lies immediately east of the road leading from the new University building through the Horticultural Department southward in the angle formed by the road running east and west past the farm buildings on the horticultural grounds. Its topography, which is not much varied, is shown on the map. It was in naked fallow in 1869, and in wheat and oats in 1870, and plowed in the fall of that year. It was staked into 1-20th acre plots in the spring of 1871, and plowed in lands north and south, throwing the ridges against the stakes and leaving the dead furrows in the middle between, on the 29th and 30th April, 1871, to the depth of 8 to 9 inches, with a width of cut of little over 13 inches. Results went to show that a better yield would have been had without the spring plowing, as a field of corn across the road planted on ground only fall-plowed, gave a better yield. The ground was laid off with a marker, so as to give 4 rows of corn to the rod each way on each plat, or 128 hills. It was planted May 3d, by hand, with "one hundred day Yellow Dent corn," donated by B. F. Johnson, Esq., of Champaign; cultivated June 4, thinned June 7, and cultivated again June 9, 19, 27, and July 6.

Although the cultivation was clean and the condition of the ground apparently the best, the crop was nearly a failure, resulting probably from drought in the first place and the attendant chinch bugs in the second. The drought, I am inclined to believe, would have been less injurious in its effects if the ground, after plowing, had been thoroughly compacted with the roller, so as to leave fewer air spaces in the soil, which, when dry, lies very loose; and hence I think has given some of our Champaign county farmers a prejudice against deep plowing. The chinch bugs were irresistable, and came from the adjoining oats in destructive quantities, so as to vitiate the result of our experiments to a great degree. I thought it best, however, to follow the experiments out to results, and accordingly on the 2d of September the hills, stalks and ears (of eight inches in length or more) were counted, and on the 4th, 5th and 6th of November, the corn was husked and the ears weighed, with the results shown in the following table:

MAP OF EXPERIMENTAL PLATS,

Containing 8 rods, each 2 × 4, except the half plats at north end, 128 hills planted on each full plat. The figures on each plat show: 1st, number hills matured; 2d, number stalks matured; 3d, number ears eight inches long; 4th, pounds corn when gathered.

Minimum number of hills, 94; stalks, 303; ears, 100; weight of ears, 27.

Maximum number of hills, 128; stalks, 491; ears, 394; weight of ears, 177.

	A	B	C	D	E	F
12½	57	62	60	60	63	60
	208	218	195	190	199	197
	112	122	93	95	62	90
	38	36½	24½	28	18½	21
12	125	124	125	121	122	124
	460	455	456	417	381	403
	318	272	280	225	162	174
	120	105	91	65	52	51½
11	123	127	126	128	125	127
	479	491	475	444	411	415
	394	361	380	294	259	223
	177	157	157	116	89	78
10	94	130?	125	125	121	121
	350	498	469	479	412	423
	288	364	363	306	242	263
	148	149	145	121½	86	98
9	112	118	130?	120	119	116
	377	419	427	393	400	376
	270	298	285	267	220	217
	103	113½	105	93	75	75½
8	133?	115	126	115	113	118
	380	348	388	371	372	397
	230	215	260	239	201	201
	57	74½	69½	80	63	63½
7	107	120	126	128	116	119
	329	392	422	427	402	376
	200	218	200	247	185	169
	73	72	60½	63½	56½	44½
6	116	116	117	116	112	105
	380	365	386	390	348	303
	207	216	204	199	144	105
	72	69	68	61½	44½	31
5	111	101	119	118	116	108
	323	308	388	403	355	328
	181	170	192	202	130	123
	54½	46	57½	56	37	33
4	120	113	110	119	114	114
	368	359	337	384	335	348
	186	170	137	191	130	100
	69½	42	27½	41	32	30
3	122	117	124	125	106	118
	358	398	408	403	324	355
	187	235	197	202	143	177
	63	71	61	47½	39	55
2	113	127	124	126	112	120
	354	437	432	418	349	365
	195	231	218	217	159	173
	66	74	57	51	41½	52½
1	125	126	126	123	120	111
	415	457	458	420	400	351
	285	286	319	255	220	196
	100	101	112	83	66	72½

TOTALS.

	No. Hills.	*No. Stalks.*	*No. Ears.*	*Weight Ears.*
A plats	1,458	4,781	3,053	1,141
B "	1,496	5,145	3,158	1,110½
C "	1,538	5,241	3,128	1,035½
D "	1,524	5,139	2,939	907
E "	1,459	4,688	2,257	700
F "	1,461	4,637	2,211	706
	8,936	29,631	16,746	5,600
Average per tier	1,489⅓	4,938½	2,791	933⅓
" " plat	118.78			74.66
1 plats	731	2,501	1,561	534½
2 "	722	2,355	1,193	342
3 "	712	2,246	1,141	336½
4 "	690	2,131	914	242
5 "	673	2,105	998	284
6 "	682	2,172	1,075	346
7 "	716	2,348	1,219	370
8 "	720	2,256	1,346	407½
9 "	715	2,392	1,557	565
10 "	716	2,631	1,826	747½
11 "	756	2,715	1,911	774
12 "	741	2,572	1,431	484½
12½ "	362	1,207	574	166½
Totals	8,936	29,631	16,746	5,600
Averages per tier	714.88	2,370.48	1,339.68	448
" " plat	118.78			

An examination of the map and tables develops the following facts:

1. Instead of 9,600 hills, only 8,936 matured—a loss of nearly 7 per cent.

2. These hills, instead of containing 38,400 stalks, matured only 29,631—an additional loss of 22 per cent. from the hills remaining, making the total failure of the "stand" about 27 per cent.

3. A large number of the stalks had no ears, there being only 16,746 ears on 29,631 stalks, 12,885 stalks, or 43 per cent. of the standing stalks were barren, making a farther loss of 40 per cent. upon the field planted, even reckoning one ear to the stalk.

4. The ears were very light in weight, averaging only about one-third of a pound each.

5. This experiment, however, was designed primarily to test the comparative productiveness of different parts of the same field; and in spite of the unfavorable season, gave some interesting facts. The tables show that the "E" plats in one, and the "4" in the other, gave the poorest yield, and we consequently would expect to find that plat "E, 4" would be the least productive in the field. As a matter of fact it is a nearly adjoining plat "C, 4," while the adjoining one, "F, 4," comes next to it—the three producing respectively 27½, 30 and 32 pounds. The tables show the "A" and "11" plats to have been most productive, and "A, 11" is the most productive plat in the field.

Referring to the topography, we find:

1. The highest ground produced less than the lowest lands, probably because the soil was less fertile and less moist—the last fact being the important one in the past dry season.

2. The southern slopes average a greater yield than the northern, though the inference is not a decisive one.

The experiments on these plats are to be repeated at least two more years in order to determine by the average of not less than three years, the natural productiveness of the plats before applying manures, the comparison of the different sorts of which will be the ultimate object.

EXPERIMENTS WITH BROOM CORN.

The five acres next east of the experimental plats just mentioned, were planted with broom corn of five varieties, four of which were kindly furnished by Messrs. Johnson and Bogardus, who also gave us instructions in their methods of managing the crop, and assisted in planting.

The ground was plowed to the depth of about six inches, harrowed and then, immediately before planting, rolled with a large wooden roller. The most fertile and moist part of the land, apparently,

was the south acre, planted with the dwarf variety. All but that variety were planted May 10, and the dwarf May 16. The rows were "scraped" June 3, hoed June 10 to 15, cultivated with the diamond plow June 27, with the double-shovel plow June 28, and with the gopher plow July 14; weeds were cut out July 24, and the brush cut and hauled August 17 to 30. The brush, not only of the different varieties, but of same variety, planted differently, were weighed separately, whilst green and uncleaned, but it was impracticable for Messrs. Bogardus and Johnson, who cleaned the brush, to do more than keep the different varieties separate in weighing the cleaned brush. This is to be regretted, as we hoped to ascertain the effect of thick seeding on the yield of cleaned and saleable brush. It was impossible, also, to get a part of the brush cleaned immediately after cutting, which may have affected the final result. The brush first cut, owing to ignorance of the proper method of cutting, contained more leaves and weighed more, relatively, than that cut later.

The varieties planted ripen ordinarily in the following order:

1. Chinese Brush.
2. Mohawk.
3. Early Evergreen?
4. Missouri Evergreen?

Dwarf.

But this year the Mohawk ripened first, the others following in their order. The following table shows varieties, distance between rows, distance in the rows and amount of seed planted:

Chinese Brush.

Weight, green, uncleaned, 2,052. Cleaned, 380.

12	rows,	3	feet apart,	15	inches in row,	10	seeds,	518	pounds—43.16	pounds per row.
6	"	3.9	"	15	"	10	"	265	" 44.16	"
12	"	3	"	18	"	8	"	377	" 31.41	"
12	"	3	"	18	"	6	"	233	" 19.33	"
12	"	3	"	18	"	12	"	660	" 55	"
54	Total weight brush, green, with seeds, 2,052								" 38	average.

Early Evergreen.

Weight, green, uncleaned, 1,568. Cleaned, 275.

12	rows,	3	feet apart,	18	inches in row,	11	seeds,	350	pounds—29.16	pounds per row.
12	"	3	"	18	"	6	"	324	" 27	"
12	"	3	"	18	"	8	"	354	" 29.50	"
6	"	3.9	"	15	"	10	"	186	" 31	"
12	"	3	"	15	"	10	"	354	" 29.50	"
54								1,568		29.04 average.

Missouri Evergreen.

Weight, green, uncleaned, 2,538. Cleaned, 500.

12	rows,	3	feet apart,	15	inches in row,	10	seeds,	737	pounds—61.41	pounds per row.
6	"	3	"	15	"	11	"	447	" 74.50	"
12	"	3.9	"	18	"	9	"	672	" 56	"
12	"	3	"	18	"	6	"	283	" 23.58	"
6	"	3.9	"	18	"	6	"	221	" 36,83	"
4	"	3	"	18	"	12	"	178	" 44.50	"
54								2,538	"	48.80 average.

Mohawk.

Weight, green, uncleaned, 1,520. Cleaned, 178.

12	rows,	3	feet apart,	18	inches in row,	12	seeds,	384	pounds—32	pounds per row.
12	"	3	"	18	"	6	"	250	" 20.83	"
12	"	3	"	18	"	8	"	266	" 22 16	"
12	"	3	"	15	"	12	"	424	" 35.33	"
6	"	3.9	"	15	"	11	"	196	" 32 66	"
54								1,520	"	28.15 average.

Dwarf.

Weight, green, uncleaned, 3,290. Cleaned, 579.

24	rows,	3	feet apart,	18?	inches in row,	8	seeds,	1,073	pounds—44 70	pounds per row.
6	"	3.9	"	18	"	8	"	382	" 63 66	"
12	"	3	"	18	"	6	"	667	" 55 58	"
12	"	3	"	18	"	12	"	1,168	" 97.33	"
54								3,290	"	60.92 "

The largest and lowest yields may be seen from the following tables :

COMPARISON OF VARIETIES.

VARIETIES.	Weight of brush with seed, green.	Weight of brush without seed, cleaned.
Mohawk	1,520 lbs.	178 lbs.
Early Evergreen	1,568 "	275 "
Chinese Brush	2,052 "	380 "
Missouri Evergreen	2,538 "	500 "
Dwarf	3,290 "	579 "

COMPARISON OF DISTANCES BETWEEN ROWS.

VARIETIES.	Field of green brush, 3 ft. between rows.	Field of green brush, 3 ft. 9 in. bet. rows.
Mohawk	35 33 lbs. per row.	32 66 lbs. per row.
Early Evergreen	29 50 "	31. "
Chinese Brush	43 16 "	44 16 "
Missouri Evergreen	*35 33 "	32 66 "
Dwarf	44 70 "	63 66 "
Total	188 02 lbs. per row.	204.14 lbs. per row.

* A little more seed planted than in the other rows with which it is compared.

From which it would appear that whilst the area planted over was increased 25 per cent., the additional yield from the same seed was about 9 per cent. greater, and that the closer planting was most profitable.

COMPARISON OF DIFFERENT AMOUNTS OF SEED DROPPED IN A PLACE.

VARIETIES.	Field, per row, uncleaned of brush.		
	6 seeds.	8 seeds.	11 & 12 seeds.
Mohawk	20 83 lbs.	22 16 lbs.	32. lbs.
Early Evergreen	27. "	29 50 "	29.16 "
Chinese Brush	19 33 "	31.41 "	55. "
Missouri Evergreen	23 58 "	----------	44 50 "
Dwarf	55 58 "	44 70 "	97 33 "
Totals of five varieties	122 74 lbs.	127.77 lbs.	257.99 lbs.

From this it would appear that increase of seed to the amount of 33⅓ per cent. did not practically increase the yield over 4 per cent., whilst doubling the seed more than doubled the yield. These results are contradictory, and we must make further experiment before drawing conclusions.

The broom-corn was sold to Messrs. Johnson & Bogardus, 1,912 pounds, at 4 cents per pound: $76 48; they cleaned the brush.

A NEW CORN PLANTER.

One acre of corn, the same as that prescribed by B. F. Johnson, was planted on the north acre of plat 2 north, May 10th, with the corn planter of Richard Penniston, of Tolona. This was cultivated June 1st, 10th and 26th, and yielded 2,756 lbs. of corn, husked December 8th. The ground was better than the average of the field, and the yield one of the best, if not the best, on the premises.

The remainder of plat 2 north was planted with peas, beans, flax and potatoes. The peas and flax were harvested as worth something, but the beans were worthless.

SEVENTY-SIX VARIETIES OF POTATOES.

The potatoes on this plat and adjoining the barn, as well as along the roadway left north of the plats, were from seed donated by the Michigan Agricultural College, and (the Breese's Peerless) planted May 13th, 17th and 18th—one piece of three acres in hills, at wide distances, 4x4 feet. The late planting and unfavorable season made the yield small, but sufficient for more extended experimentation the coming year. Seventy-six varieties were planted. They were attacked both by the Colorado beetle and three-lined beetle; but by the use of Paris green, arsenic, and hand-picking, their mischief was checked to a considerable extent. They were cultivated June 19th and 27th, and July 7th and 19th; hoed June 19th, and dug October 27th. The following is the list of varieties, and the yield:

No.	VARIETIES.	Hills.	Tubers of good size.
1	Black Chenango	34	44
2	Black Mercers	30	57
3	British Queen	23	15
4	Bulkley's Seedling	35	49
5	Calico, No. 1	28	37
6	Calico, ?	15	45
7	Casto	42	* 82
8	Chenango	27	28
9	Chili, No. 2	17	4
10	Chenery	37	116
11	Cleason [Gleason?]	22	27
12	Coldbrook's Seedling	12	7
13	Coppermine	38	20
14	Cuzco	48	* 150
15	Davis Seedling	26	32
16	Delmahoy	24	98
17	Dogger	30	72
18	Early Cottage	21	18
19	Early Don	20	21
20	" Dykeman	27	23
21	" Goodrich	38	45
22	" Handsworth	16	35
23	" Indiana	20	14
24	" London White	24	76
25	" Pinkeye	24	16
26	" Sovereign	24	15
27	" Stevens	22	25
28	Excelsior	12	26
29	Extra Early White	14	25
30	Forfarshire Red	30	76
31	Flukes	22	43
32	Irish Cups	22	65
33	Irish Grey	22	18
34	Jersey Peach Blow	24	37
35	Kearsarge	14	14
36	Lady Finger	15	10
37	Late Pinkeye	24	20
38	Lapstone Kidney	22	14
39	Massasoit	20	20
40	Mercer	23	43
41	Merino	37	56
42	Napoleon	16	8
43	No Blow	24	47
44	Old Red	16	22
45	Orono, No. 1	37	75
46	Orono, No. 2	26	12
47	Patterson's Blue	23	22
48	Patterson's Regent	19	15
49	Penn. Search Warrant	23	20
50	Pinkeye Minnesota	32	45
51	Pinkeye Rustycoat	18	15
52	Prince Albert	12	12
53	Prince of Wales	16	39
54	Rough and Ready	31	169
55	Russet	22	22
56	Sebec	26	50
57	Seedlings' Rock	20	33
58	Shakers' Russet	26	31
59	Six Weeks	14	18
60	Snow Ball	25	98
61	Snow Flake	21	60
62	Spotted Shad	12	9
63	Strawberry	21	27
64	Titicaca	29	46
65	Vandevere's Seedling	27	32
66	Wheeler's Milky White	17	28

* Rotted.

LIST OF VARIETIES —Continued.

No.	VARIETIES.	Hills.	Tubers of good size.
67	Western Red	28	26
68	White Apple	17	20
69	White Chili	28	69
70	White Mountain	30	55
71	White Peachblow	28	29
72	White Rock	22	70
73	White Spirit (all large tubers)	15	12
74	No. 1 Unnamed	23	44
75	No. 2 Unnamed	19	14
76	Breese's Peerless	169	995

ROOT CROPS.

On plat 3 north we attempted to grow one acre each of beets (white sugar), rutta bagas, parsnips, carrots and white turnips, but failed either to get the seed to germinate, as in the case of the parsnips and carrots, or were delayed by drought, and cut off by insects or frost in other cases. The failure was nearly complete.

HILLS AND DRILLS—WIDE AND CLOSE PLANTING.

On plats 4 and 5 north we attempted to compare planting corn in hills and drills. At the north seeds were planted—an acre each, planted 3 feet apart between rows; but one in hills, three kernels in a hill; the other drilled, one kernel to a foot. On the next the hilling and drilling was repeated, but at a distance of 3½ feet between rows and hills, maintaining the amount of a kernel to a foot in the drilled rows, and an additional kernel for each foot between rows in the hills. On the next tier a distance of 4 feet was taken, then 4½, and finally 5 feet. The corn was planted as follows: The six northernmost acres, May 20th; the next two, May 20th; the last ten, May 23d. It was harrowed June 3d, cultivated the 15th, thinned the 16th and cultivated June 26th, July 8th, and July 20th; husked December 10th to 22d. The ground was very unequal in its dryness and arable condition—the south ends in an ordinary season would probably have been too wet for cultivation. The chinch bug did a good deal of mischief, and hardly anything definite can be made of the figures, which are as follows:

	Drills, 1 kernel to a foot.	Hills 1 kern'l for each foot.
Planted rows 3 feet apart	1,326 lbs.	1,081 lbs.
" 3½ "	628 "	853 "
" 4 "	596 "	618 "
" 4½ "	738 "	956 "
" 5 "	1,336 "	1,326 "
Total	4,624 "	4,836 "

Most of the work on the preceding experiments was done and conducted by C. W. Silver, of Champaign county, and G. N. Gridley, of Lake, both of whom proved themselves intelligent, industrious and efficient workers.

In addition to these experiments, the following made and reported by E. L. Lawrence, head farmer, will be of interest:

EXPERIMENTS WITH POTATOES.

Made by E. L. Lawrence, Head Farmer on "Stock Farm."

The variety used was the Peach Blow, planted in rows 3½ feet apart, and 21 inches apart in the row and two peices in a place except as otherwise noted. The areas planted all equal:

Conditions of planting.	Time of planting.	Pounds seed planted.	Product marketable	Product small.	Total product.	Product in excess of seed.	Per cent. small potatos.	Per cent. seed of product.	1 Pound seed produced.
1. Old of moon	May 18	11	39	8	47	36	17x	23½	4 27
2. New of moon	" 20	11	42	10	52	41	19¼–	20	4 72
3. Large, cut large	" "	32	51	7	58	26	12x	55x	1 81
4. " small	" "	11½	45	7	52	41½	13½–	22x	4 52
5. Small cut	" "	4½	28½	4	32½	28	12½x	14x	7 22
6. " whole	" "	16	43	8	51	35	15½	31½–	3 18
7. Seed ends	" "	5	40	4½	44½	39½	10x	11x	8 90
8. "Butt" ends	" "	15	45	6½	51½	36½	12½	21–	3 43
9. Hills 3½ by 3½	" "	5½	32	2½	34½	29	7½	16—	6 27
10. One piece in a place	" "	5½	35	3½	38½	33	9x	14¼x	7 00
Totals		117	400½	61	461½	345½	128⅓	218¼	51.32
Averages		11.7	40	6.1	46.1	34.5	12 8	22.8	5.13

EXPERIMENTS IN CORN PLANTING,

Made by E. L. Lawrence, Head Farmer, Stock Farm.

The ground, which had been in corn in 1870 was plowed to the depth of about 5 inches and planted May 29th, 1871. Each plat contained 4 rows, 50 rods long, planted 3 feet 10 inches by 3 feet 10 inches, with the check row corn planter. It was cultivated four times with a cultivator and the last plat, in addition to this, was hilled up with the plow.

Plat 1, left as planted, with 4 to 6 stalks, produced..... 840 lbs.
" 2, thinned to 2 stalks in a hill..... 660 "
" 3 " 3 " ..... 850 "
" 4 " 4 " ..... 830 "
" 5, left as planted, with 4 to 6 stalks, and hilled up with plow, produced..... 850 "

The ground in the south plats was not used for experimental purposes, and specially requires drainage before being much used for experiments requiring any exactness and uniformity of conditions. It was cultivated by Mr. Lawrence, as a part of his department, in corn.

Arrangements for experiments in feeding this winter were made with Mr. Lawrence but owing to the delay in receiving the engine and boiler from the machine shops only a part of what was agreed upon has been done, and the report thereon must be made later.

EXPERIMENTS FOR 1872.

I would recommend a repetition of the experiments in testing the futility of adjacent plats, with, if possible, analyses of their soils; of the experiments with varieties of broom corn; of the varieties of the potatoes; of root crops; of planting corn in hills and drills, and of manured and unmanured plats. Also of the 21 varieties of grass seed and 6 varieties of clover seed procured last fall, but not sown on account of the drought. The ground prepared in part for these has been assigned to the horticultural department, but other ground can no doubt be got ready in time.

These experiments include three or four that we are endeavoring to have tried simultaneously at all the agricultural colleges so that our experimental work may require less repetition and proceeed more rapidly by being in many hands at once.

Besides this, I have received from several points situated in the different soils and in the different climates of the states, assurances that with a little expense on the part of the university these common experiments may be carried on simultaneously at seven different points in our own s ate, such as Belvidere, LaMoille, Macomb, Champaign, Moro, Mount Vernon and Villa Ridge, where, perhaps, by paying the *additional* cost above growing 3 or 4 acres of corn in the ordinary way, we may have experiments conducted under the general supervision of the trustees respectively residing near those points.

I have received from Prof. Turner, Dr. E. S. Hull, Dr. Manly Miles, B. F. Johnson, Esq., and several others, valuable suggestions as to other experiments in the field, and elsewhere, that it is desirable should be reached and at least begun upon at any e arly day.

REPORT OF CORRESPONDING SECRETARY.

I would respectfully submit the following preliminary report: Our fourth annual report was placed in the hands of the State printer within the time prescribed by law, several months since, but owing to the great amount of printing for the General Assembly, which has been in session nearly ever since, the printing is not yet begun. I would suggest that a topographical survey be made of the farms the coming summer, and a map of good size, that can be folded up in the report, be engraved therefrom, to illustrate future reports.

Besides the Catalogue, report of the proceedings of the Board of Trustees and its Executive Committee, I have procured for this fourth volume the addresses of Prof. Turner and Dr. Bateman, at the laying of the corner stone of the new University building, and several of the lectures of 1871, delivered at the Farmers' Conventions at Champaign, Springfield, Pekin and South Pass. I have also proposed to add a report of the Convention held in Chicago last August, by the officers of agricultural colleges. This meeting discussed many of the more important topics connected with the new education, and the report published in the "Prairie Farmer" having been destroyed by fire, it seems best to preserve it in a more permanent form.

For the fifth annual report, I have already issued and received a good many answers to a circular in regard to the early native and improved breeds of cattle in Illinois. In addition to these, the winter meetings at Champaign, Dixon, Pontiac, Avon and Pittsfield, besides furnishing and eliciting a good deal of useful information to the people, will contribute some valuable papers to this report.

These agricultural lectures and discussions, I may add, were generally well attended, and awakened a good deal of interest, both in agriculture and in the University. The expenses and pay of lecturers amounted to $533 98, and the advertisement of them to $25.

There is an opportunity of procuring, through the Smithsonian Institution, exchanges with similar institutions, societies, etc., throughout Europe and other countries, by sending our report to the Smithsonian Institution, addressed to such societies as we may desire to exchange with. This will furnish, at the mere cost of transportation from here to Washington and back, a good many desirable volumes for our library.

In the charge of the State Geologist are about 150 samples of different varieties of soils collected in different parts of the State, especially the Southern, which we can have for examination and exhibition by arranging for packing and transporting them, and giving a receipt therefor.

There is a continued and increasing demand, and almost a necessity, for analyses of such soils and the working of other laboratory experiments directly related to agriculture and other industrial arts for which there is no adequate supply, and cannot be until the chemical force of the University is increased.

Much could be done towards exhibiting the industrial resources of our State, and its changes in population, production, etc., by a series of colored and shaded maps, on the plan of those already made by Secretary Wines of the State Board of Charities. If the means for lithographing or otherwise duplicating these can be furnished, I can supply at an early date, and in time for the next annual report, maps showing such facts, as the following, by counties: density of population and its increase, wealth per capita and its increase, changes in corn production, in wheat production, in cattle, horses, swine and sheep, founding of towns, building of railways, and opening of coal mines.

Respectfully submitted,

W. C. FLAGG.

Mr. J. H. Pickrell read the following report from the Committee on Agriculture, which was accepted:

To the Board of Trustees of the Illinois Industrial University:

Your Committee on Agriculture, to whom the report of the head farmer was referred, beg leave to report that they have had the same under consideration, and that it is with no small degree of satisfaction that they can endorse the same as a *full, fair* and *just* report and that the balance, $1,477.83, is correct, and that Mr. Lawrence is entitled to his maximum salary of $1,200 per year. The balance of the net profit, together with the amount of $686.41, from State appropriation, we recommend to be placed to the credit of the farm, for the purchase of additional machinery, and to pay for the amount (engine, etc.,) already partially put up. The estimates for the next year—$3,340—made by the head farmer, we think very reasonable, especially as we think, (unless some unforeseen and unusual occurrence should prevent,) that it will be all refunded by the end of the year. Until the actually *necessary* improvements of the farm are supplied, we suggest that the net profits of the farm should be kept for that purpose.

We would further recommend that the minute details and care be left for the year to the Executive Committee.

We also would recommend that Mr. Lawrence be continued a head farmer for the ensuing year, on same terms as those of last year. We would also ask that $1,500 be loaned to us, for the purpose of stocking the farm with cattle to consume our products. The amount could perhaps be refunded before it would be needed by other departments.

All of which is most respectfully submitted.

J. H. PICKRELL,
D. A. BROWN,
JAS. R. SCOTT,
R. R. HARRINGTON.
A. BLACKBURN.

Mr. M. C. Goltra, Chairman of the Committee on Building, read the following report, which was adopted:

To the Board of Trustees of the Illinois Industrial University:

Your Committee on Buildings and Grounds, to whose supervision the University building and adjacent grounds was at the beginning of the year entrusted, would respectfully report, for the information of the Board, that such repairs and improvement have been, from time to time, made upon the building as was found necessary, or within reach of the means at the command of the committee. Floors of walnut and ash have been laid over the pine floors of the basement and first stories, the same being found necessary. On the 30th day of December, a fearful storm of wind partially removed the tin roof from the wing of the building, exposing to damage the structure underneath and the valuable library and cabinets of the University.

Temporary repairs were at once made by the use of paper roofing, until the damage could be permanently and thoroughly repaired. We think the building now in good repair, and so far as your committee are advised, it is now in the best possible condition for subserving the interests of the University.

The large additions to the number of students in attendance on the University, have rendered additions to the out-houses and other conveniences upon the grounds necessary, which additions have been made with reference to economy. The extreme and unprecedented drought of the year, has on more than one occasion, exhausted the supply of water in the cisterns and wells of the grounds, rendering the sinking of one well and the deepening of others necessary to obtain the necessary supply. The ornamental part of the grounds has been under the care of Mr. Thos. Franks, the florist of the University, and notwithstanding the difficulties in the way of floral culture during the entire season, the grounds from May until November were radiant in beauty and attraction.

The new buildings projected by the Board at the last annual meeting, in pursuance of the law of 1871, although not within the scope of supervision of your committee, have received careful attention in every stage of their progress, and your committee take pleasure in bearing witness to the faithful compliance on the part of the builder, Mr. Gehlman, with the requirements of the contracts; both in character of the work and of the materials used.

All of which is respectfully submitted.

M. C. GOLTRA,
J. M. VAN OSDEL,
JAS. R SCOTT,
J. O. CUNNINGHAM,
Committee.

The report of Mr. J. S. Pickard, Chairman of the Committee on State of Institution was read:

To the Board of Trustees of the Illinois Industrial University:

Your Committee on the state of the Institution begs leave to report as follows:

At different times during the year members of the Committee have visited the Institution, and have attended upon its exercises. They are pleased to notice steadily increasing attention to the condition of the buildings and grounds, and to observe a marked change for the better in all the public rooms of the building. The students give evidence of broader and better culture than during previous years. Their deportment in the class-room is that of earnest self-reliant men and women, who bend their energies to the accomplishment of the one purpose that has brought them here. The more advanced classes are specially commended for clearness and independence of thought.

The farm and workshops are in good condition, more than meeting our expectations, in that they are so soon self-sustaining. The less advanced classes still show some lack of earlier advantages which

should be atoned for by a little more personal attention than can be given them by the present instructional force; and your committee would inquire whether this lack might not be supplied without much cost to the Institution, by the employment of the young men, who, having already acquired a good degree of general culture, are seeking to perfect themselves in some one of the higher courses of study If one or two such could be employed a portion of the time, a double purpose might be served The better instruction of members of classes altogether too large, and quite acceptable aid to worthy young men or women, who would honor the Institution by becoming its students in special studies.

The interest manifested by the students in the library and by a large class in the laboratory is specially commendable. The constant and general use of the library is quite a marked feature of the Institution.

The general discipline of the Institution seems to be good. Your committee would suggest that more be made of the examinations held at the close of the term, and that they be made attractive to patrons and friends of the school.

Respectfully submitted,

J. L. PICKARD,
D. A. BROWN,
JAS. P. SLADE,
Committee.

The report was adopted, and so much of it as refers to the employment of students of advanced standing for aid in teaching in the lower classes, was referred to the Executive Committee.

The following report of Judge A. M. Brown, Chairman of the Committee on Horticulture, was read:

REPORT OF COMMITTEE ON HORTICULTURE.

MR. PRESIDENT: The Committee on the Department of Horticulture make the following report. For what has been done during the past year in the orchards, nurseries, forest and ornamental grounds, they refer to the reports of the Regent and the Professor of Horticulture.

The work of the season will consist chiefly of the care of the grounds and orchards, progress in planting the forests and arboretum, cultivation of the gardens, nurseries, etc.

The appropriation by the Legislature available the present year for the purchase of trees and seeds, and for labor on the tree plantations, is $1,750, all of which will be needed.

Your committee estimate the gross receipts of the gardens and fields at $1,500, of the green house, at $2,150; making the resources of the department, $3,650.

They estimate the appropriations required as follows:

Salary of foreman	$1,000 00
Labor	2,000 00
Incidental expenses	300 00
Care of green house and plants and seeds for same, and ornamental grounds	1,000 00
	$4,300 00

Your committee believe that the green house and ornamental grounds can be managed by the students who have become familiar with the work, under the supervision of the Professor of Horticulture. In this way the services of the gardener may be dispensed with and the cost of the work will be reduced at least fifty per cent.

In view of the condition of the finances of the University, your committee recommend that this course be taken, and, in that case, they ask for an appropriation for the department of $3,800.

Of this sum, the state appropriation will be $1,750, leaving $2,050 to come ont of the general fund, And of this latter it is believed, as before estimated, that the receipts from the gardens, green house, etc., will pay at least $1,900.

Your committee approve the contract made with Mr. Vickroy, the superintendent of the orchards and forests, as reported by the Regent.

Respectfully submitted,

A. M. BROWN,
P. R. WRIGHT,
B. PULLEN.

The report was received, and so much of it as relates to appropriations referred to the Committee on Finance.

The recommendation of the Committee to dispense with the services of the florist, Mr. T. Franks, was adopted.

The Committee on Nominations made the following report, which was adopted:

Executive Commiitee.—J. M. Gregory, Jas. R. Scott, L. W. Lawrence, J. O. Cunningham, Em. Cobb, A. M. Brown, J. H. Pickrell, John M. Pearson, M. C. Goltra.

Committee on Agriculture.—J. H. Pickrell, Alex. Blackburn, W. B. Anderson, D. A. Brown, James R. Scott.

Committee on Horticulture.—A. M. Brown, B. Pullen, S. Edwards, O. B. Galusha, P. R. Wright.

Finance Committee.—Em. Cobb, I. S. Mahan, S. S. Hayes, C. R. Griggs, L. B. McMurray.

Committee on Building and Grounds.—M. C. Goltra, J. M. Van Osdel, Jas. R. Scott, R. R. Harrington, J. O. Cunningham.

Auditing Committee.—L. W. Lawrence, P. R. Wright, O. B. Galusha, I. S. Mahan, Alex. Blackburn.

By-Laws.—I. S. Mahan, J. L. Pickard, D. A. Brown.

Committee on Courses of Study and Faculty.—The Regent, and Messrs. Bateman, Pickard, Hayes, Slade and Edwards.

Committee on Military.—Messrs. Brayman, Anderson, Bowen, Scroggs and Wright.

Committee on Library and Cabinet.—Messrs. Bateman, Slade, Mahan, Pickard and Griggs.

Mechanical Committee.—Messrs. Pearson, McMurray, Bowen, Harrington and Goltra.

Committee on the Institution.—Messrs. Pickard, Slade and Pullen.

Corresponding Secretary.—Willard C. Flagg.

Recording Secretary.—Edward Snyder.

The special committee on Education of Women, reported through the Chairman, Mr. J. L. Pickard, as follows:

To the Trustees of the Illinois Industrial University:

GENTLEMEN: The special committee to whom was referred so much of the Regent's report as relates to the furnishing additional facilities for the Education of Women, has considered the subject so referred, and begs leave to report as follows:

1. That the recommendations of the Regent, so far as they relate to the extension of educational facilities, meet our most hearty approval.

2. That the question of the conversion of the building now used by the University into a boarding and lodging house for the exclusive use of women, demands more serious consideration than the time allowed the committee will warrant, and inasmuch as the ability of the Trustees to make such a change of use within the year is very questionable, no harm can result from delay.

3. Many of the special demands made upon the University on account of the admission of women to the privileges of its courses of study, seem to your committee to warrant the recommendation that there be added to the Faculty some lady competent to instruct the young women in Physiology and Hygiene, and to superintend generally, their physical and æsthetic culture.

Respectfully submitted,

J. L. PICKARD,
A. BLACKBURN,
JAMES P. SLADE,
P. R. WRIGHT,
J. O. CUNNINGHAM,
Committee.

AFTERNOON SESSION.

The Board met at the time apointed.

The subject of fitting the old University building for the exclusive use of female students was discussed at some length.

Hon. Newton Bateman, Superintendent of Public Instruction of the State, and Hon. J. L. Pickard, Superintendent of Public Instruction of

the city of Chicago, being requested to give their opinoin on the subject, responded and expressed themselves both favorably to the plan as recommended by the Regent.

On motion of Mr. Brown, the matter was referred to the Executive Committee.

The Board took a short recess, to witness the Exibition Drill of the University Battalion.

The report was received and the committee discharged, on motion of Mr. Pickrell.

Mr. Lawrence moved that so much of the report as relates to employment of additional teachers be referred to the Committee on Finance.

Mr. Pearson moved to amend by referring to Committee on Course of Study and Faculty.

On motion it was so referred.

The Board then adjourned till 2 o'clock, p. m.

The Board reassembled at 4 o'clock P. M.

The reports being called for, Mr. Pickrell made the following additional report from the Committee on Agriculture:

SUPPLEMENTAL REPORT OF AGRICULTURAL COMMITTEE.

That portion of Mr. Secretary Flagg's report that relates to further experiments on the plan that was last year followed, for the ensuing year, we have had under consideration. We fully concur in his suggestions, and would recommend that Mr. Flagg be requested and empowered to carry out the plans according as he may be able to procure suitable persons at the points named.

J. H. PICKRELL,
JAS. P. SCOTT,
D. A. BROWN,
A. BLACKBURN.
Committee.

The report was accepted, and referred to the Finance Committee.

The following additional report of the Treasurer was then read and accepted:

ADDITIONAL REPORT OF TREASURER.

Statement of Sale of Agricultural College Scrip for Illinois Industrial University and Investment of Proceeds.

313 pieces, of 160 acres each, 50,080, at 89½c		$44,821 60
Invested in $15,000 00 Champaign county 10 per cent. bonds, cost		$15,000 00
" 30,000 00 Kankakee county 10 per cent. bonds, cost		29,700 00
Balance on hand		121 60
		$44,821 60
Bonds belonging to Illinois Industrial University:		
$55,000 00 Champaign county 10 per cent. bonds, cost		$55,000 00
50,000 00 Sangamon county 9 per cent. bonds, cost		50,000 00
25,000 00 Morgan county 10 per cent. bonds, cost		25,000 00
30,000 00 Pike county 10 per cent. bonds, cost		30,000 00

$25,000 00	Chicago city 7 per cent. water bonds, cost	24,961 80
30,000 00	Kankakee county 10 per cent. bonds, cost	29,700 00
13,000 00	Putnam county 10 per cent. bonds, cost	13,000 00
66,000 00	Illinois State 6 per cent. bonds, cost	67,153 34
$294,000 00	in bonds, costing	$294,815 14
	Balance due scrip	198 87
		$295,014 01

$60,000 00 Champaign county 10 per cent. bonds:

180,000	acres of scrip sold for	$101,764 50
100,000	" " "	58,427 91
100,000	" " "	90,000 00
50,080	" " "	44,821 60
430,080		$295,014 01

6,400	acres of scrip used to enter	6,362 63-100	acres of land in Pope county, Minnesota.
5,440	" " "	5,433	" " Kandigoh county "
4,160	" " "	4,167	" " Renville " "
9,440	" " "	9,340	" " Gage " Nebraska.
25,440	" " "	25,302 63.100	
24,480	" on hand.		

JOHN W. BUNN, *Treasurer.*

SPRINGFIELD, ILL., *March* 1, 1872.

The following report from the Auditing Committee, was presented by Judge L. W. Lawrence, the Chairman:

To the Board of Trustees of the Illinois Industrial University:

The Auditing Committee report that they have examined the Treasurer's report, and find the same correct—that they have examined his vouchers, consisting of orders 1 to 723, current series, and canceled the same by punching, and recommend that they be returned to the Treasurer for safe keeping.

The committee have examined the following bills, and find them correct, and recommend that orders be drawn for their payment:

UNPAID BILLS.

B. D. Whitney, planer	$250 00
J. W. Bunn, printing vouchers	5 50
J. L. Wayne & Son, tools	507 55
Larrabee & North, tools	162 25
Miller & Toll, cloth and towels	4 25
Enterprise Coal Company, four cars coal	74 00
Nicolet & Schoff, printing	4 00
T. J. Burrill, petty expense	1 95
H. K. Vickroy "	3 05
Flynn & Scroggs "	9 00
Walker Bros, oil	1 50
E. V. Peterson, stationery, etc	32 18
Dodson & Hodges, hardware	87 69
H. Peddicord, coal and plaster	43 25
J. W. Keys, hanging paper	5 00
Adams, Blackmer & Lyon, blank books	61 50
J. M. Wills, pear scions	5 00
John Tischer, flower pots	7 00
J. M. Gregory, periodicals	2 95
Hosford & Spear, furniture and oil	2 30
N. W. Manufacturing Company, tools, etc	58 92
Fuller & Fuller, oil and paint	72 62
Hesse & Co., castings, etc	31 53
A. P. S. Stuart, expense for department	25 25
Walker Bros., material and labor	39 95
Hovey & Co., seed	3 40
Graham & Stevenson, car work	26 00

Peterson, Henderson & Co., seed	$14 95
Jas. Vick, seed	16 50
J. C. McKee, lumber	43 35
E. Snyder, petty expense	2 67
Total	$1,605 06

The committee report the following bills, with the recommendation that they be referred to the Executive Committee, with power to act:

G. H. Burt, sash	$19 50
Flynn & Scroggs, binding	76 55
G. E. Hessell, harness, etc	47 45
H. Swannell, paints, oils, etc	24 23
Geo. Ely, blacksmithing	8 60
J. W. Dowell, draughting	15 00

Respectfully submitted.

L. W. LAWRENCE,
P. R. WRIGHT,
A. BLACKBURN,
I. S. MAHAN.
Committee.

The Board adjourned until 7:30 P. M.

The Board convened at the hour appointed.

Mr. J. M. Pearson, Chairman of the Committee on Mechanics, read the following report:

REPORT OF COMMITTEE ON MECHANICAL DEPARTMENT.

To the Board of Trustees of Illinois Industrial University:

After the account given you of the operations of this department, by the Regent, and witnessing, as most of you have, something of what has been done, we do not feel called upon to enter at length into the detail of operations.

These can only be ascertained by reference to the books of accounts. It is, however, needful to state that this newly developed department is growing beyond precedent. It embraces forty-two students in its operations, and many others are preparing for the course. It furnishes more labor for those students who wish to labor than all the other departments together.

To meet this growth and provide the means to utilize this labor, has required considerable expenditure of means. The larger part of this has been furnished by the liberality of the State Legislature, and has been invested in tools and machinery, as partially shown in the report of the book-keeper.

We still need further appropriations in order to enable the Professor to teach successfully the practice as well as the theory of mechanics. When these arrangements are once completed, we hope and believe that the department will be self-sustaining, that is, that the current expenses will be met by the earnings.

Accompanying this we submit statement of Prof. Robinson, of the more immediate wants of this department, and hope that the Board will be able to grant such help as is needed to carry out his suggestions.

JNO. M. PEARSON,
R. R. HARRINGTON,
Committee.

The report was received, and referred to the Finance Committee.

REPORT OF THE MECHANICAL DEPARTMENT.

ILLINOIS INDUSTRIAL UNIVERSITY,
March 8th, 1872.

Dr. J. M. Gregory, Regent:

DEAR SIR: I offer the following estimate of expenses for running the mechanical shops, and including the carpenters' shop, for the year 1872-73. In making this estimate, a few considerations which I present here have been taken into account.

Some additional machinery and tools are very much needed. Although the department congratulates itself on having so fine an outfit for the purposes of practical instruction, and feels that it owes a debt of gratitude to those who have taken an interest in its behalf, yet a few more machines would add much to its facilities, not only for educational purposes, but for furnishing the students with the needed facilities for paid labor. We now have conveniences for about eleven workmen in the machine shop, by using every tool, machines and vises, but it is not possible to so lay out the work that every one of them shall be economically employed the whole time. We cannot, then, count on more than a half or two-thirds the number employed that we seem to have facilities for. Some of the additional machinery and tools we can manufacture ourselves, which wewould prefer to do for two reasons. 1st: We will get better tools for the same money; and 2d: We can get them to better suit us in design, and having patterns, we can make for others.

Among the number of machines we wish to make ourselves are, a drilling machine or drill press, a shaping machine, a gear cutter, a milling machine, and a pattern lathe for the pattern makers' room. I would only ask at present to make the drill press and pattern lathe.

We find we can melt iron as well as brass in crucibles. Such iron makes the finest castings. We wish to do the casting in both iron and brass for the class work when the castings are not large. But our brass furnace, though working admirably for brass, has not sufficiedt draft for iron. A ten or twelve inch blower would increase the draft amply, and also blow the forge fire; and besides our bellows are nearly worn out. The needed fan can be obtained for about $30. It is quite desirable that the drill press, pattern lathe and fan blower be added the present year; and the fan as soon as convenient.

A fresh stock of materials of nearly all kinds used in the shop is now needed, including iron, steel, materials for brass casting, machine oil, pattern lumber, which should be kept in considerable stock, and the older it gets the better, so that costly patterns when made will keep their shape.

ESTIMATES FOR THE YEAR.

Iron and steel	$250
Materials for brass castings, mostly for models	40
Pattern lumber 1,000 ft	50
We should have a stock of this sufficient for several years, say 5,000 ft., at $40 per M. ($200)	
Barrel of combined lard and paraffine oil, about	40
Sheet brass and brass tubing	25
Twist drills and drill check	50
Files of various grades	50
A floor in the pattern room for patterns, 2,000 feet of lumber, about $70, work $20	90
Non-conductor materials, the Chalmers-Spencer, for covering steam pipes, engine cylinder, three barrels, at $12	36
Sturtevant blowing fan, 12½ inches. (I think this can be got at a reduction.)	45
Drill press, adapted for milling and boring	300
Pattern lathe, iron bed	175
Total, including the larger lot of pattern lumber	$1,301

The following brief statements are made regarding the machine and pattern shops of the mechanical department. Do they pay?

The detailed annual account is not made out, but the following, embracing the principal part of the work of the past year, is probably sufficient at this time.

The amount of nineteen bills, mostly for parties outside of the University, is $673 90. In each of these bills there is a profit, the amounts exceeding the cost to the department, arising from undertaking the jobs. For a large number the profit is from twenty-five to fifty per cent., and for some 100 per cent.

The pipery, for heating the mechanic and military building, when completed, will cost about $790, the pipe, about 4,000 feet, costing about $700, and the work done entirely by the department, about $90. This includes the pipe connections for the engine. This, compared with bids of a year or two ago, for steam piping in the main building, will probably show a great saving over having had the work done by contract.

The engine for the new mechanical shops, cost about $760. A Rider cut-off of same size, or a Corliss engine, working steam on the same principle, would have cost, unless discounted to us, about $1,150.

Much work has been done in fitting up the new shops, which greatly benefit the department, although not appearing as a money profit, and should the general account not make a favorable exhibit, this may serve as the explanation.

When we consider the objects of the shop as educational instead of remunerative, I regard them as amply paying, and the facilities, now or soon at hand, leave but little to be desired. Everything, from the originating of new designs to the tightening the last screw, including moulding and casting in iron and brass, is now being performed by the students in the shop-practice classes. Although the financial profit of the shop, should not be ignored, still I believe a shop, when regarded as part of an institution of learning, and necessary for advancing its educational interests, its educational facilities should be regarded as of first importance. To make the shop a necessarily paying adjunct to the Institution may detract from, or even cripple its efficiency in accomplishing its legitimate work. Shops are generally expected to pay, but why, necessarily, more than a laboratory, when part of a University.

The shop offers excellent facilities for experimenting, which I believe can very properly be regarded as a perfectly legitimate employment, and a much more profitable one than mere money making, and it is hoped that some experiments may be allowed to be undertaken before a very distant day.

Most respectfully, S. W. ROBINSON.

The report from the Committee on Finance was read by the Chairman, Judge A. M. Brown :

REPORT OF COMMITTEE ON FINANCE.

The Finance Committee, to whom was referred that portion of the Regent's report relating to the finances of the University, and the reports from the committees on Agriculture, Horticulture and Mechanics, beg leave to make the following report:

The committee approve the recommendation of the Regent in reference to the sale of the 25,000 acres of scrip still remaining unsold, and recommend that the Regent, Treasurer and Chairman of the Finance Committee be instructed to make the sale as early as possible, and for the best attainable price, and to invest the proceeds in safe interest-paying bonds. They also approve his recommendation in reference to the sale of the wild lands belonging to the University, except, that in their opinion, the minimum price should be fixed at $2 50 per acre. They have considered the subject of increasing the charge to the students for incidental expenses, to $5 per term, and have concluded that the change is not advisable at present. They also recommend that the Regent, Treasurer and Chairman of the Finance Committee be instructed to exchange our 6 per cent. State bonds for good, safe county or municipal bonds, bearing a higher rate of interest.

The resources of the University, available for the current year, actual and estimated, are as follows:

Interest on land notes	$600 00
" bonds	31,500 00
Matriculation and In. fees	5,000 00
Receipts from farm	4,500 00
" Horticultural department	1,900 00
" Mech. and Car. shops	4,000 00
" rent	1,000 00
Balance in treasury belonging to general fund	3,600 00
	$51,500 00

The expenses for the year, as estimated, and for which appropriations should be made, are as follows:

Regent's salary	$4,000 00
Four Professors, at $2,000	8,000 00
Five Professors, at $1,800	9,000 00
Course of Agricultural lectures	1,000 00
French teacher	800 00
Drawing teacher's salary	1,500 00
Lectures on Con. and Com. law	500 00
" Vet. science	600 00
Librarian and assistant	600 00
Private secretary	600 00
Treasurer	500 00
	$27,100 00

Wages of three foremen:		
Lawrence	$720 00	
Vickroy	1,000 00	
Steadman	1,000 00	
		$2,720 00
Outstanding debts due		2,600 00
Board expenses		800 00
Buildings and grounds		1,000 00
Fuel and lights		1,000 00
Stationery and printing		1,000 00
Incidental expenses		1,000 00
Insurance		500 00
Military department		250 00
Taxes		2,500 00
For carrying on farm		3,000 00
For Horticultural department, exclusive of foreman's salary and State appropriation		1,100 00
For Mechanical department, for each shop $3,000		6,000 00
		$50,570 00

The Agricultural department has a balance of the legislative appropriation of $686 41, which your committee recommend may be appropriated to the purchase of or payment for necessary farm machinery, under the direction of the Executive Committee.

The legislative appropriation for the Horticultural department for the present year, is $1,750, which should be appropriated for seeds, plants, labor on forest tree plantations.

The Chemical department has an unexpended balance of last year's legislative appropriation of $1,636 45, and an appropriation for the present year of $2,750, making together the sum of $4,386 45; and the Library and Cabinet have an appropriation of $5,000. There is an unexpended balance from last year of the legislative appropriation for Agricultural experiments and lectures of $582 34, and $3,000 for the current year. Those several sums should be appropriated in accordance with the laws on the subject.

Your committee have carefully considered the recommendation of the Regent in reference to an increase to $2,000 each, of the salaries of the five Professors, who are now receiving $1,800 a year. They appreciate very highly the value of the services of the gentlemen filling these professorships, and would not hesitate to recommend an increase of their salaries, if the financial condition of the University would allow it. But it must be seen, from the statements we have made above, that our treasury will not, at present, bear any increase of salaries whatever, especially when we consider that additional teaching force will probably become absolutely necessary at the opening of the Fall Term.

The committee ask the adoption of the resolutions herewith presented.

All of which is respectfully presented.

A. M. BROWN,
P. R. WRIGHT,
JNO. M. PEARSON,
D. A. BROWN,
S. S. HAYES.

Resolved, That the Regent, the Treasurer, and the Chairman of the Finance Committee, be authorized and instructed to sell, as early as possible and for the best price obtainable, the 25,000 acres of land scrip belonging to the University, and to invest the same in good, safe interest-bearing bonds.

Resolved, That the Executive Committee be authorized and instructed to provide for the early sale of the wild lands belonging to the University, (fixing the minimum price of said land at $2 50 per acre.)

Resolved, That the several sums of money reported by the Finance Committee as necessary for the expenses of the University during the current year, be and are hereby appropriated to the various objects and departments, as is specifically set forth in said report.

The report was received, and the resolution adopted.

The Chairman of the Committee of Finance then presented the following additional report:

ADDITIONAL REPORT OF FINANCE COMMITTEE.

To Regent and Board of Trustees of Illinois Industrial University:

Your Finance Committee, to whom was referred the report of Hon. W. C. Flagg, of experiments conducted during the past year, and recommendations for future operations, ask leave to report the following resolutions:

1. *Resolved*, That a warrant be drawn in favor of W. C. Flagg, for $476 50, to be paid out of State appropriation for Experimental purposes. Said amount to be in full for balance due Mr. Flagg on that account.

2. *Resolved*, That the plan proposed for future operations be referred to the Executive Committee, to be acted upon at its next meeting.

A. M. BROWN, *Chairman.*

The report was accepted and the resolutions proposed therein were adopted.

The following report was made by Hon. Newton Bateman, Chairman of the Committee on Library and Cabinet:

To the Board of Trustees of the Illinois Industrial University:

GENTLEMEN: Your Committee on Library and Cabinet report that they find the Library has been increased during the year by the addition of 2,413 volumes—making the total number of volumes at present in the Library 7,307. Valuable collections of minerals have been added to the Cabinet—in most cases without expense, save express charges.

Both Library and Cabinet are now in a very satisfactory condition, and are consulted daily by large numbers of students.

Your committee recommend that the appropriation of $5,000, now available for the increase of the Library and Cabinet, be expended, or so much thereof as may be deemed expedient, during the current year, under the direction of the Regent and Faculty, due regard being had to the special needs of the several departments of the University, in the selection of the books and apparatus.

NEWTON BATEMAN,
JAMES P. SLADE,
B. PULLEN,
Committee.

The report was accepted.

The Chairman of the Finance Committee offered the following additional report; which was accepted:

The Finance Committee, to which was referred the Treasurer's statement of the sale of Agricultural College Scrip for the University, and the investment of the proceeds, report that they have examined the same and found it correct. They report the paper back that it may be placed upon the record.

A. M. BROWN, *Chairman.*
P. R. WRIGHT.

On motion of Judge A. M. Brown,

Resolved, That so much of the report of the Finance Committee as relates to the increase of the charges to students for incidental expenses, be referred to the Executive Committee, with power to make such increase, provided in their judgment a necessity for the charge shall become apparent.

On motion of Mr. Pearson, the appointments of Prof. J. C. Carey, Prof. D. C. Taft and Prof. J. B. Webb, were confirmed.

Mr. Harold Hansen was appointed Instructor in Architecture and Free-hand Drawing, at a salary of $1,500 per annum.

On motion of Judge Cunningham,

Resolved, That the measure introduced in Congress by the Hon. J. S. Morrill, of Vermont, to further endow the Agricultural Colleges, meets with the hearty approval of the members of this Board, and that our fellow-citizens, representing the people and the State of Illinois in Congress, be earnestly solicited to give the measure their full support.

Resolved, That the Secretary be instructed to forward a copy of the above to each of the Senators and Representatives from Illinois, in Congress.

The Board adjourned to meet again on the second Tuesday in March, 1873.

J. M. GREGORY, *Regent.*

E. SNYDER, *Recording Secretary.*

URBANA, *March* 12, 1872.

DR. J. M. GREGORY, LL. D.,
Regent of the Illinois Industrial University:

DEAR SIR: Enclosed please receive the following documents:

I. List of warrants from No. 1 to 723 inclusive, drawn from March 15, 1871, to date.
II. Statement of the assets of the Illinois Industrial University.
III. Classified statement of appropriations and expenditures thereon.
IV. Statement of the payments of students' labor, in the various departments.

Very respectfully,

E. SNYDER, *Recording Secretary.*

List of Warrants, No. 1 to 723, from March 15, 1871, to March 5, 1872.

No.	Date.	To whom.	For what.	Total.
1	March 15..	J. L. Pickard	Expense to Board meeting	$11 15
2	" 15..	Samuel Edwards	" "	14 50
3	" 15..	O. B. Galusha	" "	9 00
4	" 15..	E. Cobb	" "	23 55
5	" 15..	A. Blackburn	" "	26 00
6	" 15..	L. W. Lawrence	" "	23 80
7	" 15..	I. S. Mahan	" "	18 20
8	" 15..	B. Pullen	" "	18 20
9	" 15..	John M. Pearson	" "	24 85
10	" 15..	D. A. Brown	" "	7 50
11	" 15..	M. C. Goltra	" "	10 00
12	" 15..	J. P. Slade	" "	19 10
13	" 15..	J. M. VanOsdel	" "	14 50
14	" 15..	A. M. Brown	" "	28 25
15	" 15..	N. Bateman	" "	10 50
16	" 15..	L. Allen	" "	11 00
17	" 15..	E. L. Lawrence	Pay of farm labor	18 46
18	" 15..	Doane House	Entertainment of legislative committees	114 00
19	.....	Geo. S. Upstone	Boarding farm hands	35 12
20	.....	F. K. Phoenix	Nursery stock and flowers	52 85
21	.....	Griggs House	Entertainment of legislative committee	21 00
22	.....	Avery & Neff	Blacksmithing	3 90
23	.....	Angle & Sabin	One tile	4 40
24	.....	Journal Company	Printing memorials	12 00
25	.....	Larrabee & North	Materials for shop	8 80
26	.....	Hovey & Co.	Garden seeds	12 91
27	.....	Dickerson & Collier	Carpenter work	31 50
28	.....	T. R. Leal	Walnut lumber	47 80
29	March 18..	Joseph McCorkle	Hardware	114 83
30	" 18..	Henry Swannell	Glass, paint, etc	41 42
31	" 18..	Trevett & Green	Hardware, spades, etc	54 30
32	" 18..	E. Snyder	Petty expense	117 71
33	" 18..	W. C. Flagg	Salary Corresponding Secretary	250 00
34	" 18..	J. W. Bunn	" Treasurer	500 00
35	" 18..	J. M. Gregory	Periodicals for library	40 13
36	" 18..	E. L. Brown	Expense to meeting	15 50
37	" 20..	A. Herbert	Pressing hay	26 00
38	" 20..	D. J. Tibbards	Gas fixtures	7 75
39	" 20..	T. J. Burrill	Work in Horticultural department	11 10
40	" 20..	Wm. M. Baker	Salary April, 1871	166 66
41	" 20..	E. Lochrie	Printing and advertising	6 00
42	" 22..	Peabody & Ayres	Castings	68 51
43	" 23..	Henderson & Fleming	Seeds and plants	7 20

List of Warrants—Continued.

No.	Date.	To whom.	For what.	Tota
44	March 23..	J. M. Gregory	Salay April	$333 33
45	" 31..	A. P. S. Stuart	"	166 66
46	" 31..	S. W. Robinson	"	166 66
47	" 31..	T. J. Burrill	"	150 00
48	" 31..	S. W. Shattuck	"	150 00
49	" 31..	E. Snyder	"	150 00
50	" 31..	James Bellangee	"	83 33
51	" 31..	H. M. Douglas	"	83 33
52	" 31..	R. B. Warder	"	50 00
53	" 31..	I. D. Foulon	"	50 00
54	" 31..	H. K. Vickroy	"	75 00
55	" 31..	Thos. Franks	"	75 00
56	" 31..	A. Thomson	"	83 33
57	" 31..	H. M. Douglas	Expense, library	19 05
58	April 1..	Herman Plessner	Work in Horticultural Department	25 66
59	" 1..	N. O. Albert	" " "	27 43
60	" 1..	Wm. Burchnell	" " "	7 70
61	" 1..	F. Brickett	" " "	3 08
62	" 1..	J. Kyle	" " "	4 85
63	" 1..	P. Gennadius	" " "	5 00
64	" 1..	E. A. Robinson	Work, Mechanical Dep t	38 63
65	" 3..	J. H. Detmers	On account of salary	50 00
66	" 5..	J. F. Drake	Work on farm	8 46
67	" 5..	E. L. Lawrance	Farm expenses, March	242 81
68	" 5..	E. Snyder	Pay-rol students' labor	391 80
69	" 6..	Union Coal Company	Two cars coal	30 00
70	" 8..	John Limbarger	Drawing posts	5 82
71	" 8..	A. P. S. Stuart	Petty expense	12 42
72	" 12..	Judge A. M. Brown	Expense to meeting	24 40
73	" 12..	J. M. Pearson	" "	17 15
74	" 12..	L. W. Lawrence	" "	25 30
75	" 14..	Hovey & Co	Seeds	1 58
76	" 14..	Beach & Condit	Coal	17 50
77	" 14..	J. J. Thomas	Smoothing harrow	20 00
78	" 14..	Tenbrook, Pearce & Co	Sweet potatoes	6 50
79	" 14..	Dr. E. S. Hull	Expense to lectures	38 25
80	" 14..	H. Shepherd	Brick	20 25
81	" 14..	Hosford & Spear	Kerosene, wicks, etc	5 65
82	" 14..	Elisha Eldred	5,000 feet fencing	72 50
83	" 14..	A. F. Childs	Drain tile	117 10
84	" 14..	T. R. Leal	Wood for green house (fuel)	28 00
85	" 14..	Joseph McCorkle	Pumps, ropes for hay baling	77 50
86	" 14..	Flynn & Scroggs	Advertising and printing	25 50
87	" 14..	E. Snyder	Petty expense	27 47
88	" 18..	H. J. Detmers	Salary in full	50 00
89	" 20..	S. Edwards	Expense to meeting	27 10
90	" 20..	O. B. Galusha	" "	7 70
91	" 20..	A. M. Brown	" "	22 90
92	" 20..	J. L. Pickard	" "	12 60
93	" 20..	Geo. S. Brown	" "	11 50
94	" 20..	B. Pullen	" "	14 00
95	" 20..	P. R. Wright	" "	21 85
96	" 20..	A. Blackburn	" "	14 50
97	" 20..	L. W. Lawrence	" "	24 55
98	" 20..	J. P. Slade	" "	20 30
99	" 20..	M. C. Goltra	" "	19 00
100	" 20..	Geo. M. Pearson	" "	19 65
101	" 20..	Geo. S. Upstone	Salary March	60 00
102	" 20..	T. J. Burrill	Purchase of cow and hogs	68 25
103	" 20..	A. P. S. Stuart	Expense to lectures	2 75
104	" 20..	John Fischer	Flower pots	21 50
105	" 21..	Trevor & Co	10,000 labels	5 75
106	" 21..	Hovey & Co	One pound plaster	3 00
107	" 21..	W. C. Flagg	Expenses Corresponding Sec	11 25
108	" 21..	Geo. C. Hopkins	Library books	65 00
109	" 21..	Robert Douglas & Son	Trees	656 20
110	" 22..	J. M. Gregory	Salary April, 1871	333 33
111	" 22..	J. W. J. Kennedy	Cabinet case for Ent	90 00
112	" 22..	Marder, Luse & Co	Electrotype of building	4 00
113	" 22..	Adams, Blackburn & Lyon	One ream letter paper	5 00
114	" 30..	Wm. M. Baker	Salary April	166 66
115	" 30..	A. P. S. Stuart	"	166 66
116	" 30..	S. W. Robinson	"	166 66
117	" 30..	T. J. Burrill	"	150 00
118	" 30..	S. W. Shattuck	"	150 00
119	" 30..	E. Snyder	"	150 00
120	" 30..	Jas. Bellangee	"	83 33
121	" 30..	H. M. Douglas	"	83 33
122	" 30..	A. Thompson	"	83 33

List of Warrants—Continued.

No.	Date.	To whom.	For what.	Total.
123	April 30..	J. D. Foulon	Salary April	$50 00
124	" 30..	R. B. Warder	"	50 00
125	" 30..	H. K. Vickroy	"	75 00
126	" 30..	Thos. Franks	"	75 00
127	" 30..	G. Deuerlich	Chemicals and apparatus	52 52
128	May 3..	H. K. Vickroy	Boarding of hands	87 85
129	" 3..	H. K. Vickroy	Petty expense	7 02
130	" 3..	G. W. Graves	Two boxes horseradish	7 10
131	" 3..	J. Kile	Work in Horticultural Dept	18 00
132	" 3..	P. Gennadius	" " "	10 00
133	" 3..	H. Plessner	" " "	20 00
134	" 3..	F. Brickett	" " "	20 00
135	" 3..	G. S. Haskell	Grass seed	3 00
136	" 3..	S. Hutchinson	Two harrows	18 00
137	" 3..	Union Coal Company	Two cars coal	30 00
138	" 3..	Griggs House	Entertainment legislative com	22 50
139	" 3..	J. W. Colberg	Instruction of Union Band	65 00
140	" 3..	E. L. Lawrence	Expense of farm	454 69
141	" 3..	W. M. Haney	Black walnut lumber	20 96
142	" 3..	T. J. Burrill	Petty expense	21 85
143	" 3..	E. Snyder	Pay-roll for students' labor	498 76
144	" 3..	Thomas Franks	Plants, seeds, etc	30 50
145	" 3..	Fuller, Finch & Fuller	Glass	47 02
146	" 3..	Flynn & Scroggs	Book-binding for library	37 65
147	" 3..	P. Locrie	Advertising	6 00
148	" 3..	W. C. Flagg	On account farm expenses	200 00
149	" 13..	J. M. Gregory	Salary May, 1871	333 33
150	" 13..	W. M. Haney	Black walnut lumber	26 43
151	" 13..	J. Mauz	Engravings for catalogue	78 50
152	" 13..	S. W. Shattuck	Salary May, 1871	150 00
153	" 13..	A. W. McDonald	Five days' plowing	15 00
154	" 13..	J. W. Bunn	Local land taxes	2,168 54
155	" 13..	W. M. Baker	Salary May, 1871	166 66
156	" 13..	A. P. S. Stuart	"	166 66
157	" 13..	S. W. Robinson	"	166 66
158	" 13..	T. J. Burrill	"	150 00
159	" 13..	E. Snyder	"	150 00
160	" 13..	Jas. Bellangee	"	83 33
161	" 13..	H. M. Douglas	"	83 33
162	" 13..	A. Thomson	"	83 33
163	" 13..	R. B. Warder	"	50 00
164	" 13..	J. D. Foulon	"	50 00
165	" 13..	Thos. Franks	"	75 00
166	" 13..	H. K. Vickroy	"	75 00
167	" 13..	S. P. Percival	Seed potatoes	18 85
168	" 29..	J. E. Turnell	Hogs	40 00
169	" 30..	A. Moller & Co.	Duties on chem. from Germany	111 87
170	June 2..	E. L. Lawrence	Farm expenses, May	358 12
171	" 2..	H. K. Vickroy	Board of hands	66 40
172	" 2..	H. K. Vickroy	Petty expense	2 16
173	" 2..	J. H. Kile	One month's wages	17 66
174	" 2..	P. Gennadius	" " "	15 00
175	" 2..	Herman Plessner	" " "	20 00
176	" 2..	F. Brickett	" " "	20 00
177	" 2..	T. J. Burrill	" " "	16 18
178	" 2..	O. W. Silver	Work on Exp. farm	14 60
179	" 2..	G. N. Gridley	" " "	29 22
180	" 7..	I. D. Foulon	Salary balance of year	50 00
181	" 7..	R. B. Warder	" " "	150 00
182	" 7..	J. H. Pickrell	Expense to meeting	18 90
183	" 7..	J. M. Pearson	" "	21 65
184	" 7..	L. W. Lawrence	" "	27 05
185	" 7..	M. C. Goltra	" "	12 00
186	" 7..	T. J. Burrill	Salary balance academic year	450 00
187	" 7..	A. M. Brown	Expense to meeting	30 65
188	" 7..	S. W. Shattuck	Salary balance academic year	450 00
189	" 7..	James Bellangee	" " " "	250 00
190	" 7..	A. P. Stuart	" " " "	500 00
191	" 7..	Wm. M. Baker	" " " "	500 00
192	" 7..	S. W. Robinson	" " " "	500 00
193	" 7..	E. Snyder	" " " "	450 00
194	" 7..	H. M. Douglas	" " " "	250 00
195	" 7..	J. M. Gregory	" " " "	1,000 00
196	" 7..	D. C. Taft	Salary spring term	120 00
197	" 8..	E. Snyder	Contingent fund	75 00
198	" 8..	J. Mauz & Co.	Engraving	44 75
199	" 8..	S. W. Shattuck	Excavation for new building	92 25
200	" 8..	Geo. Ely	Blacksmithing	21 62
201	" 8..	Union Coal Co.	Two cars coal	30 00

List of Warrants—Continued.

No.	Date.	To whom.	For what.	Total.
202	June 8..	R. Peacock	Lumber	$102 74
203	" 8..	Larrabee & North	Circular saw and brass	4 80
204	" 8..	Deere & Co	One cultivator	18 00
205	" 8..	King & Hamilton	One corn plow	10 00
206	" 8..	Hovey & Co	Seeds	32 45
207	" 8..	Nicolet & Schoff	Printing and advertising	15 75
208	" 8..	Fuller & Fuller	Paints	11 63
209	" 8..	S. W. Robinson	Petty expenses Mech. department	20 80
210	" 8..	J. W. Colberg	Instruction of University Band	42 00
211	" 8..	E. V. Peterson	Stationery, etc	61 95
212	" 8..	M. E. Lapham	Lumber	51 59
213	" 8..	W. Price	Paint	4 02
214	" 8..	H. M. Douglas	Expense for library	10 07
215	" 8..	E. Snyder	Petty expense	51 13
216	" 8..	E. Snyder	Students' labor	573 71
217	" 9..	J. O. Cunningham	Cash adv. on taxes lands	284 32
218	" 14	P. Locrie	Printing and advertising	4 00
219	" 14..	Johnson Harvester Co	Parts and repairs	10 33
220	" 14..	I. B. and W. R. R. Co	Freight on chemicals	25 15
221	" 14..	Champaign Gas Co	Gas for May, 1871	16 40
222	" 16..	W. A. Baker	On account of purchase for library	200 00
223	" 19..	J. M. Gregory	" " " "	250 00
224	July 1..	H. K. Vickroy	Expense Horticultural department	210 82
225	" 1..	C. W. Silver	Work for June, 1871	29 25
226	" 1..	N. C. Ricker	Work on buildings	50 17
227	" 1..	E. C. Swartz	" "	21 00
228	" 1..	E. L. Lawrence	Expense of farm for June	653 18
229	" 1..	W. A. Chase	Work in gardens	10 00
230	" 1..	Rudolph Jeorg	" Horticultural department	21 96
231	" 1..	H. E. Robins	" shop	32 80
232	" 1..	G. N. Gridley	" Exp. farm	23 37
233	" 7..	J. Mauz	Engravings	53 50
234	" 7..	J. N. Wharton	Work in shop	33 25
235	" 7..	Chadden & Hesse	Lumber, etc	8 83
236	" 7..	Union Coal Co	Two cars coal	15 00
237	" 7..	J. Teeple	Assist. in library and office	50 00
238	" 7..	J. E. Cantrell	Work in shop	28 00
239	" 7..	I. C. R. R. Co	Advanced freights	55 17
240	" 7..	Frank Dunayski	Painting	6 40
241	" 12..	W. A. Chase	Work in orchards	3 00
242	" 12..	J. P. Campbell	" "	12 12
243	" 12..	John Paton	" armory	6 25
244	" 12..	C. A. Singlitary	" shop	18 11
245	" 12..	F. W. Satterlee	Cleaning cistern	3 00
246	" 13..	C. I. Hays	Work on University grounds	11 25
247	" 13..	A. White	One month's work in building	35 00
248	" 13..	T. Davis	" " " "	35 00
249	" 13..	Thomas Franks	Salary for June	75 00
250	" 13..	Alexander Thomson	Salary for June, 1871	83 33
251	" 13..	W. LeBaron	Lecture expenses	11 60
252	" 13..	George Ely	Blacksmithing	5 75
253	" 15..	Flynn & Scroggs	Printing catalogues, 1871	739 90
254	" 15..	Flynn & Scroggs	Programmes and advertising	19 80
255	" 15..	Fuller & Fuller	Chemicals, paints, glass	55 66
256	" 15..	J. M. Gregory	Petty expense	26 15
257	" 15..	W. C. Flagg	Expenses farm	50 00
258	" 15..	Simoneaw & Colburn	Muriatic acid	9 00
259	" 15..	State Journal Printing Co	Printing memorials	20 00
260	" 15..	Hovey & Co	Seeds	9 35
261	" 15..	E. Snyder	Petty expense	200 66
262	" 21..	Hovey & Co	Seeds	2 70
263	" 21..	F. W. Christian	Periodicals	22 00
264	" 21..	Dodson & Hodges	Hardware	106 90
265	" 21..	E. Snyder	Stand of colors	10 65
266	" 21..	M. F. Hatch	Work in machine shop	13 30
267	" 24..	D. Van Nostrand	Books for library	30 00
268	" 24..	E. Eldred	Lumber	279 10
269	" 24..	Leggat Bros	Books for library	556 68
270	" 24..	C. A. Prickett	Work in orchards	26 00
271	" 29..	H. E. Robins	" machine shop	29 75
272	" 29..	J. N. Wharton	" " "	36 75
273	" 29..	W. H. Hase	Cerpenter work in building	3 45
274	" 31..	J. E. Cantrell	Work in machine shop	50 00
275	" 31..	G. Gabriel	" harvest	6 50
276	" 31..	John Paton	" machine shop	42 00
277	" 31..	N. C. Ricker	" on building	59 80
278	" 31..	G. N. Gridley	" Experimental farm	24 64
279	" 31..	C. W. Silver	" " "	49 00
280	" 31..	E. L. Lawrence	Farm expense, July, 1871	301 83

List of Warrants—Continued.

No.	Date.	To whom.	For what.	Total.
281	Aug. 1..	L. W. Lawrence	Expense to meeting	$23 10
282	" 1..	J. H. Pickrell	" Ex. meeting	17 95
283	" 1..	J. H. Pickrell	Two Berkshire pigs	100 00
284	" 1..	M. C. Goltra	Expense to meeting	14 50
285	" 3..	A. M. Brown	" "	47 25
286	" 3..	H. Peddicord	Lime and lard	11 75
287	" 3..	E. Snyder	Petty expense	49 90
288	" 3..	F. W. Satterlee	Plastering	20 77
289	" 3..	Jesse Nash	1,008 feet lumber	30 24
290	" 3..	Hussey, Wells & Co	Tools, materials, etc	30 07
291	" 3..	Hall, Kimball & Co	Iron for engine	81 77
292	" 3..	J. Mauz	Engraving	17 00
293	" 3..	Editors of Nation	Subscription for 1871	5 00
294	" 3..	Fuller & Fuller	Paint	22 88
295	" 3..	Hall Safe and Lock Co	One safe	142 50
296	" 3..	D. M. Ford	Castings	29 63
297	" 3..	Frank Douglas	Oil cups and lubricator	10 99
298	" 3..	Larrabee & North	Tools and hardware	92 07
299	" 3..	Jefferson & Son	Teaming	7 00
200	" 3..	Frank Dunayski	Work on building	7 05
301	" 3..	Thomas Franks	Salary July, 1871	75 00
302	" 3..	A. Thomson	" "	83 33
303	" 3..	H. K. Vickroy	" "	75 00
304	" 3..	J. H. Kyle	One month's work, July, 1871	18 00
305	" 3..	P. Gennadius	" " "	12 69
306	" 3..	Herman Plessner	" " "	20 00
307	" 3..	F. Brickett	" " "	20 00
308	" 3..	H. K. Vickroy	Board of hands, July	71 63
309	" 3..	Rudolph George	Work in orchards	9 00
310	" 3..	Geo. H. Lyman	" shops	27 50
311	" 3..	A. C. Swartz	" on building	36 00
312	" 3..	T. J. Burrill	Sundry expenses	42 60
313	" 3..	C. A. Singletary	Carpenter work on building	15 75
314	" 3..	J. W. Dowell	Painting	17 00
315	" 3..	A. White	Work cleaning and white-washing	16 20
316	" 7..	J. Teeple	One month's work in library	50 00
317	" 7..	W. M. & J. F. Olcott	30 tons hard coal	255 00
318	" 7..	I. C. R. R. Co	Advanced freights	6 40
319	" 7..	George Ely	Blacksmithing	17 35
320	" 7..	Jesse Nash	Walnut lumber	79 29
321	" 7..	W. C. Flagg	Experimental farm	19 90
322	" 7..	W. J. W. Kennedy	Case for recitation room	20 00
323	" 7..	D. C. Kennedy	Work in shop	9 97
324	" 7..	T. Davis	" building	35 00
325	" 7..	F. Dunayski	" "	10 78
326	" 7..	W. J. Nash	Oak and ash lumber	62 35
327	" 19..	W. S. Chase	Work on building	10 08
328	" 19..	Meininger & Schick	Books and periodicals	26 09
329	" 19..	Larrabee and North	Tools and materials	17 13
330	" 19..	Park & Royer	Lumber	4 20
331	" 19..	Stock Journal Co	Subscription, 1871	2 00
332	" 22..	Keene & Cook	Books for library	267 30
333	" 22..	J. W. Dowell	Painting	23 20
334	" 22..	Charles Weeks	Oak and walnut lumber	202 15
335	" 22..	Champaign Gas Co	Lights for March and April	38 80
336	" 22..	Frederic Kaempfer	Eyes for cabinet	6 43
337	" 22..	A. Thomson	Salary to Aug. 25, 1871	69 45
338	" 22..	E. A. Robinson	Work in mechanical shop	25 00
339	" 29..	E. L. Lawrence	Farm expenses, August	317 59
340	" 30..	J. C. McCauley	Work in fields	7 12
341	" 30..	M. C. Goltra	Expenses to meeting	12 00
342	" 30..	W. C. Flagg	Salary superintendent	250 00
343	" 30..	A. M. Brown	Expenses to meeting	8 00
344	Sept. 1..	Frank Dunayski	Whitewashing building	18 23
345	" 1..	F. Brickett	One month's work in orchards	19 62
346	" 1..	Herman Plessner	" " "	18 00
347	" 1..	J. H. Kyle	" " "	18 00
348	" 1..	P. Gennadius	" " "	13 63
349	" 1..	W. S. Chase	Carpenter, building	10 20
350	" 1..	J. E. Cantrell	Work in shop	54 00
351	" 1..	C. I. Hayes	Work in shop and orchards	11 02
352	" 1..	J. Paton	" "	32 37
353	" 1..	N. C. Ricker	Carpenter work, building	67 65
354	" 1..	E. E. Perry	Work in shop and orchards	38 40
355	" 1..	C. W. Silver	Wages, August	38 40
356	" 1..	Enterprise Coal Co	Three cars coal	45 00
357	" 1..	Thos. Naughton	Photograph of building	3 00
358	" 1..	E. Eldred	Lumber	200 13
359	" 1..	J. McCorkle	Hardware	18 16

List of Warrants—Continued.

No.	Date.	To whom.	For what.	Total.
360	Sept. 1..	Fuller & Fuller	Paints and glass	31 32
361	" 1..	J. N. Wharton	Work in shop and building	53 00
362	" 1..	E. P. Walker	" "	53 00
363	" 1..	Thos. Franks	Salary, August, 1871	75 00
364	" 1..	H. K. Vickroy	" "	75 00
365	" 1..	A. C. Swartz	Work on building	47 25
366	" 1..	E. Snyder	Sundry expenses	57 14
367	" 1..	Wright & Bussey	Barrel salt	2 75
368	" 2..	H. K. Vickroy	Boarding hands, August	66 40
369	" 2..	T. Davis	White-washing building	59 24
370	" 2..	John Paton	Work in armory	13 75
371	" 2..	H. E. Robins	" shop	47 25
372	" 2..	T. J. Burrill	Petty expense	26 05
373	" 5..	Leggart Bros.	Books	37 03
374	" 7..	J. M. Gregory	Salary, September	333 33
375	" 8..	F. W. Stone	Two Hereford cattle	457 50
376	" 9..	G. D. Wicks	Team and carriage	10 00
377	" 11..	Harvey Sadowsky	Short-horn heifer	200 00
378	" 11..	G. Gabriel	Work in orchards	19 37
379	" 11..	W. S. Chase	Carpenter work on building	11 55
380	" 11..	C. I. Hays	Work in green house and grounds	53 23
381	" 11..	I. C. R. R. Co	Advanced freights	12 83
382	" 14..	Prairie Farmer Co	Publishing meeting of Industrial Ass'n	25 00
383	" 14..	S. W. Shattuck	Salary, September	150 00
384	" 14..	T. Davis	Carpenter work	14 00
385	" 14..	T. E. Rickard	Work in cabinet	21 25
386	" 14..	M. E. Lasher	Moving barn	60 00
387	" 14..	J. W. Dowell	Painting and materials	29 15
388	" 14..	D. E. Owens	Three stones for engine	70 00
389	" 18..	Frank Dunayski	Cleaning building	7 83
390	" 18..	E. A. Robinson	Work in mechanical shop	104 00
391	" 19..	Mrs. M. Clark	Scrubbing building	6 60
392	" 19..	N. W. Manufacturing Co	Engine furnishing	148 20
393	" 19..	E. E. Perry	Work in shop	15 62
394	" 19..	C. W. Silver	Work on Experimental farm	12 32
395	" 19..	B. K. Bliss & Son	Grass seed	12 17
396	" 19..	Mrs. P. W. Frisbie	Five American Cyclopedias	24 98
397	" 20..	Moller & Co	Shipping charges from Germany	56 51
398	" 20..	I. D. Foulon	Salary, August	75 00
399	" 20..	Chadden & Hessee	Engine castings	60 36
400	" 23..	Wier & Burson	Plastering and material	220 15
401	" 23..	Rohrbeck & Gobler	Chemicals, etc	87 30
402	" 23..	A. P. Stuart	Purchase of Mineralogical Cabinet	279 16
403	" 25..	R. A. Rogers	One Richards' indicator	76 50
404	" 25..	De Volson Wood	Morau's Hydrauliques	3 25
405	" 25..	M. Lukanitsh	Tools for shop	18 90
406	" 26..	N. C. Ricker	Carpenter work	54 65
407	" 26..	J. C. Craver	Work on farms	6 70
408	" 26..	J. Teeple	One month's salary	50 00
409	" 26..	Geo. Ely	Blacksmithing	3 85
410	" 26..	Adams, Blackmer & Lyon	Blanks and stationery	104 50
411	" 26..	Herman Plessner	One month's wages	21 23
412	" 29..	A. K. Williams	Books	13 00
413	" 29..	S. W. Robinson	Sundry expenses for shop	49 75
414	Oct. 2..	C. W. Silver	Salary, September 10–30, 1871	26 66
415	" 2..	W. M. Baker	Salary, September 1871	166 66
416	" 2..	S. W. Robinson	" "	166 66
417	" 2..	A. P. Stuart	" "	166 66
418	" 2..	T. J. Burrill	" "	150 00
419	" 2..	E. Snyder	" "	150 00
420	" 2..	H. K. Vickroy	" "	75 00
421	" 2..	Thos. Franks	" "	75 00
422	" 2..	D. C. Taft	" "	125 00
423	" 2..	H. J. Detmers	" "	150 00
424	" 2..	H. Hanson	" "	83 33
425	" 3..	A. M. Brown	Expense to meeting	12 25
426	" 3..	E. Snyder	Petty expense	56 29
427	" 3..	E. Snyder	Students pay roll, September	406 15
428	" 3..	E. Lawrence	Farm expenses, September	179 31
429	" 3..	H. K. Vickroy	Boarding farm hands	34 82
430	" 3..	F. Brickett	Wages, September	19 23
431	" 3..	Henry Swannell	Paint. glass, etc	67 51
432	" 3..	Miller & Toll	Material for erasers	2 33
433	" 3..	Beach & Condit	Coal for shop	6 25
434	" 3..	F. C. Marguard	Chemical apparatus	69 38
435	" 3..	Fuller & Fuller	Paint, glass, etc	52 83
436	" 3..	E. F. Hollister	Matting for library	24 98
437	" 3..	Elisha Eldred	Lumber	302 57
438	" 9..	J. M. VanOsdel	Expense to meetings	103 00

List of Warrants—Continued.

No.	Date.	To whom.	For what.	Total.
439	Oct. 9..	Enterprise Coal Co	Six cars coal	90 00
440	" 9..	I. C. R. R. Co	Advanced freights	75 40
441	" 9..	W. C. Flagg	Expense experimental farm	6 55
442	" 9..	J. M. Gregory	Salary, October	333 33
443	" 9..	I. D. Foulon	" one month	75 00
444	" 9..	John Fisher	Flower pots	11 46
445	" 9..	B. Westerman & Co	Books	5 34
446	" 9..	Meininger & Schick	"	8 40
447	" 9..	Flynn & Scroggs	Printing and advertising	24 40
448	" 9..	S. W. Shattuck	Salary, October 1871	150 00
449	" 9..	R. Peacock	Lumber	60 92
450	" 18..	C. Green	Brooms, pails, etc	4 15
451	" 23..	J. D. Wilder	Thirty yards slated paper	22 50
452	" 23..	A. S. Barnes & Co	Shipping charges on books	5 50
453	" 23..	Elisha Eldred	Lumber	31 04
454	" 23..	Dodson & Hodges	Hardware	55 28
455	" 23..	Jones & Co,	Bell	315 60
456	" 23..	J. Teeple	Salary one month	50 00
457	" 30..	A. S. Barnes & Co	Freight on books	37 05
458	" 31..	W. M. Baker	Purchase of books, etc., in Europe	2, 826 84
459	" 31..	A. P. S. Stuart	" chemical apparatus	1, 084 84
460	" 31..	W. M. Baker	Salary, October 1871	166 66
461	" 31..	A. P. S. Stuart	" "	166 66
462	" 31..	S. W. Robinson	" "	166 66
463	" 31..	T. J. Burrill	" "	150 00
464	" 31..	E. Snyder	" "	150 00
465	" 31..	D. C. Taft	" "	125 00
466	" 31..	H. J. Detmers	" "	150 00
467	" 31..	H. Hansen	" "	83 33
468	" 31..	Thos. Franks	" "	75 00
469	" 31..	H. K. Vickroy	" "	75 00
470	Nov. 1..	J. O. Cunningham	Six hundred and twenty-one posts at 12½c.	77 62
471	" 1..	J. O. Cunningham	Expense to meeting	5 75
472	" 1..	J. M. Gregory	Purchase of books and apparatus	558 75
473	" 1..	J. H. Pickrell	Expense to meeting	8 90
474	" 1..	Flynn & Scroggs	Printing	38 00
475	" 1..	M. C. Goltra	Expense to meetings	13 00
476	" 1..	L. W. Lawrence	" "	22 60
477	" 1..	A. M. Brown	" "	6 00
478	" 1..	J. H. Pickrell	Money order for stock purchase	1, 051 00
479	" 2..	J. W. Colberg	Music lessons to band	20 00
480	" 2..	E. V. Peterson	Stationery, etc	34 87
481	" 2..	I., B. and W. R. R. Co	Freight on books	8 15
482	" 2..	Palmer, Fuller & Co	Lumber	25 67
483	" 2..	Nicolet & Schoff	Printing	18 00
484	" 2..	S. S. Shattuck	Payment of digging well, etc	45 45
485	" 2..	Trevet & Green	Hardware and tools	214 86
486	" 2..	Geo. Ely	Blacksmithing	20 45
487	" 2..	E. G. Larned & Co	Hardware	13 68
488	" 2..	Keen & Cook	Books	7 17
489	" 2..	H. K. Vickroy	Board of hands, October	9 10
490	" 2..	Walker Bros	Planing lumber	71 00
491	" 2..	C. W. Silver	Services in laboratory	40 00
492	" 3..	T. J. Burrill	Cash paid for labor	3 42
493	" 3..	J. M. Gregory	Expense purchasing books	4 43
494	" 4..	M. Parr	Work in laboratory	3 65
495	" 4..	W. P. Sweet	Lightning rods	101 60
496	" 6..	E. Snyder	Students' pay-roll, October	565 02
497	" 7..	F. M. Hatch	Teaching the classes, to date	70 00
498	" 7..	E. L. Lawrence	Salary, October, and farm expenses	209 53
499	" 7..	I. C. R. R. Co	Advanced freights	10 15
500	" 13..	I. D. Foulon	Salary one month	75 00
501	" 13..	B. C. Westerman & Co	Books	5 85
502	" 13..	H. M. Clark	6,908 tile	117 30
503	" 13..	W. C. Flagg	Account of salary	23 50
504	" 16..	Enterprise Coal Co	Three cars coal	51 00
505	" 2..	J. M. Gregory	Salary October, 1871	333 33
506	" 21..	D. Van Nostrand	Books	224 64
507	" 25..	J. Duerlich	Books	244 34
508	" 25..	H. Mahlman	Chemical apparatus	217 18
509	" 25..	J. Teeple	One month's salary	50 00
510	" 27..	Fairbanks, Greenleaf & Co	Bills of scales	197 00
511	" 27..	M. Miles	Devon heifer	200 00
512	" 27..	Col. Sam'l. L. Colt	Two Jersey cattle	475 00
513	" 27..	A. S. Barnes & Co	Shipping expense from Europe	66 70
514	Dec. 1..	W. M. Baker	Salary—November	166 66
515	" 1..	A. P. S. Stuart	" "	166 66
516	" 1..	S. W. Robinson	" "	166 66
517	" 1..	J. F. Carey	" "	166 66

List of Warrants—Continued.

No.	Date.	To whom.	For what.	Total.
518	Dec. 1..	T. J. Burrill	Salary—November	$150 00
519	" 1..	S. W. Shattuck	" "	150 00
520	" 1..	E. Snyder	" "	150 00
521	" 1..	J. E. Webb	" "	150 00
522	" 1..	H. J. Detmers	" "	150 00
523	" 1..	D. C. Taft	" "	125 00
524	" 1..	H. M. Hansen	" "	83 33
525	" 1..	Thos. Franks	" "	75 00
526	" 1..	H. K. Vicroy	" 's	75 00
527	" 1..	I., B. and W. R. R. Co.	Freight	9 55
528	" 1..	E. L. Lawrence	Farm expense	191 51
529	" 2..	C. Butler	Work in orchards	5 39
530	" 2..	H. K. Vickroy	Boarding hands	5 35
531	" 2..	N. O. Albert	Work in orchards	16 17
532	" 2..	C. Bussey	Eight days' work in orchard	6 15
533	" 2..	C. W. Silver	Salary, November	40 00
534	" 2..	Leggat Bros	Books	161 89
535	" 5..	Thos. Bradburn	Books	45 00
536	" 6..	M. C. Goltra	Expense to meeting	12 00
537	" 7..	C. Green	Pail and oil can	5 10
538	" 7..	R. Peacock	Lumber	396 34
539	" 7..	J. D. Welder	State paper	11 67
540	" 7..	Chadden & Hesse	Castings	20 50
541	" 7..	Robinson & Son	Fire brick	41 25
542	" 7..	J. Grinnel	Shipping models	15 00
543	" 7..	Nicolet & Schoff	Printing	18 50
544	" 7..	Empire Coal Co	Fuel and light	24 00
545	" 7..	Walker Bros	Dressing lumber	28 97
546	" 7..	Lee & Sons	Apple stocks	64 50
547	" 7..	L. Woodward	Pear stocks	60 75
548	" 7..	L. W. Faulkner	Glass and paint	3 30
549	" 7..	J. A. Root	Apple seeds	41 50
550	" 7..	A. P. S. Stuart	Periodicals	11 54
551	" 7..	E. T. Gehlman	Plastering and lumber	138 56
552	" 7..	Otto Rettig	Hanging wall paper	6 00
553	" 7..	Herman Plessner	Work	1 54
554	" 7..	J. Burt	Four pigs	4 00
555	" 7..	M. E. Lapham & Co	Lumber	6 58
556	" 7..	S. W. Robinson	Traveling expenses	46 50
557	" 8..	Prof. E. Snyder	" "	20 15
558	" 8..	Prof. E. Snyder	Petty expenses October and November	106 39
559	" 8..	Prof. E. Snyder	Students' pay-roll November	521 99
560	" 8..	W. C. Flagg	Salary	500 00
561	" 11..	J. H. Kyle	Two days' work	1 54
562	" 11..	Leggat Bros	Nautical almanac	1 79
563	" 11..	J. M. Gregory	Salary December, 1871	333 33
564	" 11..	M. Gifford	Four and half days' work	5 20
565	" 11..	Christian Lese	Models	203 13
566	" 16..	J. Colberg	Lessons to University Band	32 00
567	" 16..	A. P. S. Stuart	Purchase of chemical apparatus	288 83
568	" 16..	J. D. Fonlon	Salary one month	75 00
569	" 16..	Ayers & Dean	Castings for shop	249 79
570	" 16..	L. W. Morris	Freight from Germany	23 45
571	" 16..	I. D. Foulon	Petty expense	4 30
572	" 16..	Champaign Gas Co	Gas for October and November	64 80
573	" 18..	Stillwell & Bierce	No. 2 heater	87 50
574	" 18..	L. H. Corey	600 crinoidea	50 00
575	" 18..	J. F. Corey	Salary—December, 1871	166 66
576	" 20..	W. M. Baker	" "	166 66
577	" 20..	A. P. S. Stuart	" "	166 66
578	" 20..	S. W. Robinson	" "	166 66
579	" 20..	T. J. Burrill	" "	150 00
580	" 20..	S. W. Shattuck	" "	150 00
581	" 20..	E. Snyder	" "	150 00
582	" 20..	J. B. Webb	" "	150 00
583	" 20..	H. J. Detmers	" "	150 00
584	" 20..	D. C. Taft	" "	125 00
585	" 20..	H. Hansen	" "	83 33
586	" 20..	Mathews & Dever	Insurance	460 50
587	" 20..	J. Teeple	One month's work	50 00
588	" 20..	G. Lemberger	Work on Experimental farm	27 75
589	" 26..	J. O. Cunningham	Books	14 50
590	" 26..	J. M. Gregory	Periodicals	100 00
591	" 27..	I., B. W. and R. R.	Freights	11 15
592	" 27..	I., B. W. and R. R.	Freights	15 10
593	Jan. 3..	N. O. Albert	Work in orchards	29 35
594	" 3..	E. L. Lawrence	Farm expense	124 86
595	" 3..	H. K. Vickroy	Salary, December, 1871	75 00

List of Warrants—Continued.

No.	Date.	To whom	For what.	Total.
596	Jan. 3..	Thos. Franks	Salary, December, 1871	$75 00
597	" 3..	Ohlrich & Co	Shipping charges	64 29
598	" 4..	Moller & Co	"	22 00
599	" 5..	E. C. Coal Co	Two cars coal	40 00
600	" 6..	C. W. Silver	Salary, December, 1871	40 00
601	" 6..	U. S. Patent Office	Reports	22 50
602	" 8..	I. C. R. R. Co.	Advanced freights	35 20
603	" 8..	J. H. Pickrell	Expense to meeting	23 55
604	" 8..	J. H. Pearson	" two meetings	40 50
605	" 8..	E. Cobb	" to meeting	23 05
606	" 8..	A. M. Brown	" "	28 25
607	" 8..	L. W. Lawrence	" "	23 85
608	" 8..	M. C. Goltra	" "	12 00
609	" 10..	D. Van Nostrand	Books	1 32
610	" 10..	Journal Printing Co	Printing circulars	10 00
611	" 10..	Trevess & Green	Hardware	201 20
612	" 10..	E. Halberstand	Flower pots	7 65
613	" 10..	T. J. Burrill	Sundry expenses	60 90
614	" 10..	Hessler & Coler	Fruit cans, etc	163 10
615	" 10..	Thos. Lindsay	Fence posts	24 00
616	" 10..	Rock River Paper Co	Building paper for green-house	22 30
617	" 10..	R. F. Pope	Scions and seeds	25 42
618	" 10..	Strong Bros	Brooms	3 25
619	" 10..	Jefferson Bros	Use of team	2 00
620	" 10..	Walker Bros	Dressing lumber	7 75
621	" 10..	George Ely	Blacksmithing	10 80
622	" 10..	I. D. Foulon	Care of library	97 25
623	" 10..	Nicolett & Schoff	Printing and advertising	18 50
624	" 10..	Hosford & Spear	Kerosine oil	2 90
625	" 10..	A. Barr	Sash for barns	3 75
626	" 10..	Samuel Edwards	Pear Cions	4 25
627	" 10..	Webster, Davis & Co	Lumber	35 88
628	" 10..	S. W. Shattuck	Brick for house	5 00
629	" 10..	T. J. Burrill	Sundry expense	15 65
630	" 10..	T. S. Hubbard,	Redeeming lot No. 206	8 84
631	" 10..	Ohlrichs & Co	Shipping charges	23 60
632	" 10..	I. D. Foulon	Salary, one month	75 00
633	" 11..	Thos. Meehan	Services as lecturer	200 00
634	" 12	Prof. E. Snyder	Students' labor pay-roll, Dec	467 79
635	" 12..	Rohrbach & Gobler	Apparatus and chemicals	61 60
636	" 13..	D. A. Steadman	Salary, Dec. 25 to June 1	20 83
637	" 22..	J. Teeple	" January	50 00
638	" 24..	J. M. Gregory	" "	333 33
639	" 24..	P. Lochrie	Printing and advertising	10 00
640	" 27..	W. Apel	Phil. apparatus	358 12
641	" 27..	W. M. Baker	Salary, January	166 66
642	" 27..	A. P. S. Stuart	" "	166 66
643	" 27..	S. W. Robinson	" "	166 66
644	" 27..	J. F. Carey	" "	166 66
645	" 27..	T. J. Burrill	" "	150 00
646	" 27..	S. W. Shattuck	" "	150 00
647	" 27..	E. Snyder	" "	150 00
648	" 27..	J. B. Webb	" "	150 00
649	" 27..	D. C. Taft	" "	150 00
650	" 27..	H. Hanson	" "	83 33
651	" 27..	D. A. Steadman	" "	83 33
652	" 27..	H. K. Vickroy	" "	75 00
653	" 27..	T. Franks	" "	75 00
654	" 27..	C. W. Silver	" "	40 00
655	" 27..	M. Miles	" "	333 33
656	" 27..	I. C. R. R. Co	Three cars coal	150 00
657	Feb'y 3..	E. L. Lawrence	Farm expenses, January	140 82
658	" 3..	W. F. & J. M. Olcott	One car hard coal	110 00
659	" 3..	E. C. Coal Co	Two cars coal	40 00
660	" 3..	E. Snyder	Students' labor, January	489 30
661	" 3..	W. L. Smith	Repairing chimney	7 00
662	" 3..	I. D. Ferris	" furnace	5 00
663	" 3..	S. M. Marble	9,870 lbs. coal	25 20
664	" 3..	I. D. Foulon	Salary, one month	75 00
665	" 12..	F. W. Christian	Bill of periodicals	70 60
666	" 13..	Wm. Williams	Repairing boiler	145 00
667	" 13..	H. K. Vickroy	Salary, February	75 00
668	" 22..	A. M. Brown	Expenses to meeting	33 50
669	" 27..	Schaffer & Harwood	One car coal	45 00
670	" 27..	U. S. Patent Office	Bound reports	32 50
671	" 27..	Ayres & Dean	Castings	9 60
672	" 27..	A. H. Andrews	Liquid slating	4 75
673	" 27..	J. Bacon	Thirteen cars coal	120 62
674	" 27..	N. O. Albert	Work, January, 1872	17 90

List of Warrants—Continued.

No.	Date.	To whom.	For what.	Total.
675	Feb'y 27..	Fuller & Fuller	Glass and oils	$157 97
676	" 27..	Fuller & Fuller	Shipping charges	33 08
677	" 27..	R. A. Sutton	Brick	69 00
678	" 27..	E. L. Lawrence	Farm expenses, February	185 52
679	" 27..	E. L. Lawrence	Lecture expenses	27 30
680	" 27..	B. F. Johnson	" "	26 63
681	" 27..	Enterprise Coal Co	Two cars coal	40 00
682	" 27..	Metallic Plane Co	Tools	11 00
683	" 27..	Miller & Toll	Goods for library	6 08
684	" 27..	L. W. Morris	Shipping charges	19 93
685	" 27..	D. Van Nostrand	One book	8 28
686	" 27..	L. C. Garwood	Clock repair and glass	21 25
687	" 27..	T. G. Landsden	Piping	8 78
688	" 27..	J. M. Gregory	Lecture expense	43 80
689	" 27..	Bliss, Tillotson & Co	Electric wire	6 25
690	" 27..	J. M. Gregory	Salary, February	333 36
691	" 27..	M. Miles	" "	333 33
692	" 27..	Wm. M. Baker	" "	166 72
693	" 27..	A. P. S. Stuart	" "	166 72
694	" 27..	S. W. Robinson	" "	166 72
695	" 27..	J. F. Carey	" "	166 70
696	" 27..	T. J. Burrill	" "	150 00
697	" 27..	S. W. Shattuck	" "	150 00
698	" 27..	E. Snyder	" "	150 00
699	" 27..	D. C. Taft	" "	150 00
700	" 27..	J. B. Webb	" "	150 00
701	" 27..	H. Hansen	" "	85 35
702	" 28..	A. D. Steadman	" "	83 34
703	" 28..	Thomas Franks	" "	75 00
704	" 28..	J. Teeple	" "	50 00
705	" 28..	Chas. W. Silver	" "	40 00
706	" 28..	Trevett & Green	Hardware	288 03
707	" 28..	Finch & Co	100 paper bags	3 50
708	" 28..	M. Miles	Expense for cattle and lecturing	37 55
709	" 28..	W. C. Flagg	Salary	.....
710	" 28..	A. P. Stuart	Lecturing expenses	13 65
711	" 28..	J. B. Turner	" "	14 75
712	" 28..	Wm. Le Baron	" "	14 10
713	" 28..	L. D. Whiting	" "	26 50
714	" 28..	T. A. E. Holcomb	" "	1 00
715	March 4..	D. C. Taft	" "	7 60
716	" 4..	S. W. Shattuck	" "	27 25
717	" 4..	E. S. Hull	" "	125 00
718	" 4..	E. Snyder	Students' pay-roll	475 04
719	" 4..	J. M. Gregory	Sundry expenses	174 37
720	" 4..	Champaign Gas Co	Gas for Dec. Jan. and Feb	68 40
721	" 4..	E. M. McAllister	Postage on periodicals	9 48
722	" 4..	I. C. R. R. Co	To Treasurer for book transfers	1,344 15
723	" 4..	J. W. Colberg	Ten lessons to University band	40 00
				$68,560 13

J. SNYDER, *Recording Secretary.*

URBANA, *March* 10, 1872.

Statement of assets of Industrial University, March 1, 1872.

Buildings:

New University building (not completed)	$75,000 00
Mechanic and Military Hall	25,000 00
Old University building	45,000 00
Ornamental and Parade Grounds	5,000 00

Apparatus and Furniture:

Library	20,000 00
Cabinets, mechanical and engineering	5,000 00
Chemical Laboratory appropriation	5,000 00
Furniture and heating apparatus	5,000 00

Farms:		
160 acres, "Griggs Farm," (rented)		$9,600 00
410 acres, stock farm		32,800 00
House and barn		10,800 00
Teams		750 00
Stock		2,615 00
Implements and tools		1,400 00
Produce unsold		1,610 00
Experimental farm, per acre, at $200		14,000 00
Balance scales, implements, etc.		200 00
Horticultural Department:		
110 acres orchard, etc., at $250		27,500 00
20 acres forest plantation, at $240		4,800 00
3 dwelling houses		4,500 00
Barn and corn crib		6,000 00
Green and hot house		3,500 00
Nursery stock		2,500 00
Teams		600 00
Implements		1,000 00
Produce unsold		300 00
Shops:		
Carpenter shops, lumber on hand		465 87
Hardware on hand		28 15
Working benches		96 00
Tool cases		75 00
Small tools		360 98
Mechanical Shop:		
Boiler, engine, 3 lathes, plainer, shaftings, beltings, pattern-maker's tools, bench tools, etc., per inventory		5,574 50
Land Scrip and Located Land:		
24,460 M. scrip, 25,440 acres located		50,000 00
Interest Bearing Funds:		
$354,000 in interest bearing bonds, as per Treasurer's statement	$354,000 00	
Mortgage notes, bearing interest at 8 per cent.	8,600 00	
		$362,600 00

RECAPITULATON.

University buildings	$150,000 00
Apparatus and furniture	35,000 00
Farms	73,775 00
Orchards and gardens	50,700 00
Shops	56,602 50
Land scrip, and lands located	50,000 00
Total	$416,077 50
Interest bearing	362,600 00
Grand total	$778,677 50

Appropriations.

Current appropriations, at March meeting, 1871	$41,463 88	
" " additional, for building repairs	1,000 00	
" " " for mechanical department	1.900 00	
		$44,363 88
Unexpended State appropriation of 1870		4,419 70
State appropropriation, 1871:		
Main building	$75,000 00	
Mechanical and Military Hall	25,000 00	
Library and Cabinet	5,000 00	
Experiments and Lectures	3,000 00	
Chemical Department	2,750 00	
Horticultural Department	1,750 00	
		112,500 00
Total appropriations		$161,283 58

Expenditures.

On warrants drawn, from No. 1 to 723, inclusive	$68,560 13
From State Treasury, on warrants and vouchers	98,357 59
Total expenses	$166,283 58

STATEMENT *of the Appropriations, Expenditures and Credits of Departments of the Illinois Industrial University, from March* 1, 1871, *to February* 29, 1872.

Title.	Total appropriations.	Total expense.	Overdrawn.	Unexpend'd balance.	Earnings and credits of departments.	Remarks.
Board expenses	$1,200 00	$1,160 35		$30 65		
Salaries	25,000 00	23,473 58		1,526 42		Part of Treasurer's and Cor. Secretary's salaries, unpaid
Agricultural Department	3,686 41	6,716 30	3,029 89		7,019 88	Sales of farm produce
Horticultural Department	5,498 12	6,854 86	1,356 74		1,338 52	Sales from garden and orchards
Insurance	400 00	460 50	60 50		59 29	Reimbursed by Ætna Insurance Company
Taxes on lands	2,235 00	2,461 70	226 70			
Building repairs	2,000 00	2,654 63	654 53			
Fuel and light	1,000 00	2,190 93	1,190 93		1,044 23	Sales of fuel to students, etc.
Printing, advertising and stationery	1,000 00	1,477 56	477 56		542 85	Advertisements in University Circular
Incidental expenses	1,000 00	1,231 40	231 41			
Library and cabinet	7,000 00	7,029 96	29 96		154 31	Sale of duplicates
Unpaid bills, 1871	800 00	731 43		68 57		
Safe	100 00	142 50	42 50			
Military Department	250 00	256 47	6 47			
Mechanical Department	2,400 00	4,487 99	2,087 99		1,763 07	Sales and work
Chemical Department	4,714 05	3,077 60		1,636 45		
Carpenter shop		1,725 70	1,725 70		1,073 48	Sales and work
New University building	75,000 00	73,357 59		1,642 41		
Mechanic and Military Hall	25,000 00	25,000 00				
Experiments and lectures	3,000 00	2,417 66		582 34	76 48	Sales of broom corn
Total	$161,283 58	$166,917 72				

The fifth column shows the earnings of the departments, for comparison with the excess or overdraft on appropriation. In the shop account the materials and improvements will have to be considered as found in the reports of the Superintendents.

URBANA, ILL., *March* 10, 1872.

E. SNYDER, *Recording Secretary.*

STATEMENT *of the Labor of Students, done in the different Departments named, for the year beginning March* 1, 1871, *and ending March* 1, 1872.

Time.	Mechanical Departm't.	Carpenter shop.	Horticult'al Departm't.	Building repairs.	Agricultu'l Departm't.	Chemical Laborat'y	Janitors' fees and incidental expenses.	Library and Cabinets.	Military Dep't.	Guarding buildings.	Total.
March, 1871	$129 55	$31 14	$154 16	$6 12	$7 08	$1 25	$62 50	.....	.....	.....	$391 80
April, 1871	78 86	30 53	307 04	3 00	3 00	.....	71 40	$4 93	.....	.....	498 76
May, 1871	178 42	32 84	223 09	43 27	.....	.....	90 89	5 20	.....	.....	573 71
Vacation work	728 83	54 65	322 09	135 77	188 37	.....	.....	21 25	$20 00	.....	1,470 96
September and October, 1871	153 53	66 29	144 11	7 88	2 49	.....	29 85	.....	2 00	.....	406 15
November, 1871	168 08	169 13	134 12	15 53	3 24	.....	55 37	17 25	2 50	.....	565 02
December, 1871	135 11	157 39	125 88	10 67	8 30	.....	77 77	.....	6 87	.....	521 99
January, 1872	212 08	83 57	41 15	12 57	.....	.....	40 95	56 84	.....	$42 14	489 30
February, 1872	194 84	86 39	73 95	5 00	.....	.....	56 69	31 22	3 50	23 45	475 04
Total	$1,979 30	$711 93	$1,525 59	$239 61	$212 48	$1 25	$485 42	$136 69	$34 87	$65 59	$5,392 73

URBANA, ILL., *March* 10, 1872.

E. SNYDER, *Recording Secretary.*

MINUTES OF MEETING OF EXECUTIVE COMMITTEE.

AUGUST 2, 1871.

The Committee met at 3 P. M., in the Regent's office.

Present: Messrs. Brown, Cobb, Cunningham, Goltra, Pickrell, and the Regent.

The reading of the minutes of the last meeting was dispensed with.

The report of the Book-keeper, his statement of expenditures to date, and of collections, were read and approved.

The bills presented for payment were audited and allowed.

The Committee then took a recess till 7:30 P. M.

EVENING SESSION.

The Committee assembled at 7:30 P. M

Dr. Gregory and Judge Cunningham were appointed a committee, with power to act, to have lightning rods put on barns and house on horticultural ground.

The Regent was authorized to employ the following assistants and teachers: Mr. R. E. Warder, assistant in Chemical Department, at a salary of $1,000 per year; Mr. I. D. Foulon, as teacher of French, and general assistant, at a salary of $75 per month, for ten months; a private secretary, at a salary of $50 a month.

The Regent reported progress of negotiations to obtain a competent drawing teacher, and was authorized to employ the candidate, at a salary of $1,000 per year.

It was voted that there be employed a competent Assistant Professor of Civil Engineering, at a salary not exceeding $1,500 per annum.

The Faculty were authorized to change the course of Veterinary lectures from the winter to the fall term, if found desirable.

A hard wood floor was ordered to be laid in the main hall and corridors of the first story.

On motion, permission was given to the farm superintendents to sell the old hay press, and dispose of the other implements worn out, or not desirable, excepting those donated to the University.

It was moved and carried that the Regent be directed to have the garden barn moved, and fitted up for students.

The Regent was also authorized to have the Agricultural Museum fitted up into students' rooms, if it should become necessary.

Voted to purchase scales for Experimental farm.

The purchase of 30 tons hard coal and 100 tons Illinois coal, for winter storage, was approved.

On motion of Judge A. M. Brown, it was

Resolved, That the Regent and Chairman of the Agricultural Committee be authorized to purchase a male and female of the Hereford cattle, mentioned in a recent letter from Dr. Miles to the Regent; and that they are also authorized to purchase such individuals as they may deem necessary, of other breeds of cattle, provided such expenditures shall not exceed $3,500.

The making of the necessary settees, library cases, desks for Chemical laboratory, and purchase of matting for library, was referred to the Regent, with power to act.

On motion of Mr. Cobb, the Regent and Judge Cunningham were appointed a committee to purchase a bell, weighing at least 1,000 lbs., for the new University building.

The following preamble and resolution of Judge Cunningham were adopted:

WHEREAS it is represented that the architect of the new University building recommends the use of iron columns under the floor of the Chapel, in southeast wing; therefore,

Resolved, That the contractor for construction of said building be requested to put in such columns, in lieu of the brick piers, provided that the size and shape of such iron columns be approved by the architect.

The following bills on new building were then approved, and vouchers drawn and signed for the same:

E. F. Gehlman, material and work for new building	$8,429 80
E. F. Gehlman, Mechanical hall, work and material	5,952 58
S. W. Shattuck, summary of bills, for wells, brick for same, grading and services as sup't	315 39

The Committee adjourned, to meet on Wednesday, Aug. 30, 1871, at 4 P. M.

J. M. GREGORY, *Regent.*

E. SNYDER *Rec. Sec'y.*

AUGUST 30, 1871.

The Committee met at 4 P. M., in the Regent's office.

Present: Messrs. Brown, Cobb, Cunningham, Goltra, Pickrell, and the Regent.

Reading of the minutes of last meeting dispensed with, and resolved to take a recess till 7:30 P. M., in order to inspect the work on buildings and farms.

EVENING SESSION.

Committee assembled at 7:30 P. M.

Report of Book-keeper, statement of collections, and expenditures to date, were read and approved, and the bills presented for payment audited and allowed.

On motion of Judge Cunningham, the amount of $600 was assigned from the State appropriation, for Mechanic and Military hall, for the construction of racks for 300 muskets, and shelves for accoutrements, also $100 for the purchase of instruments for military band.

The Regent was directed to make applications for arms, ammunition, etc., necessary for military instruction.

On Mr. Cobb's motion, the Regent was requested to procure estimates on heating apparatus, furniture and fixtures for new University building.

On recommendation of the Regent, Prof. D. C. Taft was appointed Assistant Professor in Geology for the next academic year, at a salary of $1,500 per year.

Hon. W. C. Flagg, Superintendent of Experiments, was requested to report to the Committee, at his earliest convenience, on the required alterations, or accommodations of barn for the purpose of experimental feeding.

It was ordered that E. L. Lawrence bring before this Committee an estimate of cost and plan of location of certain ditches contemplated to be made on Stock farm.

The bill of Mr. F. W. Stone of Guelph, Canada, for two Hereford cattle, amounting to $400 in gold, was audited and ordered to be paid.

It was moved and carried that the Farm Superintendent be authorized to sell the remaining 29 head of cattle, and such hogs as are ready for sale.

The sum of $25 was appropriated to defray the expense of reporting and publishing the proceedings of the recent meeting of representatives of Agricultural and Industrial Institutions at Chicago; the same to be charged to the Experimental appropriation.

Prof. S. W. Robinson was authorized to buy a boiler large enough to feed the engine and warm the rooms of the Military and Mechanical hall, and directed to use his discretion as to kind of boiler to be purchased.

It was resolved that the Regent and Corresponding Secretary be authorized to make such arrangements for holding, during the coming winter, Farmers' Institutes at the University, and other parts of the State, as they may find advisable, provided that not more than $500 be used in such Institutes.

The preparations for the laying of the corner stone of the new University building, and dedication of the Mechanic and Drill hall, were

referred to a committee, consisting of Judge Cunningham and the Regent. It was decided that 40 feet be added to the width of Green street, where it passes through W½ W½ N. E½ of section 18, provided that no part of such addition be regarded as a public donation of such.

The following accounts, approved by J. M. Van Osdel, architect, were audited and vouchers signed:

E. F. Gehlman, for main University building, labor and materials	$14,348 14
E. F. Gehlman, for Military and Mechanical hall, labor and materials	3,599 25
S. W. Shattuck, summary of sundry accounts	127 75

The Committee then adjourned to meet Sept. 13, 1871.

NOVEMBER, 1871.

The Committee met at the Regent's office, on Wednesday, November 1st, 1871, at 4 o'clock P. M.

Present—Messrs. Brown, Cobb, Cunningham, Goltra, Lawrence and the Regent.

Absent—Messrs. Griggs and Pearson.

The reading of the minutes of last meeting was dispensed with.

Judge J. O. Cunningham offered the following resolutions, which were adopted:

Resolved, That the Regent be instructed to cause regular daily meteorological observations to be taken from this date, or as soon as suitable instruments for such observations can be obtained; and that accurate records of such transactions be kept in the University.

Resolved, That the Regent and Faculty be requested, as soon as circumstances will permit, to fix accurately the point on the Illinois Central Railroad where the fortieth parallel of latitude crosses said road, and take measures for permanently establishing a monument at said point, and that they likewise be requested to fix the exact latitude and longitude of the northeast tower of the new University building.

The Book-keeper's report of collections and expenditures to date, was then read and adopted. An amount of $20.21, expended from the contingent fund, was audited and allowed.

The bills and accounts which have been paid since last meeting, and such as were now presented for payment, were audited and allowed.

The Committee then took a recess, to meet again at 7:30 P. M.

The Committee re-assembled at 7:30 P. M.

The Regent reported that the Special Committee appointed to purchase blooded stock had made the following purchases:

One young Hereford bull, "Challenger,"	$150
One yearling Hereford heifer, "Graceful 6th,"	250
(These were purchased on the recommendation of Dr. Miles, from Mr. Jones, a breeder in Canada.)	
One young short-horn bull, "Baron Lonajo,"	700
(Purchased of J. H. Pickrell, who donates $200 of the price.)	
One short-horn yearling heifer, "Lady Una," bought of Mr. Harvey Sodowsky	200
One Ayrshire bull calf, 6 months old	150
One Ayrshire yearling heifer, "Niobe,"	300
(These were purchased of Hon. M. King, of Minnesota.)	

All the foregoing are now on the Stock farm, and are doing well.

The Committee have also bargained for one Devon heifer, Minnewawa, for $200, on the way here from the Michigan Agricultural College.

One Jersey bull and one heifer, to be received from Col. Colt, of Hartford, Connecticut, to cost together, $300. Hon. W. C. Flagg has offered us a donation of a young Devon bull from his herd. This will give us a male and a female of each of the leading breeds of neat cattle.

There have also been purchased or donated the following pure bred animals, now on the farm:

Four Southdown ewes, bought of M. Jones, for	$100
One Southdown buck, donated by J. H. Pickrell	
One Berkshire boar, "Primus," bought of J. H. Pickrell	50
One Berkshire sow, "Biddy," bought of J. H. Pickrell	50
Two Berkshire sows, donated by J. H. Pickrell	

The Committee contemplates other purchases, when a full report will be made.

The money for several of these purchases has been advanced by Mr. J. H. Pickrell, and a warrant is asked to reimburse him.

This report was accepted, and a warrant for $1,051 ordered to be drawn to J. H. Pickrell, for moneys advanced in the purchase of stock.

The purchase of one Durham heifer from Mr. H. Sodowsky and one Devon bull calf from the Michigan Agricultural College, were sanctioned, and warrants ordered to be drawn for the amounts.

It was resolved that the Committee accept, with thanks, the donation of one Devon bull calf from Hon. Willard C. Flagg.

The thanks of the Committee were also expressed to Mr. Burdett Loomis, for a donation of pictures of pure bred sheep.

It was voted that the Chairman of the Committee on Agriculture be requested to make such arrangements as he may see fit, for the care of the blooded stock, and report at the next meeting.

The plan for ditching and drainage, presented by Farm Superintendent Lawrence was accepted, and he was authorized to carry it out. He was also directed to sell, at his discretion, three horses, now not needed for work.

It was decided that the arrangement for the employment of Mr. H. K. Vickroy for next year, be referred to a committee, to consist of Dr. J. M. Gregory and Judge A. M. Brown, to report at next meeting.

A contemplated sale of a span of mules from the Horticultural Department, was referred to the Regent and Prof. T. J. Burrill, with power to act.

The following accounts of the State appropriation were audited and allowed:

E. F. Gehlman, for University, main building, material and work	$16,000 00
E. F. Gehlman, for Mechanic and Military hall	20 00
S. W. Shattuck, sundry bills	79 88

The Regent was authorized to employ Prof. J. F. Carey as Professor of Ancient History and Languages, at a salary of $2,000 per annum.

It was further resolved, that Prof. J. B. Webb be appointed to the Professorship of Civil Engineering, at a salary of $1800 per annum, subject to the action of the full board, provided that he enter at once upon service.

The current appropriation for Building Grounds was increased by $1,000

The subject of insurance on buildings was referred to the former special committee, Dr. J. M. Gregory and Judge J. O. Cunningham.

On motion, it was resolved that the Regent be authorized to cause to be built in a convenient position in the new University building, a fireproof vault, of sufficient size for the protection of the valuable papers and books of the Institution.

The Committee then adjourned, till Wednesday, December 6th, 1871, at 3 o'clock P. M.

J. M. GREGORY, *Regent.*

E. SNYDER, *Secretary.*

DECEMBER MEETING, 1871.

The Committee assembled at the Regent's office, Wednesday, December 6th, at 3½ P. M., Dr. Gregory in the chair.

Present—Messrs. Cunningham, Goltra, Griggs, Pearson, Pickrell and the Regent.

Absent—Messrs. Brown, Cobb and Lawrence.

On motion, the Committee took a recess till 5 P. M., to inspect the farm, orchards and shops.

The Committee met at the appointed hour. The reading of the minutes of the last meetings dispensed with.

The report of the Book-keeper, statement of expenditures to date, collections for the Treasurer, and his account for petty expenses for the month of November, 1871, from contingent fund, were read, and the latter audited and allowed.

An account of Prof. E. Snyder, for traveling expenses on University business, for $20.50, was audited and paid.

The bills presented for payment were audited and allowed.

The Committee took a recess, to assemble at 9 P. M.

EVENING SESSION.

The Committee met, according to adjournment.

The following bills, payable from the State appropriations, were then drawn, and vouchers for the same drawn and signed:

E. F. Gehlman, for University main building, labor and material	$6,214 00
S. W. Shattuck, sundry bills for main University building	20 06
Johnston Bros., Mechanical shop, fire brick and clay for boiler	36 50
Northern Manufacturing Co., for Machine shop, pipes and valves	19 92
Jones & Laughlin, for Mechanical shop, shafts, couplings, hangers, pulleys	226 58

On motion, Messrs. J. H. Pickrell and J. M. Pearson were appointed a committee to select and purchase such machinery as may be necessary for steaming and cutting feed on stock farm.

The Regent, Dr. J. M. Gregory, then read the following report:

In addition to the usual business of the monthly meeting, there are several items which will demand your attention. First. The Mechanical building is now finished, and the steam engine, manufactured by the students, is being set up. Work benches have been provided in both the Machine and Wood-working shops, and the time seems favorable for the inauguration of some more definite plan for the arrangement of these shops. Their chief design, it must be remembered, is to afford such illustrations of shop practice as will give to the students of Mechanical Engineering a better comprehension of the theories, and a mastery of the practical application of their studies. But to keep the shops in operation for these purposes there must be tools, materials, and useful work to be done. To supply these will cost a large and constant expenditure, which should be met by the value of the articles manufactured.

The Machine shop, which has had much of the personal attention of Prof. Robinson, and of a skillful foreman, has found an abundant demand for its work, in the manufacture of apparatus for the University, and of various pieces of machinery, patterns, models, etc., for other parties. It has fully paid expenses.

The Wood-working shop has been chiefly employed in providing and repairing buildings, fences walks, furniture and fittings for the several departments of the University. It is believed to have fully paid its way till the present time. It has been, for the last six months, under the supervision of a skillful student, a former proprietor of a shop.

The smallness of our shops has hitherto forbidden the admission of many students who have desired employment in them. The spacious extent of the new shops will enable us to give employment to much larger numbers, and will involve, of course, much larger risks and expenditures.

The Machine shop may still remain under the personal supervision of Prof. Robinson and his foreman; but there is an immediate need of a competent foreman, who will give all his personal attention to the Wood-working shops the whole time, the present foreman being engaged in his studies, and unable to give the necessary amount of time to superintend properly the enlarged operations now contemplated. It is recommended that a man of the necessary skill be employed as foreman, under the same general conditions as those adopted in the employment of the foreman on the Stock farm, viz: the payment of a maximum salary, without contingency, and of a maximum salary, conditioned on the net income of the shop. Some inquiry has been made for a suitable candidate, and the name of one who is believed to be well fitted to this place will be laid before you.

I have also to report for examination and approval the book purchase made during last summer and autumn. By a vote taken last March the Regent was authorized to expend the library fund for books, apparatus, etc. Lists of books wanted for the several departments of science and art were prepared by the members of the Faculty in charge, and measures taken to procure them. To obtain the American books, I visited Chicago and New York in person, and made purchases as in the accompanying bills. After consultation, it was judged best that Prof. Baker should go to England and look up and purchase the large number of English books that were found on the lists. I accordingly secured the services of Prof. Baker, and his report and bills accompanying will exhibit the work done by him. Some of his orders are not yet filled, and others remain to await the binding of some of the books. Some weeks must probably elapse before the last bills will be received and the business fully closed up. I also, under the discretion you gave me, agreed with Prof. Stuart to go to Germany and make some purchases for the Chemical and Mining departments. Prof. Stuart's report, which I here-

with present, gives a full account of his purchases. I recommend the payment of these gentlemen. They having fully given their summer vacation to this service, it seems quite reasonable that the payment of their expenses be met by the University.

The Committee will recollect that only one-half of the appropriation for the new University building was voted by the Legislature last spring; but it was with the understanding, fully implied in the bill itself, that the other half would be voted. It seems desirable that the Executive Committee shall make some sufficient statement of the expenditures thus far made, and an estimate of the amounts needed to complete the building in time for our use.

The report was accepted.

On recommendation of the Regent, it was—

Resolved, That in the admission of students to the shops preference shall be given to those students who are in the Mechanical course and in Architecture, and that students who have not had at least one year's experience in such work shall be required to give one term of free service in the shops before beginning to draw wages: *Provided*, that no more than two hours a day of such free service be required, and that work performed at other hours shall be compensated at such rate as the foreman or Faculty may determine.

Mr. J. H. Pickrell, Chairman of Committee, made the following report:

To the Executive Committee of the Illinois Industrial University:

The undersigned, committee to arrange with Mr. E. L. Lawrence, Head Farmer, for the care of blooded stock now on the farm, would respectfully report that Mr. Lawrence has agreed to take care of said stock, charging for the food fed, and the necessary care that they may require.

This report was adopted.

It was decided that the employment of Mr. A. Stedman, as Foreman of the Wood-working shops, be referred to Dr. J. M. Gregory and Judge S. W. Lawrence, with power to act.

A committee, consisting of the Regent and Mr. J. M. Pearson, was appointed to inquire into the necessity of tools and machinery for the University shops, with instructions to procure such as were immediately required, and report on the purchase of such others as they may deem necessary.

The Regent then read the following report:

To Executive Commitee of the Illinois Industrial University:

The special committee on the employment of Head Gardener, recommend the passage of the following resolutions:

Resolved, That Mr. H. K. Vickroy be appointed Foreman of the Horticultural grounds of the Illinois Industrial University—said grounds including the market, specimen, and other gardens, nurseries, orchards, fruit and forest tree plantations—for the year beginning March 1, 1872, at a salary of $75 per month, with the use of house, supply of garden vegetables, and the use of one good milch cow. It is stipulated that the farmer shall reside on said grounds, and provide board for the laborers employed, at a rate not exceeding $3 75 per week. He shall, as far as practicable, employ the labor of students, and shall keep full and accurate records of all operations on the Horticultural grounds aforesaid, and exhibit or furnish a copy of the same to the Regent monthly, with full account of sales, receipts and expenditures.

Resolved, That in order to induce and reward special diligence and care, in case the said foreman shall perform his duty faithfully, and secure an efficient, economical, and successful management and cultivation of said grounds, according to the plans and directions of the Board of Trustees, and their committee, there shall be allowed and paid said foreman, at the end of the year, from the net profits of said Horticultural grounds, the further sum of $500, or such part of this sum as the net profits will allow; said profits to be estimated by the Executive Committee—and permanent improvements, embracing planting, culture and care of forest trees, arboretum and botanical garden, also drainage, planting, and care of hedges, new fence building and construction of roads, garden path, and repair of old ones, being counted at cost.

The report was accepted, and the resolutions adopted.

Prof. W. M. Baker's report of purchase of books in England, was read, the bills audited and allowed.

Prof. A. P. S. Stuart's report of purchase of Chemical and Mining apparatus, models, collection of minerals, etc., in Germany and England, was read and approved, and the bills audited and allowed.

The Regent was instructed to prepare a memorial to the legislature, in reference to the further appropriation needed for the completion of the main building.

The Committee then adjourned, to meet again on Wednesday, January 3, 1872, at 3 o'clock P. M.

JANUARY MEETING, 1872.

The Executive Committee met on Wednesday, January 10, 1872, at 4 o'clock, in the Regent's office.

Present—Messrs. Brown, Cobb, Cunningham, Goltra, Lawrence, Pearson and the Regent.

Absent—Mr. Griggs.

The Chairman stated, that on consultation of the members of the Committee, it had been found advisable to change the day of meeting from January 3, to the present date.

The report of the Book-keeper and the statement of expenditures to date, and receipts for collections, were read and approved.

The bills presented were then audited and allowed.

The bills on State appropriations were referred to Messrs. Cobb and Goltra.

The Committee then adjourned, till Thursday, January 11, 1872, at 8 A. M.

SECOND DAY'S SESSION.

The Committee met at the hour appointed and proceeded to business.

Dr. Gregory as chairman of the committee appointed, reported the engagement of Mr. D. A. Stedman as foreman carpenter, at a minimum salary of $1,000 per annum to March 1, 1872.

On recommendation, Prof. Taft was appointed to full Professorship in the chair of Geology and his salary fixed at $1,000 per annum from date.

Judge A. M. Brown moved that the Regent be requested to go to Springfield to attend to the interests of this University, in regard to

the prospective appropriation for the finishing of the new building, and that he call such members of the Board to assist him in his work, as he may deem necessary. Carried.

On motion of Mr. J. M. Pearson, it was resolved that the Book-keeper be instructed to prepare for the next meeting of this Committee an account of the amount paid for students' labor during the year ending January 1, 1872, also, state in what departments said labor was employed, and as far as possible, the amount of profit and loss involved in the operation.

The Regent then read the following communication from Hon. F. Watts, Commissioner of Agriculture:

DEPARTMENT OF AGRICULTURE, D. C.
December 20th, 1872.

J. M. GREGORY, L.L. D.,
Regent Illinois Industrial University:

SIR: By the act of the 2d of July, 1862, Congress donated to the several States a portion of public lands, in the ratio of their population, for the purpose of establishing Agricultural Colleges, thereby evincing a purpose to promote that great interest, through the instrumentality of the respective States.

Many Colleges have been and doubtless more will be established. State Agricultural and Horticultural Societies and Boards of Agriculture have also been established by law in many states. A correspondence and consultation between friends of these interests have lead to the conclusion that a convention of delegates representing them, for the purpose of conferring upon subjects of mutual interests, would promote the good of all. It has been suggested that I take the responsibility of initiating such a meeting. I therefore propose, that each Agricultural College, State Agricultural Society, State Horticultural Society, and State Board of Agriculture, depute two delegates. to meet in convention in the city of Washington, on Thursday the 15th of February next. to take such action regarding the interests of Agriculture as they shall deem expedient.

I am, very respectfully,

FREDERICK WATTS,
Commissioner

Dr. J. M. Gregory and Hon. C. R. Griggs were appointed delegates to the meeting. It was moved and carried, that the bill for extra work on the Mechanic and Military hall, and the subject of acceptance of the building, be referred to the Chairman of the Building Committee with instructions to report at 2 P. M. The Committee adjourned to meet at 2 P. M

AFTERNOON SESSION.

The Committee assembled at the hour appointed.

The Chairman of the Building Committee made the following report:

Your Committee, to whom was referred the bill for extra work rendered in the construction of the Mechanic and Military hall, together with the proposition to formally receive from the hands of the contractor the above named building, would respectfully report that they have had the same under consideration.

They find the building well and substantially constructed, so far as they can see, in accordance with the contract entered into with Mr. Gehlman. They also find his bill for extra services in construction of building, including the setting of the engine, and sidewalks in front of the building, amounting to $730 64, reasonable. They therefore recommend that the building be accepted from the hands of the contractor, and that he be paid the amount of such bill.

M. C. GOLTRA,
Chairman.

The reprot and recommendation were adopted.

Mr. Cobb reported back the following bills on State appropriation:

B. F. Gehlman, balance of bill for Mechanic and Military hall	$ 663 73
N. W. Manufacturing Company, pipes and valves for steam heating in the halls	631 77
S. W. Robinson, for engine complete, material and students' labor	1141 06
S. W. Shattuck, superintendent's services	74 50

The above bills were audited and warrants for same drawn and signed.

It was resolved that a committee be appointed, to consist of the Regent, Mr. Goltra, and the Treasurer, to propose a plan, to be submitted to the next meeting of the Board of Trustees, for the sale of wild lands belonging to the University, and also to consider and report upon the disposition of the scrip remaining on hand.

This committee is to report to the next meeting of the Executive Committee.

The Regent was instruced to have the roof on the present University building put in good repair as speedily as possibly.

It was resolved that the Regent require from each foreman of the several departments a receipted inventory of all tools and implements now on hand, with the condition of each; and each of said foremen, at the end of each quarter, be required to report tools and implements in their possession, with the state of repairs of each article.

The meeting then adjourned to the second Wednesday in February.

FEBRUARY, 1872.

The Executive Committee met on Wednesday, February 14th, 1872, without a quorum, and adjourned without doing any business.

E. SNYDER,
Recording Secretary.

MARCH, 1872.

No meeting of the Executive Committee, on account of the meeting of the full Board.

E. SNYDER,
Recording Secretary.

APRIL, 1872.

The Committee met in the Regent's office, on Wednesday, April 3d, at 4 o'clock P. M.

Present—Messrs. Cunningham, Cobb, Goltra, Pearson, Scott and the Regent.

Absent—Messrs. Brown, Lawrence and Pickrell.

The Regent read the reports of the Horticultural and Mechanical departments; also, the report of the Book-keeper, with statement of expenditures and collections.

The petty expense of the Book-keeper, for $29 10, was audited and allowed.

The bills presented for payment were audited and ordered paid.

An amount of $500, for thirty-six lectures on Commercial and Constitutional Law, was allowed.

The Committee then took a recess until 7 : 30 P. M.

The Committee re-assembled at the hour appointed.

The programme for the year's work and estimate of expenditures from the Superintendent of Experiments, Hon W. C. Flagg, was submitted to the Committee by Mr. Pearson, and approved.

The Regent was authorized to procure the engravings needed for the new Catalogue.

The meeting then adjourned, to meet at the call of the Regent.

APRIL 12, 1872.

The Committee met on Tuesday, April 12, 1872, at 4 P. M., pursuant to a call of the Regent.

Present—Messrs. Cobb, Cunningham, Goltra, Pearson, Scott, and the Regent.

Absent—Messrs. Brown, Lawrence and Pickrell.

The record of last meeting was read and approved.

The Committee then proceeded to inspect the new main building of the University, taking a recess till 7 P. M.

EVENING SESSION.

The Committee met at the time appointed.

The bills presented for payment were audited and allowed.

The following preamble and resolution were adopted:

WHEREAS, the General Assembly of the State of Illinois, at its regular session, held in the year 1871, passed an act appropriating the sum of $75,000 for the erection of a main University building, for the use of the Industrial University, which building, by the terms of said act, should not cost to exceed $150,000; and whereas, the act aforesaid required that full plans and specifications for said proposed building should be presented to the Governor of Illinois, and be by him approved before any contract should be entered into for the construction of said building, or any part thereof, by the Board of Trustees; and whereas, plans and specifications for a building, such as is contemplated in said act, were presented to the Governor of Illinois, and were by him approved; and whereas, on the 6th day of June, 1871, by the authority of the Board of Trustees, and in pursuance of the authority of said act, the Regent of the University did enter into a contract with Mr. E. F. Gehlman, for the construction of a building according to the plans and specifications so approved by the Governor of Illinois, said building to be fully completed for the use of the University on or before September 1, 1872; and whereas, in pursuance of said contract, the work upon said building was commenced and partially completed during the year 1871, leaving the walls in an unfinished condition; and whereas, the General Assembly has adjourned, having failed to make the necessary and expected appropriation for the full completion of said building; and whereas, as we are advised by the architect in charge of the building, serious losses are likely to occur to the University in the event of a forfeiture of the contract with Mr. E. F. Gehlman; be it therefore

Resolved, That the bonds of Champaign county, now held by the University, or so much thereof as may be necessary, be by the Treasurer converted into cash, and used in the completion of said building, according to contract now in force with Mr. E. F. Gehlman, dated as aforesaid.

The subject of removing the hedge east of new University building was referred to a committee, consisting of the Regent and Mr. J. R. Scott.

The renting of the gardener's house, to Mr. D. A. Stedman, was referred to the Regent and Judge Cunningham.

The printing of the Catalogue was referred to Dr. J. M. Gregory, with power to act.

The standard of qualification regarding the examination for admission for the academic years 1872–3 and 1873–4, was raised as follows:

For 1872—College of Engineering, Plane Geometry.
College of Literature, Plane Geometry.
For 1873—College of Agriculture, Elements of Botany and Physiology.
College of Engineering, Algebra and Geometry complete.
College of Natural Science, Botany, Physiology and Natural Philosophy.
College of Literature, Algebra and Geometry, elements of Botany and Physiology.

It was moved and carried, that from September, 1872, a term fee of $5 be charged to every matriculated student of the University.

One tenoning machine, not to exceed $250 in price, was ordered to be bought for the carpenter's department.

The Committee adjourned till May 1, 1872, at 4 o'clock P. M.

J. M. GREGORY, *Regent.*

E. SNYDER, *Rec. Sec'y.*

MAY 1, 1872.

The Executive Committee met May 1, at 5 o'clock P. M., in the Regent's office.

Present—Messrs. Brown, Cunningham, Lawrence, Goltra, Pickrell, Scott, and the Regent.

Absent—Messrs. Cobb and Pearson.

The minutes of the last meeting were read and adopted.

The following resolutions were adopted:

Resolved, That Mr. M. C. Goltra be and is hereby authorized to visit, examine and make a list of the lands of the University in Nebraska, affixing to each piece or tract a fair minimum price or valuation, with a view to a sale of said lands; and in case Mr. Goltra shall be unable to undertake the duty himself, that he be authorized to employ a suitable and competent person to act in his stead.

Resolved, That Mr. E. Cobb and Judge Lawrence be authorized to perform the same duty with reference to the lands in Minnesota.

The Book-keeper's statement was read and accepted.

The reports from the Horticultural Department and the carpenter shop were approved, and the Regent was authorized to purchase the lumber needed at the shop.

The bills presented for payment were audited and allowed.

Mr. Goltra was authorized to engage the services of Mr. Thos. Wardell as superintendent of the building in course of erection.

The Regent was authorized to draw a warrant for such amount as may be certified to as expended on the building during last month, subject to the approval of the architect, and not to exceed the amount of $8,000.

The Regent and Corresponding Secretary were appointed a committee to have a topographical survey of the University farms made.

Adjourned to meet on Wednesday, June 5, 1872.

J. M. GREGORY, *Regent.*

E. SNYDER, *Rec. Sec'y.*

JUNE, 1872.

The Committee met on Tuesday, June 5, 1872, at 5:30 P. M., in the Regent's office, Dr. Gregory in the chair.

Present—Messrs. Brown, Cunningham, Goltra, Lawrence, Pearson, Pickrell, Scott, and the Regent.

Absent—Mr. Cobb.

The record of last meeting was read and approved.

Mr. Goltra made a report of the ordered survey of the University lands, in Gage county, Nebraska. Mr. W. M. Beatty, employed by Mr.

Goltra for the purpose, had gone there last month and his report was submitted, and read to the committee, reporting the land as very desirable, country rapidly settling, and giving estimated price of every section of the 2,300 acres located there.

The report was accepted, and the bill of $111 60 for expenses and services for Mr. W. M. Beatty allowed, and ordered to be paid.

On motion of Judge J. O. Cunningham, it was—

Resolved, That the Regent be requested to advertise the Nebraska and Minnesota lands for sale upon the following terms, to-wit: One-fifth cash, and the residue upon terms to suit the purchaser, the deferred payments to bear interest at ten per cent.; that upon a sale being made the Regent execute to the purchaser a contract for a deed upon a compliance with the terms of sale, which contract shall require the purchaser to pay all taxes.

The Regent then made an oral report, stating, that responding to repeated calls, he had visited Washington, D. C., in order to aid delegates from several agricultural colleges in obtaining a proposed appropriation of public lands for same, and reported the prospects favorable.

Committee adjourned, to meet to-morrow at 8 o'clock A. M.

SECOND DAY'S SESSION.

Committee met at 8 A. M.

The chairman read the report of Book-keeper and statement of expenditures and collections to date, which was accepted.

The bills presented for payment were then audited and allowed. The reports and accounts of the Mechanical and Horticultural Department, and carpenter shops, were read and approved.

Certificates were granted, on recommendation of the Faculty, to the following graduates of 1872:

JOHN J. DAVIS, of Freeport.
WILLIS A. REISS, Belleville.
ALONZO L. WHITCOMB, Urbana.
ALFRED M. FLAGG, Rochelle.
STEPHEN A. REYNOLDS, Belvidere.
JAMES N. MATTHEWS, Mason.
CHARLES W. ROLFE, Montgomery.

The Regent was authorized to draw a warrant for the amount which Mr. Van Osdel shall certify due to Mr. E. Gehlman for the work due on new building during the past month.

Mr. M. C. Goltra reported, as a committee on employing Mr. Wardell as Superintendent at new University building, that the gentleman named had been prevented by a previous engagement from entering upon his duties, which were temporarily discharged by Mr. Stedman, of

the University carpenter shop, but that he was now ready to come. Mr. Goltra was authorized to employ him forthwith until the inclosing and roofing of the building.

It was ordered that a warrant be drawn in favor of Dr. J. M. Gregory for his expenses to Washington.

The Committee then took a recess for the Commencement Exercises, to re-assemble at 4 P. M.

AFTERNOON SESSION.

The Committee met at the hour appointed.

On motion, a sufficient sum was appropriated to purchase a moulding and spading machine for the carpenter shops.

Prof. S. W. Robinson was authorized to manufacture a boring machine for the use of the machine shops.

Dr. J. M. Gregory was authorized to permit students to room in the University building during vacation, and that such students be charged one term's room rent for the vacation.

Judge L. A. Lawrence was authorized to employ a competent man to survey and appraise the University lands in Minnesota, and $125 were appropriated for the purpose.

The Committee then adjourned, to meet on the first Wednesday in July, or at call of the Regent.

J. M. GREGORY, *Regent.*

E. SNYDER, *Rec. Sec'y.*

JULY, 1872.

The Executive Committee met at 3:40 P. M., in the Regent's office.

Present—Messrs. Brown, Cunningham, Goltra, Lawrence, Pickrell, Scott, and the Regent.

Absent—Messrs. Cobb and Pearson.

The reading of the minutes of the last meeting was dispensed with.

The Book-keeper's statements of expenditures to date, and collections for Treasurer, were read and accepted.

The reports from the Horticultural, Mechanical and Carpentry Departments on work done, were read and received.

The bills presented for payment were audited and allowed.

Mr. J. M. Van Osdel made a report on the progress of work on the University building, stating that $82,002 74 had been expended to date,

and recommended that the contractor be paid $5,000 for work done since the last meeting.

The report of Mr. Van Osdel was accepted, and a warrant for $5,000 was ordered to be drawn, as recommended.

The Regent was authorized to pay Mr. E. Gehlman, on his contract, for work done in July, such amount as Mr. Van Osdel may certify as due him.

A communication from Mr. H. K. Vickroy, in regard to the Horticultural Department, was referred to Judge A. M. Brown, with a request to report at the September meeting.

The Regent recommended that Miss Lottie E. Patchen be appointed teacher of instrumental music, at the University, for the coming year, and that she receive the fees charged for instruction on the piano, as her salary.

Voted to adopt the recommendation.

The Regent was authorized to further advertise the University, at a cost not exceeding $125.

An account for petty expenses, of $41 89 of Dr. J. M. Gregory, was audited, and a warrant ordered to be drawn.

An amount of $13 30 was allowed to Mr. Chas. W. Silver, on balance of salary.

It was decided that the matter of freighting lumber be referred to Dr. J. M. Gregory, with power to act.

The arrangement of the keeping of the hedge, between the stock farm and Mr. Percival, was referred to Dr. J. M. Gregory and Mr. Jas. R. Scott.

The Regent was authorized to have the steam heating apparatus extended into one wing of the fifth floor of the old College building.

The question of putting in another iron staircase in the rear of new University building, was referred to the Regent and Mr. Van Osdel.

The Committee adjourned, to meet again at the call of the Regent.

J. M. GREGORY, *Regent.*

E. SNYDER, *Rec. Sec'y.*

SEPTEMBER, 1872.

The Executive Committee met at four o'clock P. M., in the Regent's office.

Present—Messrs. Brown, Cobb, Cunningham, Lawrence, Pearson, Scott, and the Regent.

Absent—Messrs. Goltra and Pickrell.

The reading of the minutes of the last meeting was dispensed wit h. Dr. J. M. Gregory read the following report:

GENTLEMEN: On account of the understanding had when we last met, no meeting of the Executive Committee was called in August. Since your meeting, on the 2d of July, the work on the building has been pressed forward with reasonable dispatch. It is now nearly roofed in, and the brick work is completed, except the towers. A large part of the east wing is already plastered, and all the rooms, except in the west wing, are lathed. The contractor expects to have the building finished by the first of December. The excellency of the plan adopted by the Trustees appears more and more as the work goes on, and the structure has received much intelligent commendation, as one of the finest University buildings on the continent.

The necessity imposed upon us of studying more than usual economy, on account of the use of our funds in completing the new University building, has been steadily kept in mind.

Shortly after the close of the Spring Term I dispensed with the services of my Private Secretary, and, through the aid of Professors Carey and Snyder, kindly rendered, have succeeded in meeting the unusual demands during the summer. I am now compelled to again have some clerical assistance, but hope to provide it at a cheaper rate than was before paid.

In corresponding with Dr. Detmars, I learned that his engagements will not permit him to give his customary course of lectures on Veterinary Science during the coming year. I have accordingly opened correspondence with Dr. Law, of Cornell University, and Dr. Eachman, Professor of Veterinary School, Montreal; and from letters received from the latter gentleman, I have a hope that satisfactory arrangements will be made to provide for competent instruction in this department.

The Reports herewith presented will show the work done and the progress made in the several practical departments of the University during the past summer.

The prospects for the coming year are unusually flattering. Our great difficulty will be to secure the necessary accommodations for the large body of students expected. The necessity of our new building grows every day more and more apparent, and it is to be hoped that the necessary appropriation may be made to finish and furnish it for early use.

The perforated base for ventilation ought at once to be ordered, as it will soon be required. I have ordered the fitting up of the rooms in the second story of the Veterinary Hall, as they will be needed for students.

The lands in Minnesota and Nebraska have been advertised for sale, as you directed, and two or three letters of inquiry have been received in regard to terms.

The reports of the Mechanical Departments were read, and a bill of petty expenses presented, which was audited and allowed.

The subject of charges to be made to the carpenter shop, for steam power, was referred to a committee consisting of Messrs. Pearson and Cobb, with instructions to report at the next meeting.

The matter of the sale and payments for a steam engine manufactured for Messrs. Cole & Co., of Chester, Ill., was referred to Mr. Pearson and Prof. Robinson.

The report of the Book-keeper and statement of expenditures to September 1, 1872, was read and accepted.

The report of the Carpentry Department was read and accepted, and bills for traveling and petty expenses were audited and allowed.

The following resolution was adopted, on motion of Judge Cunningham:

Resolved, That in all cases cash be required for work done in the shops, unless otherwise ordered by the Regent.

The request of Mr. Stedman, for purchase of timber, was referred to the Regent and Judge Cunningham, with power to act.

Dr. J. M. Gregory was authorized to have the Gardener's house moved to the southeast corner of the arboretum.

The Committee then adjourned to meet again at 9 o'clock next morning.

SECOND DAY'S SESSION.

The Committee met at the appointed hour, occupying their time in looking over the accounts, plans and the work of the new building.

Adjourned to meet at 2 o'clock P. M.

AFTERNOON SESSION.

The Executive Committee met, pursuant to adjournment, at 2 o'clock P. M.

The following bills presented for payment, were audited and allowed:

Mr. T. Waddell's bills, for Superintendents' services, was referred to Dr. Gregory for adjustment and payment.

An order for $2,800 was ordered to be drawn to Mr. E. F. Gehlman, for work done on new building during last month.

FOURTH ANNUAL COURSE OF AGRICULTURAL LECTURES AND DISCUSSIONS.

CIRCULAR.

The fourth annual series of agricultural lectures and discussions, held under the auspices of the Industrial University, will begin at the University, in Urbana, on Monday, January 8, 1872, and continue for one week. Other courses will be given at the times and places following:

At Dixon, Lee county, commencing on Monday, January 15, at 7 P. M., and continuing, with three sessions daily (9 A. M., 2 P. M. and 7 P. M.,) until Thursday, January 25, at 9 P. M.

At Pontiac, Livingston county, commencing on Monday, January 29, at 7 P. M., and continuing until Thursday, February 1, at 9 P. M.

At Avon, Fulton county, commencing on Tuesday, January 30, at 7 P. M., and continuing until Friday, February 2, at 9 P. M.

At Pittsfield, Pike county, commencing on Monday, February 6, at 7 P. M., and continuing until Thursday, February 9, at 9 P. M.

These Agricultural and Industrial Institutes have a two-fold purpose. One is to bring before old farmers and other citizens of our State, the new facts of science and of practice for their examination and adoption, if found suited to their conditions. Another object, is to give to practical men an opportunity to compare their observations and experience, that the public and our industrial teachers may get the benefit of anything of value they have to communicate. We want to bring the live practical men and the live scientific men together that all may be benefited.

The University engages to furnish lecturers, or persons to open the discussions, and the citizens at the points visited furnish halls properly warmed and lighted. So that these courses are free to all interested. All persons are earnestly invited to attend, and by so doing help to advance the intelligence and the interests of the great industrial classes of our State.

"The great advantage of directing education towards the pursuits and occupations of the people, instead of wasting it on dismal verbal-

ism, is that while it elevates the individual, it at the same time gives security for the future prosperity of the nation."

LECTURERS.

Among the gentlemen who have consented to make addresses at one or more of these meetings, are the following:

Thomas Meehan, Editor of the Gardener's Monthly, and one of the leading Botanists and Horticulturists of America, will deliver a course of six lectures at the University, commencing Monday, January 8, and continuing through the week—on:

1. A General View of Agriculture and Horticulture.
2. Structure of Plants.
3. How Plants Live.
4. How Plants Grow.
5. Pleasures of Plant Culture.
6. Profits of Plant Culture.

Nurserymen, fruit growers and gardeners should hear them all.

Dr. E. S. Hull, Horticultural Editor of the Prairie Farmer, will lecture at Dixon—on The Fruitful Conditions of Trees; at Pontiac—on Conditions Affecting Tree Growth; at Avon, on both the above topics; and at Pittsfield--on Office of the Roots of Trees. Dr. Hull is "known by his fruits."

B. F. Johnson, Correspondent of the Country Gentleman—Corn, its Varieties, and their Culture.

Dr. Wm. Le Baron, State Entomologist—on Insects.

A. M. Garland, Secretary of the Board of Agriculture—on The Fence Question.

John M. Pearson, of the Board of Trustees—on Planting by Machinery.

Judge L. W. Lawrence, of the Board of Trustees—on The Cause and Cure of the Deterioration of our Spring Wheat Crops in Northern Illinois.

Hon. T. A. E. Holcomb—on Packing and Marketing.

Hon. W. C. Flagg, Corresponding Secretary of the Board of Trustees—on Our Railways and Our Farmers.

D. A. Brown, President of the State Agricultural Society—on Drainage.

LECTURERS FROM THE UNIVERSITY.

Dr. J. M. Gregory, will lecture on The Advantage and Disadvantage of Farm Life, and on the Education of Farmers' Children.

Dr. Manly Miles, Professor of Agriculture of the Illinois Industrial University, and of Michigan Agricultural College, will lecture during the whole winter term, from January 2 to March 27, before the Agricultural classes of the University, upon Practical Agriculture, and also

at one or more of the outside courses. The young farmers of Illinois should attend this winter course at the University. They can get no equal amount of practical imformation so cheaply.

Prof. Wm. M. Baker—on The Agriculture of the Ancients; Prof. A. P. S. Stewart—on Agricultural Chemistry; Prof. S. W. Robinson—on ————; Prof. Thomas J. Burrill—on Fungus Plants; Prof. S. W. Shattuck—on Sewerage and Irrigation; Mr. E. L. Lawrence, Head Farmer—on Cattle Feeding.

J. M. GREGORY, *Regent.*

W. C. FLAGG, *Cor. Sec'y.*

INDIAN CORN.

BY B. F. JOHNSON, OF CHAMPAIGN.

Ladies and Gentlemen—I have undertaken to read to you a paper on "Indian Corn, its varieties, their culture and use." I presume there are few students here who do not practically know as much about Indian Corn as myself, and I see by the keen critical eyes of the outside audiences, that there are gentlemen present who feel assured they know a great deal more. No doubt; and in consideration of the doubt I feel for my performance I ask your indulgence to hear me to the end and to give me that generous appreciation due to an honest first attempt. If I do not stick to any text, and if I make my paper other than you might expect, you will at least acknowledge I go astray in good company and belong to a great and prevailing party.

And first, let me say a word to you as to the poverty of the bibliography of Indian Corn. The treatises on Wheat are almost without number. Oats have had their historian, Cabbages have been widely and graphically handled, and the literature of Onions, Pumpkins and Potatoes is so varied and extensive as to leave us nothing to desire; but I have been able to find at most three or four books on Indian Corn. To be sure, in all botanical works it is referred to and described, but there is very little to be found in those works that would interest you in this connection.

Besides the numerous papers on Indian Corn in the reports of the Agricultural department, which papers, I am sorry to say, belong, to a great extent, to the domain of fiction, there have been printed in the United States but three books on Indian Corn. The first, written by the distinguished and indefatigable Cobbett, and originally printed in England, and afterwards reprinted here, thirty or forty years ago, I have been unable to get sight of. The second was published in 1859,

as an appendix to Mr. Klippart's excellent work on the Wheat plant, and the third was sent out by the Appletons in 1866, and was prepared and compiled by Mr. Edward Enfield. Of course the agricultural papers have done a great deal to enlighten us on "Corn, its varieties, their culture and use," but the information therein contained is so varied, fragmentary and extended, so doubtful, unreliable and contradictory, we can truly say, that so far as relates to the United States, and in fact to the whole of North and South America, the history of Indian Corn remains to be written. And here let me say, that if one were compiled and written, no matter how well and thoroughly the work might be done, it would be pretty sure to be an unprofitable undertaking, since cotemporary periodical agricultural publications, to a very great extent, supply the demand for popular information on such subjects. However, there are several exhaustive works on the Maize plant, and its cultivation and use, as far as they relate to South Germany, written in German, but that language is a sealed book to me and I could hear of no translation. The best and most labored and extensive in its researches is the book on the Maize Plant, written 36 years ago, by M. Bonnafaces, of the Central Society of Agriculture of France, and is entitled *The Natural History of Maize.* I do not know that this desirable work has been translated into English. Nevertheless it is from this source Mr. Kleppart acknowledges to have obtained a large share of the matter going to make his treatise, and in a roundabout way, that is where I obtained some of the facts for this paper. I also confess to having obtained a good deal of information, not special to the United States, from an Essay on the Corn Plant, printed in the *French Journal of Practical Agriculture* and written by M. Huerzo, of the above named Central Agricultural Society of France, and published in Paris during the summer of 1871.

THE ORIGIN AND HISTORY OF MAIZE.

All we know of the origin and history of the Maize Plant may be told in a few sentences, if we leave out of the account the long and barren controversy which originated with certain European botanists and writers on natural history. It seems these learned men were jealous of the new world, and labored, for a long time, to convince mankind the various kinds of *Sorghum* described by ancient writers were different species and varieties of *Zea Mays*, or Indian Corn. It is claimed, however, that in 1819, some kernels of maize, together with a maize stem 18 inches long, were found in the sycamore coffin of a mummy, taken from a sarcophagus of basalt near Thebes in Egypt. Not only were grains of maize found in the coffin, in company with this ancient gentleman, but also six loaves of bread, some kernels of wheat, an earthen bowl, a wooden cushion, a collection of small fruits, some bulbs and an assortment of aquatic plants. In

addition to all these things, the coffin further contained a garland of lotus blossoms and three hundred and ninety small figures of baked clay, and all this, mummy and all, contained in a coffin five feet seven inches long. However, no dimensions of width or hight are given. Aside from the absurdity and impracticability of packing such a full and handsome showing of the Agriculture, Horticulture, Culinary, and Cremaic arts of Egypt, into so narrow a compass, it has been pretty clearly shown that the excellent *savant* who made the alleged discovery was imposed upon; that the coffin and its contents were fraudulently prepared and got ready to meet a pressing demand of the mummy and relic market.

Humboldt, the universal savant, says there is no doubt in the minds of botanists that maize is a truly American plant, and that the new world gave it to the old world. When Europeans discovered America, *zea mays*—in Aztec language *thaolli;* in Haitian *maheiz*, in Guichua *cara*—was cultivated from Southern Chili to Pennsylvania and Massachusetts Bay. And he says, "it was cultivated in the neighborhood of the equator, from the level of the sea to the upper plains of the Andes, and that it had been the principal food of the inhabitants of Venezuela for a great many centuries." Humboldt states, also, that maize was introduced into Mexico by the Goltecs in the seventh century of our era. M. Alphonse DeCondolle, the first botanist of the country, informs us that maize was unknown in Europe, Asia and Africa before the discovery of the new world, and that the North American Indians were ignorant of it before the discovery of the Isle of Cuba and Mexico. It was on his return from his first voyage, in the year 1493, that Columbus brought to Europe the first grains of maize, and thence its cultivation spread into Portugal and the south of Europe. The Portuguese, who were at this era the great navigators of the world, having doubled the Cape of Good Hope previously, and discovered Java in 1495, introduced it along the African Coast, and from Java its cultivation spread into Asia and China. In China, maize was first correctly figured in a Chinese work written in 1552. The Spaniards introduced it into Sicily, the Venetian and Milan States and into France; the Italians into Switzerland and Hungary; the Hungarians into Austria, and the Austrians into the Valley of the Rhine.

Maize was, from the remotest centuries, held in great esteem in Peru and Chili, and indeed through all South America, and wherever it can be successfully cultivated, it is the principal food of the indigenous inhabitants. However, maize is not grown in the Valley of the Amazon, nor in some of the hot and humid deltas and lowlands of the different South American States, because of the excess of heat and humidity; nor on some of the dry and elevated plains, because there is neither heat nor moisture sufficient; but over nine-tenths of the whole temperate, sub and intra tropical regions of that vast continent, it is as con-

spicuously a principal crop as in the Western States of the United States.

In what quarter of the new world, in what state, territory or country maize is indigenous, or found growing wild, has never yet been accurately determined; but the probabilities are, that its native habitation is somewhere in those lands of vegetable wonders, the eastern or western slopes of the Andes, where the potato originated. For a long time Bonnafaces was the only scientific writer who adhered to the opinion that maize was of an Eastern or Chinese origin, Humboldt, DeCandolle and other eminent botanists strongly combating that opinion. More recently, however, there seems to be a sentiment developing that Bonnafaces was right in his conjecture, if not in his arguments. Molls' Encyclopedia of the Agriculturist assigns maize to both worlds, but without offering reasons for the broad statement. Modern botanists and naturalists, however, have advanced the idea that inasmuch as neither North nor South America possess plants allied to maize, and inasmuch as Eastern Asia has them in numbers, and inasmuch as it is true, as a general statement, that plants of allied families are pretty sure to be found together, it is therefore inferred that, taken together with the fact that *zea mays* was first correctly figured in the Chinese work in 1552, that it has an Asiatic origin. The inference then is, that at a period, nobody knows how remote, Asia and America were connected by land at Behrings Straits, and that over this dry land came a vast emigration from Eastern Asia, bringing the maize plant with others, and among other seeds the seeds of the Catalpa and Honey Locust. However, this crossing from Asia into America might have happened otherwise than by the dry land, since within the memory of man there have been several shipwrecks and castaways of junks from China and Japan, on the Alutian Islands—junks drifting with passengers, crew and cargo, safe and sound, 2,500 miles from home and landing on the Northwest coast of North America. The name Indian Corn suggests that maize owed its origin to India in the East. It should be remembered that Columbus died in the belief that he had discovered the eastern extremity of the continent of Asia, or farther India, and to this day Jamaica, Cuba, Hayti, San Domingo and other islands lying between the continents of North and South America, are known as the West Indies. Hence, the newly discovered grain was described as Indian Corn, corn or wheat from India. A similar misapprehension, (though there is no doubt about its origin,) gave us the word "Turkey," on the supposition that the bird came from that country. In the French language, the bird is called "dinde," a corruption or abridgment of the words "de" and "Inde" from India.

And here let me make a suggestion, that instead of employing the word "corn" to describe one most valuable cereal, we substitute the

word *maize*, leaving the word "corn" as in other English speaking countries, to be used as descriptive of the cereals which are used for food and bread. Says the *Encyclopedia Brittanica:* "Corn is a purely Saxon word and is the grains or seeds of plants separated from their ears, and used for making bread. There are several species of corn; such as wheat, rye and barley, millet and rice, oats, maize and lentils, peas and a number of other kinds, each of which has its peculiar qualities and usefulness." Besides *maize* is only a little way removed from *maliz*, one of the original indigenous Indian names. And since this is about all we can do in return for the bestowal of this wonderfully productive, magnificent and useful plant, let us at least acknowledge the obligation by perpetuating, as near as we can, the name by which it was anciently, if not originally known I hope, young gentlemen, you will consider the suggestions, and say whether, as far as you are concerned, our great cereal shall be described by the illogical and inaccurate name of "Indian Corn," called "Indian" because it did not come from India, and "Corn," because it is not corn but *maize.*

VARIETIES OF MAIZE.

M. Hueze, in his papers on the maize plant, in the *Journal of Practical Agriculture*—and I suppose he had all the at present available botanical, practical and scientific material at his command—enumerates six species and thirty-five varieties of maize; all of which, both species and varieties, he describes more or less at length. What M. Bonnafaces, the better authority, has to say, I do not know, for I have not been able to see his work. Mr. Klippart says nothing about species, but he enumerates and particularly describes sixty-nine varieties, including the California or wild maize. Mr. Enfield is equally silent on species, but names and shortly describes ten varieties of yellow maize, eight of white and ten of sweet. He also names as varieties the species California Maize, Chinese Tree Maize and Egyptian Maize. I propose to follow M. Hueze's description of species, and I am obliged to do so, for they are the only ones at hand. All I shall say about the special botany of *Zea Mays* is, that it forms a genus of grasses characterized by its monœcious flowers, forming a terminal panicle *(tassel)*, each spikelet containing two flowers, each with two palea and three stamens. (That is, maize has both male and female flowers, the tassel part being the male portion, and the silk the female, unlike the flowers of the wheat plant, which are hermaphrodite, or male and female flowers both included, and each forming a portion of the same flowers). The male or fertile flowers of maize *(the ear)*, form a long dense spike, completely enveloped in a number of floral leaves (husks) from which the thread-like stigmites (silk) protrude several inches; the spikelets, as in the male, contain two flowers, but they have no stamens; one flower has an ovary with a long style ending in the

above mentioned thread-like, forked stigmite; the other flower has only two empty palea.

M. Hueze describes six species of maize: the first *Zea Mays*, or common maize. This species has smooth and shining or dull grains, entire leaves, and naturally divides itself into three catagories of varieties. First, maize with egg-shaped kernels, more or less regular—the flint varieties; second, maize with elongated kernels—the dent varieties; and third, maize with compressed and flattened kernels, the gourd seed and more pronounced dent varieties. The varieties of this species are the ones almost exclusively cultivated in the United States and in Europe, and indeed throughout the world; the other species and their varieties being considered by cultivators as little more than vegetable curiosities.

Second species, (Caragua Maize) *Zea Caragua*. This species is supposed to have orginated in Chili, grows to a very large size, has grains three-quarters of an inch long, half an inch wide and a quarter of an inch thick, which are flinty in their character, rather than belonging to the dents. Its leaves are denticulated, or toothed on the edges and the stalk, and the husks of the ear are frequently shaded by a delicate violet tint. This species, and the varieties of it, are unknown to us, if the denticulated edges of the leaves are the certain marks of it. I observe here, however, that in the south of Europe, the Caragua Maize is believed to be the best for forage purposes, a larger share of nutriment being developed during early growth, than in any other variety.

Third species, (Pointed Maize) *Zea Rostrata*. The grains of this species are pointed at their superior extremity, and it is represented in this country by what is known as Rice Maize. It has been cultivated from the remotest antiquity in Peru, where they make out of the unmature ears various kinds of pickles and confections. For the same purpose, it is cultivated to a considerable extent in Europe.

Fourth species, (Bristling Maize) *Zea Hirta*. This species is said to have originated in California. It has entire leaves, but both leaves and husks are studded with short, stiff hairs. This species and its varieties are unknown to us, so far as I know.

Fifth species, (Clothed Maize) *Zea Tunica*. This species has been so named by Aug. St. Hilaire, and by Bonnafaces, *Zea Christosperma*. It is said to have originated in California, though it has been long known in Buenos Ayres under the name of *Pinsingallo*. The kernels of this maize are each of them enveloped in a separate tunic or husk; the the grains are of various shapes, and maybe colored, yellow, white or red.

The Sixth species is put down by Mr. Hueze as Red Shelled Maize, *(Zea Erythrolepis)*; but this species is so evidently a sport or accidental variety—a sport which may be encountered in every maize field in the

land, and a variety having nothing to distinguish it in its botanical structure from twenty others, it may not with either accuracy or justice, be described as a species.

As to the description of varieties it would be an almost endless task, which, if accomplished to day, would be of little use or value a year or two hence; for the varieties of maize so mix and intermarry, so cross and re-cross, that in a maize-growing country, like Illinois, it would be found almost impossible to establish and fix one variety so that it would for several seasons reproduce its like—or to keep another pure, distinct and personal.

There is, however, I think a kind of maize, so differing from the ordinary varieties that it deserves to be classed as a very distinct one. It is the Chinese Tree Maize under one form, and the Baden Maize under another, not counting the Judson's Bunching Maize, which was one of the most barefaced and shameless frauds of the generation. It is pretty well established that the varieties of maize carrying more than one ear, have little if any advantage over the ordinary one-eared varieties; since it requires quite as much space to mature the stalk carrying three ears, as three stalks carrying each one ear. Besides, it can be counted on as pretty nearly a certainty, that in the single-eared varieties, common cultivation will assure one ear, while extra care and uncommon watchfulness are absolutely necessary to get the best yield from the many-eared varieties.

THE COMPOSITION OF MAIZE.

The varieties of maize ordinarily cultivated in the northern part of the United States and in Europe, produce less stalks and leaves for a given quantity of grain, than the maize cultivated in Central Illinois and in the South and Southwest. Maize kernels in a normal or healthy state contain a mean of 14 in a 100 of water. The kernel is made up of five distinct parts: First, the scaly envelope, which is ordinarily more or less colored; second, the corneous part; third, the starchy part; fourth, the oily part, which, fifth, envelopes the germ. Completely dry maize kernals contain, according to one analysis:

TABLE I.

	Parts.
Starch	67.55
Nitrogenous matters	12.50
Fatty matters	8.80
Dextrine	4.00
Cellulese	5.90
Mineral matters	1.25
	100.00

The following table will enable us to compare the composition of cereals, each with the other, and also teach us that the hard wheats of warm countries have a composition quite different from the ordinary wheat of cooler latitudes, and that we may look for the same difference in composition between the varieties of maize grown in cold from those grown in warm countries:

TABLE II.

Cereals.	Starch	Gluten and other nitrogenous matters	Dextrine, glucose and similar substances	Fatty matters	Cellulose	Mineral matters.
Hard wheat, of Venezuela	55 12	22.75	9 50	2.61	4 00	3.02
Hard wheat, of Africa	64 57	19 30	7 60	2.12	3 50	2.71
Hard wheat, of Taganrock	63 30	20 00	8 00	2.25	3 60	2 85
Half-hard wheat, of Brie, France	68.65	16 25	7 00	1 95	3 40	2 75
White soft Tuselle wheat	75 31	11 65	6 05	1.87	3 00	2 12
Rye	67 65	13 50	11.30	2 25	3 10	2.20
Barley	66 43	12 96	10 00	2.76	4 75	3 10
Oats	61 59	12 41	10 25	5 50	7 00	3 25
Maize	67 55	12.50	4.00	8 60	5 90	1.45
Rice	89 15	7.05	1.00	0 80	1 10	0 90
Maize of Illinois (assumed)	60.00	15.00	6.00	10.00	6.00	3.00

If we compare the composition of these cereals, as shown in the tables above, we shall find: First, that ordinarily, maize contains as much starch as wheat, rye and barley; second, that it contains as much nitrogenous matters as rye and barley; third, that it contains more fatty matters than all the cereal grains; fourth, that it contains less dextrine than these same grains; fifth, that it contains more cellulese than wheat, rye and barley; and sixth, that it contains more mineral matters than the last named grains.

Remembering that in the above tables the specimens of maize analyzed were grown in a comparatively cold climate, and remembering the increased development which hot climates give to gluten and fatty matters, in the wheat there grown, I have made a rough and assumed analysis of the average maize kernel as grown on the rich soils of Central Illinois. I have put that estimate in the last line of the second table. The quantity of water contained in maize kernels is large in proportion to the coldness of the climate in which it is grown. As to gluten and fatty matters, these elements are much more abundant in maize grown in southern countries than in those kinds grown in countries farther north. I had prepared numerous tables, giving, in various ways, the composition of the maize plants and its kernels, but since these analyses were made in Europe and in New York and New England, from specimens there grown, I have left them out of this paper, because they would not fairly represent the maize plant as grown in the South and West. However, from these two tables of analyses, we

are led to conclude that maize ought to grow, as it does grow, on those lands which are rich in alkaline and nitrogenous principles.

And it may not be out of the way here for me to suggest that among the labors devolving on the Scientific Departments of our Agricultural Colleges, will be to give us a complete analysis of the home-grown maize plant, and a comparative one, showing what that wide difference truly is, which separates the wheats of Minnesota, Wisconsin and Iowa, from those of Southern Illinois, Missouri, Tennessee and Alabama.

CLIMATIC CONDITIONS OF CULTURE.

On this continent, maize is more or less profitably grown and cultivated from Southern Chili up the Pacific Coast to Oregon, and from Canada and Maine down the broad stretch of the Atlantic to the mouth of the Colorada river, in latitude 40 deg. south, that being near the northern boundary of Patagonia in South America. It is cultivated, though to a limited extent, in China and Japan, and to an extent still more limited in India. It is a leading crop, second only to wheat and barley, in all the provinces of the Ottoman Empire. The same statements may be made of Southern Russia, Hungary, Southern Austria and Portugal. In France it is grown in what is called the "maize region," and in Germany between Heidelberg and Frankfort. In Algiers the French colonists and the natives both grow maize. And it is grown on the west side of Africa, (and for what I know to the contrary, on the east side too,) from the Straits of Gibralta down through the Grain coast, the Gold coast, the Ivory coast, and all manner of dark and shining coasts, to the Cape of Good Hope. To go back a little: There is a legend, too, that maize, once on one happy and memorable year, matured in England. The year was that year of wonders, 1850. That summer, Mr. Keene grew in St. James Park, London, a crop of maize. It was planted on the 24th of May, and was harvested the 10th of October, and yielded at the rate of 40 bushels per acre. The variety was what is known in Europe as the 40-day maize, the seed of which came from the Pyrenees. Mr. Cobbett, the sworn enemy of the potato, on his first introduction of maize into England, was enthusiastic in its praise, and predicted the great cereal would take the place of the potato he so much hated, and from that success, argued wide, general and lasting benefits to the country. Unfortunately it was soon ascertained that the earliest varieties of maize would not mature in England oftener than one year in six or seven. After extensive engineering and observation, M. Alphonse DeCandolle assigns the growth of the maize plant to the following limits: In North America, south of 54 degrees north latitude. In South America, north of 40 degrees south latitude. In Europe, south of latitude 54 degrees north. It must not, however, be understood in this general statement, that within these assigned and arbitrary limits there

are not tracts more or less extensive, on which, on account of soil or climate, circumstance or elevation, maize cannot be grown. For instance in California, though corn grows vigorously in the hot and humid valleys of the San Joaquin and Sacramento rivers, on the coast, from the 35th degree parallel north, the air is much too dry and the nights to cool to mature the crop.

Where the mean temperature of the period of growth ranges from 60 to 80 degrees Fahrenheit, maize accomplishes all the phases of its existence in from 60 to 150 days; soil, climate and variety cultivated making up the account of this wide difference. Boussengualt has made known the following facts: In Alsace, in France, 40 degrees north latitude, with a mean temperature of 62.3 degrees Fahrenheit, maize matured in 153 days, requiring a total of 9,539 degrees of accumulated heat. In Alais, in the south of France, latitude 44 degrees north, the average mean temperature for the period of growth being 72 degrees Fahrenheit, maize matured in 135 days, requiring 10,050 degrees of accumulated heat. In Jamaica, in latitude 18 degrees north, with a mean temperature of 71.6 Fahrenheit, 122 days, with a total amount of heat of 9,735 degrees, was required for the maturity of maize. In Magdalena, South America, in latitude 10 degrees north, with a mean temperature of the period of growth of 81.4 degrees Fahrenheit, maize matured in 92 days, and requiring 7,488 degrees of accumulated heat. On the elevated plains on the east side of the Andes, I know not how many feet above the level of the sea, with the low average of 58.4 degrees, 183 days, and 10,697 degrees of accumulated heat, were required. In Central Illinois, where, according to the reports of the agricultural department, the average mean temperature for May, June, July and August for 1869, was 71.7 degrees Fahrenheit, giving us 8,819 degrees of accumulated heat; and the average mean temperature in 1870, was 75.5 degrees, affording us 9,286 degrees of accumulated heat. Only those fields early planted were thoroughly ripened in 1869, while almost everything in the way of maize put into the ground, came to full and healthy maturity in 1870. In 1869, in Massachusetts, the average mean temperature for the four months above named, was as low as 63.8 degrees Fahrenheit, giving that portion of the country during the summer months, including May, 7,856 degrees, Fahrenheit, of accumulated heat only. As one might conclude, the earlier kinds of flint maize succeeded in accomplishing nothing better than an indifferent maturity. In 1870, a summer of unusual heat, the benefits of which were felt so far east even as Massachusetts, the average mean temperature of the four months got up as high as 67.8 Fahrenheit, producing 8,339 degrees of accumulated heat. That year the common yellow Dent maize of Illinois came then to perfect maturity. There is no doubt that the varieties of maize

grown in Alsace, in France, and in Alais also, were the early northern flint kinds, while those grown in Jamaica and Magdalena were the large and what we call the late varieties; so that even if the required number of degrees of accumulated heat could have been had, for the late kinds but extended over 135 or 153 days, the southern maize would not have ripened in the north. Nevertheless we may conclude from these facts, which are not altogether congruous nor logically related, nor are they very many nor very striking, *that the vegetation of maize is the shortest where the average mean temperature is the most elevated.* Maize, then, demands at least from 6,500 to 7,000 degrees for the maturation of the earlier flinty varieties, while wheat demands from 4,500 to 6,200 to accomplish full growth. Like all intertropical plants, maize resists very well ordinary drought, but it grows with most vigor where the summers are at once warm and humid. It is for this reason it grows so well on all the bottom lands of our south-western rivers, and then almost never fails to make a good crop; because if the rains are wanting, moisture in the mellow soil is not, nor is it in the air, charged and surcharged with vapor all the long hot summer nights. In the long and dry, but not too hot, summers of the south of Europe, where irrigated maize makes a most luxuriant growth, south of 33 degrees north, Blodgett says that even under the most favorable circumstances, maize lacks the productive vigor of the rich plains, prairies and bottom lands north of that parallel.

PREPARING THE SOIL.

Having related to you the origin and history of maize—having described as best I could the species and varieties of maize—having imparted to you some information as to the composition of maize, and having described the climatic conditions necessary to the growth of maize—you are now ready to hear something about the planting and cultivation of maize. And here comes up to be discussed the question of deep or shallow plowing, and of deep or shallow cultivation. Proceeding on the assumption that the tendency of all, or nearly all, plant food is to hide and burrow itself in the earth, the advice and testimony of all the agricultural books and of all the scientific writers, is, all of it, in favor of deep plowing and deep cultivation. All the great *practical* farmers, from Crete to Poor Richard, and from Poor Richard to Horace Greeley, hold an undivided opinion on this point. The reasons why you should plow deep and cultivate deep are so many, and have been enforced in so many ways, that it is scarcely necessary to name them. To plow deep is to renew the soil by bringing up to the light of the sun and benefit of the air the riches which lie below. It is to afford to the growing plant more plant food, and make the access to it more easy. It is to provide drainage, where the soil is wet, and moisture where it is dry, and to furnish better areation in both cases. In a word, and to

put the great champion of deep plowing, Horace Greeley's opinion of it, into a sentence, we have only to turn up the soil to the depth of 18 inches, to make a garden of the world, and bring in the golden age. But there is another side to this question of deep plowing and deep cultivation. It is possible the assumption that the tendency of plant food is to bury itself in the earth out of the sight of man and the reach of plants, is an assumption indeed. And it is possible that the converse of this proposition is the nearer the truth; that the tendency of all, or nearly all plant food, except during or immediately after the rainfalls, is to the surface, and therefore that deep plowing, plowing to the depth of from 6 to 16 inches, is a delusion and a snare. Inasmuch, young gentlemen, as your education is sought to be made universal, in the matter of agriculture at least, and to be universal is to be able to see many sides of many things; and, inasmuch as the object of these lectures is to bring out discussion, and to stimulate thought and inquiry, quite as much as to give special instruction, I shall proceed to state a few of the facts which go to show there is something to be said in favor of shallow plowing and shallow culture. Since I commenced to prepare this paper, I have been called upon by a Mr. Schnibley, a practical farmer of Peoria county, Illinois, who has brought more facts together on this matter than any man I know. His views, compared with the generally accepted ones, are so heterodox and peculiar, so original and amusing, if they are not suggestive and instructive, that I venture to repeat them for your benefit. In the spring of 1858, at which time dates the commencement of Mr. Schnibley's experiences, he had more land than he felt justified in cultivating in maize, with one team, a stout one though it was. Partly because he could do no better, and partly as an act of charity, he rented a portion of his land to a neighbor, who, in addition to his other misfortunes, was the owner of a wretched team. Mr. S. commenced plowing early in May of that year, and, as his custom was, put his plow down 6 inches, while the renter scarcely plowed 2½ inches. In reply to Mr. S.'s remonstrances, his tenant told him his team was too weak to plow deeper; but then he added, with your genuine Sucker independence, "he would not plow deeper if he could." A pretty breadth of acres had been turned over by landlord and tenant, each doing the work in his own way, when, on the 13th of May, 1858, came one of those down-pouring rains, the like of which had been rarely seen in the State. The following day Mr. S. visited his part of the field, and found it all ran together like a bed of mortar, and that if he crossed the plowed land he would have to wallow half boot-leg deep. However, he was able to walk over the tenant's portion dry shod. The tenant planted his part of the field in a few days after the rain, while the landlord, with his field stirred to the depth of 6 inches, had to wait until the middle of June, and then he found the surface baked through and through. That

year the tenant gathered a good crop of maize, and distanced his landlord. Then said Mr. S. to himself, "deep plowing wont do in wet seasons, that's sure; but one extreme follows another—1859 will be dry, and deep plowing will win this time, sure." So he ripped the soil up again, 6 inches deep; while the tenant contented himself by plowing 2 inches, and no more, and saving his team in the proportion of six to four.

The year 1859, as everybody in the West will remember, was a dry one indeed, but the tenant beat the landlord as badly as in the wet year before. Then Mr. Schnibley began to investigate, to think and to inquire, to reason and compare, and he came to this conclusion: that to invert the soil further than to furnish a proper seed bed for the plant under cultivation, was to reverse the order of nature—since the pest and the air and the sun spend the greater share of their forces near the surface, and acting separately, or in concert, draw the fertility of the soil—bring up the plant food to the surface, or as near to it as the demands of plant roots require. Then he fortified his opinions by observing that, where the land was freed of weeds, the best crops of oats and spring wheat were often grown on the unplowed maize stubbles of the previous year. That for winter wheat in Central Illinois, about the only sure one was the first on prairie soil, and was pretty sure to be good in proportion to the shallowness of the plowing. That in Illinois, as in England, and in all grazing countries, the oldest pastures were the best, and that pastures which had never been plowed, but the wild grasses thereof eaten and tramped out by cattle, and by cattle subdued and enriched, would carry two beasts to the acre better than pastures often broken up would carry one—and that the opinion was becoming universal that surface manuring was the best. The experiences of other farmers confirmed his own convictions. That of Messrs. Johnson and Bogardus, for instance, who in Champaign county, Illinois, in the year 1865, nearly lost a crop of broom corn in consequence of deep plowing—the only good corn they had that year, growing on land plowed two and one-half inches deep; that of Mr. Clevenger, a neighbor of theirs, who, following the traditions of Pennsylvania, plowed two years in succession six inches deep, for maize—found himself beaten by his native Illinois neighbors, who plowed scarcely three; that of the wheat farmers of the Southern part of the State, who now tell us, that in order to grow a good crop of wheat on their calcareous yellow clays, the soil must not only not be plowed deep, but that it must be repacked after seeding, by harrowing, rolling and tramping as hard as a road bed. Mr. Schnibley explains the fact that there is a steady falling off in the yield of wheat per acre, in the western middle States, by stating that the falling off is just in proportion to the extent and depth to which deep plowing is practiced.

Such are some of Mr. Schnibley's views and opinions. For myself, I am, and always have been an advocate of deep plowing, and in a small way I have always practiced it, but I must confess, though my small fields are yearly plowed deeper and deeper, the return grows less and less. And now I have a piece of information for you, which I should not like to have reach the ears of Mr. Schnibley, for fear of consequences. Having made the acquaintance of Mr. Henry McAfee, of the experimental farm of the University of Wisconsin, at Madison, I wrote to him for some account of his experiments with the maize plant. He replied promptly, sending me a long and very interesting letter, as bearing on the question of deep *vs.* shallow plowing. I make the following extract from Mr. McAfee's letter: "Four plats of ground, fall plowed, all alike, were again plowed in spring, as follows: No. 1, five inches deep; No. 2, twelve inches deep; No. 3, twelve inches deep, and subsoiled four inches; No. 4, eleven inches deep, and subsoiled six inches. All planted alike, four feet by four, three grains to a hill, to Dulton and common Yellow Dent Maize, yielded as follows:

TABLE III.

Depth stirred.	Bushels of Dulton, per acre.	Bushels of Dent, per acre.
5 inches	34 71	59 25
12 "	39 75	54 26
16 "	35 53	48 16
17 "	33 24	45.21

"Soil," says Mr. McAfee, "lying flat, a heavy, sandy loam with sticky retentive subsoil, badly in need of underdraining." The great lesson taught here is that on soil plowed eleven inches deep, and subsoiled six inches, the yield was 14.04 bushels less than on soil stirred or plowed five inches.

In concluding this section, and for the purpose of fortifying by some pertinent facts the heterodox notions of the advocates of shallow plowing, and also for the purpose of showing that the assumption, perhaps first here presented, that the tendency of plant food is always to the surface, except during and immediately after rainfalls, I call your attention to a phenomenal state of the soil which was common all over Central Illinois during the cold and dry winters of 1870–'72, and which was continued late into the spring of the year 1872. During that winter and spring, where and whenever the ground was bare, there was visible an exudation resembling a light hoar frost. In roadside ditches, and on richly manured fields, and wherever stock had fed, and ran, and tramped, there, as might have been expected, the exudation showed strongest. We have not learned yet what the chemical composition of the substance was, but we know that it was not readily soluble to light

rains, and that it was visible until after the heavy June rains. We conclude, however, it to have been alkaline and nitrogenous, since no such maize and oat crops have been produced in Illinois as during the season of 1872. And we know that maize and oats succeed best, especially maize, on soils which are at once rich in alkaline and nitrogenous matters. Then again, it was the experience of 1872 that the maize crop was about equally good whether the soil was plowed deep or shallow, or whether it was not plowed at all. The prolonged drought of 1870, 1871, and the first half of 1872, appears to have drawn such plant food as maize and oats need to the surface, (and it may be added that vegetable growth generally was rank, healthy and unusually vigorous). So, it we confine ourselves to these facts and experiences, we begin to see that the shallow plowers have some strong arguments on their side, and that the assumption that the tendency of all or nearly all plant food is upward, and not downward, is not so great an assumption after all.

TIME FOR PLANTING MAIZE.

Having decided whether we shall plow deep or plow shallow, and having our lands prepared, we are ready to hear something about the proper time to plant. This period varies greatly according to the latitude under which the work is done, and the soil, aspect and configuration of the fields. In general the nearer we approach hot countries the planting is earlier in the season. In the south of Europe, Portugal, Spain and Italy, and particularly in their more southern parts, they plant for the first crop in February. In our Southern States—in South Carolina, Georgia, Alabama, Louisiana and Southern Texas, they plant from the middle of February to the middle of March, and the time of planting gets later and later until we reach our own neighborhood, latitude 40° north, where the greater share of the planting is done in the first half of May. I shall try to show, further along in this paper, that in average seasons, the average time of our planting is a great deal too late, and that with seed properly selected and saved, on soils surface or otherwise drained, our best time for planting is two, if not three weeks earlier. I have not heard that in the Southern States more than one crop of maize is ever attempted to be grown in the same year. They manage these things better in the south of Europe.

In Spain, Portugal and Italy, they make their first planting in February, their second in April, and their third in June. However, in these latitudes they depend on irrigation for the maturation of the second and third crops. The maturity of maize occurs, in temperate climates, from the last of July into the month of October. With us maize matures from the middle of August to the middle of October. The earlier the planting the earlier and the better the harvest. There is nothing truer than the proverb which says, "that which hot August does not

bake, September will not roast." Mr. Rice, of Champaign county, Illinois, in 1871, had maize fully ripe and in the shock by the middle of August, and the writer of this paper had the same work accomplished only five days later. But both fields were planted on the 15th of April. In Turkey the maize crop is harvested toward the end of July. Maturity occurs in Algiers in July and August; in Tuscany toward the end of August; in Portugal during the month of August, and in the Milan States in the month of September. In Egypt the harvest does not occur until into the middle of October, on account of their waiting for the benefits of the overflow of the Nile, which commences to show itself about the time of the summer solstice, and is two months acquiring its greatest hight. In the Southern States the maize crop is mature in August, and must at once be harvested on account of the depredations of birds, vermin and insects, and because the late summer and fall rains rot the trace roots and the ear stems, so that the ears and stalks both are subject and liable to fall to the ground. In bringing before you, in the same section, the time of planting and the time of maturity, I have sought to show that early planting brings early maturity, and inasmuch as the average summer temperature of the South of Europe is not higher than our own, there is little or no difficulty in getting our crop equally early into the ground. In general I may here state, the same variety ripens from ten to fifteen days earlier when grown on soils of an indifferent quality than when grown on those very rich. We have learned in a previous section that accurate analysis shows maize grown in southern latitudes contains more nitrogenous and fatty matters than maize grown further north, that it is stronger food, and therefore the maize resembling that grown in the south is the more desirable to produce. Remembering then that it is the length and heat of the summer in the case of wheat and corn both, which increases the properties of gluten and fatty matter, it is by early planting that this change may be made. To plant early is to increase the length of the growing season, no more, no less. In order then to grow maize of the best quality, and to keep it up to the highest standard, to secure to the kernels a maximum of fatty and nitrogenous matters, to obtain great size and length of grain in proportion to cob, it appears to be necessary to grow it on rich soils, and give it the benefit of the earlier heat of the season. From the specimens of maize I saw in the department of agriculture, in the winter of 1871, in Washington, I feel pretty confident in stating that nearly all, if not absolutely all, the varieties of maize grown in Turkey and Egypt, and the South of Europe, are flinty in their character, and have more or less pronounced the kidney bean form of the flinty varieties cultivated in New England and New York. Now, flintiness is not, perhaps, objectionable, because it implies weight and solidity, but the kidney bean form of kernel is, because it almost always

indicates a large cob in proportion to grain, and that implies deterioration. Maize, I conclude, has the kidney bean form in the countries I have named, because the soil is poor and the climate dry and hot, and is flinty because the same varieties have a long time been cultivated in the same place. The maize grown in the Island of Cuba, which lies north of latitude 20 degrees north, is wholly flinty, nevertheless the flinty varieties of New England will not ripen there, because before maturity the plant sinks under the drought or the heat. The Republic of Venezuela, a vast territory, eight times as large as Illinois, having four or five times as many square miles of *illanos* or prairies, is a great maize growing country, and has been, so says Humboldt, from the most ancient times. Immense quantities of maize are imported into the Island of Cuba and the other West India Islands, and I am informed by a gentleman eighteen years in business in Cuba, that the maize of Venezeula is in every case flinty. There is an ear of maize in the Smithsonian Museum, at Washington, taken from an ancient mound in Peru. As figured in the agricultural report of 1870, the grains show themselves to be only very slightly indented. There is also shown in the same plate and opposite to page 420, an ear of maize, such as is at present grown by the Indians of Arizona and New Mexico. It has fourteen rows of grains, which are full and plump, and is six and three-quarters inches long and four and three-fourths inches around. That is, the ear has a diameter of a trifle less than one and one-half inches. Here, in as hot a climate and as long a summer as Arizona possesses, we have again the general flint character and probably the kidney bean form.

Every observing farmer must have noticed, that when, in Illinois, even on our best lands, maize is planted and badly tended, degeneration follows, and that degeneration shows itself in a small ear with a large cob, a shallow kernel having a fleshy character and a tendency to the kidney bean form. Further, I think the general experience is, that all the varieties of gourd seeds and dents, in course of years of cultivation in the same soil and under the same latitude, will change their form, and become less sharpened and intented at the superior extremity of the grain. I regard the gourd seeds and the dents as varieties which, in the places where they are grown, have achieved a partial maturity only, varieties which, when they have become fairly acclimated, will then fill their outer envelope and become flinty, just as after long years of cultivation those varieties common to Southern Europe and South America have become flinty. If we take our late varieties of smoothest dents, carry them north to New England, or where they will not fully mature, we shall find that immature product resembling our gourd seeds and coarser dents. Mr. Tutle, of Milan, Ohio, quite celebrated as a maize grower, and who, in the summer of 1871, is said to have grown

two hundred and fifty-five bushels on two acres, writes me his seed was originally the "Hackberry," one of the roughest gourd seeds, but that by selection for fifteen years, this variety had changed its form, so as to very much resemble our smoothest dents.

It having been shown that maize has an inevitable tendency to become plenty, which is not a deterioration, and should not be objected to, it will have been seen, also, that it has a tendency equally strong, when grown on a thin soil, under a dry and hot or a dry and cool climate, to enlarge the cob and shorten the kernel, and this is deterioration. We should then plant early to get the advantage of the heats of the latter part of summer, and not trust to September to make our maize crop. Gluten and fatty matters depend, for the measure of their development in wheat and maize, upon the high temperature of the climate under which they are grown. Maize planted in June may, in favorable seasons, mature, and to appearance be nearly as valuable as that planted in April; but the results of feeding and the test of the chemist will agree in demonstrating that the heats of August have developed nitrogenous and fatty matter in the early crop, which are greatly deficient in the late one. In addition to what I have said as to the advantages following early planting, I may call your attention to the fact that early planted maize is ready to go into beef and pork by the first of September, and stock men will tell you that with mature maize of the current year's growth, more fat and flesh can be laid on hogs and cattle, when fed in open lots, in the six weeks preceding the 15th of October, than for the remainder of the year. But it may be objected that if we plant maize so very early, say during the first half or about the middle of April, there is danger that the seed will rot in the ground. There is, indeed, very little danger of it, and especially if the land has been drained by open or closed ditches, and the field put in good tilth. The seed which has been properly selected and saved, if committed to soils prepared as above, will remain in a healthy condition and wait the arrival of the necessary temperature for germination. This may be partly proved by the fact, known to every observing farmer, that where, in previous seasons, maize grains have been fully matured and soundly ripened, volunteer plants are always to be found in the fields in the springs succeeding such years. For two successive years I have planted maize in the month of March, and just as soon as the frost was fairly out of the ground, and the plants came through the spring frosts uninjured. If, however, maize planted early lies subsequently many days sodden in water, the grains will rot, just as they will rot the more quickly in proportion as the temperature is higher, in a similar situation in May and June.

VEGETATION OF MAIZE.

Suppose maize to be planted about the 15th of April, in this latitude, it will germinate in from six to ten days and produce a cotyledonous leaf, which takes the form of a little tube or horn. When once developed, the leaf remains nearly stationary from eight to ten days. During this time the forces of the plant appear to be at work developing the root, which, when mature, is fibrous and short compared with the stalk, when it has achieved its full growth. And here let me say that my observation goes to confirm me in the opinion, that the root development should take place at a low temperature, in order to make a strong, healthy plant, in some way similar to what is necessary in the growing of bulbs. House grown bulbs, in order to produce strong spikes of flowers, must be started and remain at a low temperature in the dark. If bulbs are exposed to heat and light from the first, roots and leaf stalk start to develope and grow at the same time, and the result is, neither strong roots nor handsome spikes of flowers. And so of those bulbs planted in the fall: they must be so planted to secure development, if not growth, at a low temperature, or there will be few flowers and less fragrance.

When two or three leaves have appeared—that is to say, from three or four weeks after planting—the stalk commences to lengthen, and keeps steadily on, because at that period of the year the temperature of the air and soil steadily increase. When two or three joints have appeared, frequently, and especially in very strong, rich soils, lateral shoots push out at the base, called suckers. The general impression seems to be that these suckers lessen the hight of the main stem and shorten and diminish the size of the ear. Some varieties sucker more than others, and a few varieties produce ears from these suckers: Suckering seems to show there is a want of equilibrium between the forces at work in the soil below and those at work above in the atmosphere, and that suckering is an effort of the plant to restore the balance between the two. In that case, it is worse than useless to pull them off, and in the other, that is, where varieties produce suckers bearing ears, it is a foolish interference with the habit and diminishes the yield of the plant. In July and August trace roots appear, and solely for the purpose of keeping the plant in an upright position. Where the crop is heavy, and the weather at the season not favorable to root development, it is thought by some to be an excellent plan to throw a light furrow to the foot of the stalk and so hasten their development.

Maize flowers, ordinarily, during the last half of July and the first half of August—the male and female flower developing pretty nearly at the same time. Sometimes, however, under the stimulus of smart

rains and great heat, there is a sort of secondary growth of silk, and generally, there is not so apt to be a corresponding development of pollen from the male flowers. In that case the result is, the ears are not filled to the end. To provide against this contingency, it is a good plan to mix from five to ten kernels in the hundred of some late variety with the ordinary seed used; and my personal experience is, that the plan is a good one. In general, the fertilization, of the silk and the filling of the ear, is best accomplished when the air is at once warm and humid. No species of plant cross and re-cross so readily and easily as maize. Indeed, considering the offices performed in this regard by the winds, the bees, the birds and insects, I doubt whether it would be possible to keep a large field of some special variety pure in a maize-growing country, even if the situation were one, two or three miles remote from other fields. Maize is ripe and ready to be harvested, when that harvesting is done by putting into shock, in August and September, the fodder being valuable in proportion to the earliness. After the complete filling and hardening of the ear, the work is accomplished.

To resume, maize may be said to accomplish all the phases of its growth somewhat after the following manner: From the first to the eighth day, generally the fourth or fifth, development of the plumule and radical. From the ninth to the twentieth day, appearance of the roots and leaves. From the twentieth to the thirtieth to the day development of the roots, leaves and their sheaths. From the thirtieth to the fiftieth day, further development of the roots, leaves and stalks. From the fiftieth to the seventy-fifth day, development of the roots, leaves and stalks, and the appearance of the tassle and the envelope of the ears. From the seventy-fifth to the ninetieth day, development of the roots, leaves and stalks and the male and female flowers—from which we may conclude that maize is ordinarily in flower from two and a half to three months after planting.

In regard to the distance apart at which maize should be planted, there is necessarily as many opinions as there are experiences, and as many experiences as there are soils, situations, climates and varieties. In New England, the distance apart is scarcely more than two and a half feet. In the States of New York and Pennsylvania, it is not more than three feet—but the distance increases as we proceed west, south and southwest. The practice in Illinois conforms itself in a manner to construction of the planters, and I suppose the average distance over the State is not far from three feet eight inches one way, by three feet the other—though the average distance apart is less at the North and more at the South. The error of our cultivation, next to late planting, seems to be too thick seeding, that is, hills and drills are too near together and there are too many kernels put in a hill; there seeming to be an ever present fear that not more than one-half the seed will germinate, and

that the stand will not be a complete one. From all I have been able to gather on the matter of how, and how wide apart to plant, I conclude that the best and most economical use of the land is to plant in drills, running north and south, three feet six inches on new land and three feet eight inches on the old, and with one grain and no more every foot the other way. If the land is foul, in order to destroy the weeds, rows both ways are desirable; but say what we will in favor of planting in hills, it is theoretically evident that that method, which, allowing sufficient space for cultivation, distributes the plants most evenly, is pretty sure to get the greatest amount of good from the soil, and show the best results in the way of a crop. But here is a great opening for discussion, which I leave for the present. The practice among the farming quakers of New Jersey, some of whom are the best farmers and the most successful maize growers in the country, is to plant in hills four feet apart each way, three stalks to a hill. But the varieties grown are among the largest, and the average yield of the best farms in the neighborhood of Salem, in that State, approaches seventy-five bushels per acre. Mr. Tuttle, of Erie county, Ohio, who is reported to have grown two hundred and fifty-five bushels on two acres, wrote he was in the habit of planting five grains in a hill, four feet apart each way. On the worn-out lands of Virginia, in the neighborhood of Washington, I observed the practice was one or two plants to a hill, and distance fully four feet apart each way; such practice I believe being common all along down the Southwestern States. On the rich and best bottom lands of the South, the largest crops are produced from two kernels in a hill planted from four and a half to five feet each way, a less distance causing the stalks to shoot up tall and slender, bearing short and imperfect ears. In general, the rule is, the hotter the climate and the richer the soil, the greater the distance between the hills and the thinner the seeding. Indeed, it has lately been demonstrated, that maize sown broadcast for purposes of fodder is valueless in proportion to the thickness with which it is sown; that the saccharine juices of the plant are not even present when the plants stand as thickly as timothy in a meadow. As to the depth to plant, it should be shallow in proportion to the earliness of the season. When the soil is cold and moist, as it is pretty sure to be in April, one inch in depth or one and a half inches at most, is deep enough. Then the rains that fall will readily sink below the seed, and if the weather should prove cold save it from the rot. As the season advances, the depth should be increased to two or even three inches, none happens to be so far behind as not to have finished planting until into June.

THE CULTIVATION OF MAIZE.

Perhaps on the whole subject of maize production there is no more difficult section to handle than this; and it is so, perhaps, because there is such a great difference of opinion, founded on quite as great a variety of practice and experience. In order to get the opinions of experienced and enlightened men on this point, I addressed letters to a number of successful farmers, asking for the results of their experience. So far, their replies have been generally wanting, and I think that in order to draw them out, I shall have to resort to a system of interviewing, a practice, which though liable to abuse, has been the source of much amusement to the world. I suppose those who believe in shallow plowing will also advocate shallow cultivation, and that those who plow—say six inches deep—will cultivate to the same depth. It is not uncommon, however, for those who plow moderately deep, to cultivate a good deal deeper than they plow; not because, perhaps, in their opinion deep plowing merely for the sake of deep plowing will help the crop, but because it is necessary to keep down and destroy the weeds and thereby give to the crop the monopoly of the soil. The first and prime necessity being a clean crop, the question then comes up: shall we cultivate simply and solely for the purpose of keeping down the weeds and pulverizing an inch or two of the surface, or shall we cultivate not only to destroy the weeds, but also by root pruning and otherwise to assist the plant to development and maturity. The advocates of shallow cultivation say, do no more than to keep your fields clean, and give your crops a monopoly of the soil, and be careful above all neither to cut nor disturb the roots of the plant, for in so doing you interfere with the wise provision of nature and prevent perfect development by destroying the equilibrium which nature has established between the root and the stalk. The other side say plow deep, not only to kill the weeds, but to stir the soil and root prune, into the bargain. They assure us that this partial disturbance of the roots has a beneficial effect, and is almost always followed by increased growth, just as the pruning of trees and vines does the same thing. They will point you to the fact that maize growing in an open field, and plowed and cultivated in the ordinary way, will outgrow, two to one, patches of the same plant growing in gardens, be the soil there ever so rich, and where the cultivation is done with the hoe. And it is true that when the season is favorable, the soil moist, and the air warm and humid, deep plowing does, under such circumstances, drive the crops ahead at a wonderful rate. But on the other hand, such plowing under circumstances of the weather just opposite to that above described, almost always injures, and sometimes fires and destroys the crop. It is, no doubt, a much more difficult job to keep fields clean with

surface cultivation than with deep cultivation, because some weeds have not only to be killed, but must be buried in order to get rid of them; and this necessity it is, say the shallow cultivators, which has made deep cultivation popular. Indeed, a field thoroughly foul, nothing but deep plowing will cleanse, except, perhaps, it may be done with the hoe; but hoeing is not the kind of cultivation under discussion.

Mr. Tuttle, of Ohio, who grew the heavy crop of maize before mentioned, writes me he plowed four inches deep as soon as the plants were fairly out of the ground; cultivated one way and hoed and thinned to four plants. When six inches high, cultivated thoroughly both ways and hoed once, and that was all the cultivation the crop had.

The Iowa College boys, having plowed prairie sod seven inches deep, then harrowed and cross-harrowed seven or eight times, planted 115 acres of maize. These fields, after planting, were harrowed with an A harrow once, cultivated with a five toothed one-horse cultivator, twice both ways, and once one way, with a two-horse walking cultivator. The weeds were kept down with a hoe, and the yield was sixty bushels per acre. Now, the Wisconsin boys on their experimental plots plowed from five to eighteen inches deep, cultivated three times with shovel plows, twice with turning corn plows, hoed once, and grew fifty-three bushels per acre. You will perceive I keep the balance as even as I can between the deep-plowers and the shallow-plowers, present to you the facts and leave them to your critical examination to draw such deductions as your judgment may determine.

As to decided opinions on many great questions of agricultural practices, I have none; and as for matters of science, it is scarcely safe for any one to dogmatize, except perhaps on the conclusions of the multiplication table.

THE AVERAGE YIELD OF THE MAIZE CROP.

I have stated elsewhere my opinion that the census returns of 1860, so far as they relate to the maize crop, were gross exaggerations, and that a similar fault ran through the reports of the Department of Agriculture. And now comes in, since I prepared the notes for this paper, a synopsis of the census returns of 1870, which reports the maize crop for that year a trifle less than 771 millions, or $77\frac{3}{4}$ millions less that it was in 1860, $113\frac{1}{2}$ millions less than it was in 1869, and $333\frac{1}{4}$ less than the reports of the Agricultural Department make it for the same year. If the census figures of 1860 were correct, and those of 1870 correct also, what a commentary on a government that suffers agriculture to decline in such a way; and if the census returns of 1860 and the agricultural reports since, are, as I believe, gross exaggerations, what a commentary on a government which tolerates such monstrous inefficiency. However—and it is

some apology for this condition of things at Washington—we find the same exaggerated notion as to the extent and yield of our maize crop at home. From the necessities of cultivation in a 160 acre field, there are less than that number of acres by what a rod in width would make clean around the field; which spaces are used for hedges, fences, farm roads, turning rows, etc., etc., so that instead of there being 160, there are but 156 acres. But suppose the average field of the country be 40 acres, and it is much less, there are 16 forties in a section; then there is a loss of 32 acres in each section of 640 acres. But suppose the maize fields do not average more than 20 acres—and these do not—you see readily how the loss of land in hedges, fences, etc., is increased. Taking out hedges, fences, farm roads, turning rows, building sites, cattle and hog and poultry yards, and the other many exigencies of civilization and settlement, I question whether more than 500 of the 640 acres in every section will be occupied by the crops. That is, there is actually an unacknowledged discount of 27 per cent., when we talk of the breadth of our crops; and this state of things exists without any inclination, on the part of our farmers, to exaggerate. Now, as to the exaggeration of those who are not so conscientious. To make his creditor rest easy, to satisfy his own personal and proper pride, which makes every man claim to do, if he does not do, quite as much as his neighbor, there is an inevitable and universal inclination to exaggerate; not only the average yield, but the acreage also. It is notorious that when buyer and seller meet, they never agree, and that the common result is, there is less yield per acre, less in the crib and less in the wagon, than either the grower or seller ever estimate. If you ask a man, the average farmer, for instance, to state, to the best of his knowledge and belief, the gross sum he owes and the total amount owing to him, you will find, on investigation, that he has largely underestimated his debts and quite largely overestimated his credits. We, all of us, have a good deal better notion of what does or should belong to ourselves, than of that which should belong to our neighbor. I have taken pains, for the last four our five years, to grow a good crop of maize, and have generally succeeded. Each year I have, to the best of my ability, after the grain was cut up and put into shock, tried correctly to estimate the yield, but I have always exaggerated, notwithstanding I had the ever present sense of the likelihood of an excessive estimate. Two acres of good maize grown in the summer of 1871, I concluded would yield at the rate of 60 bushels per acre; but after being carefully husked, hauled and weighed, the return was a few pounds less than 50 bushels per acre. And the acres were full acres too, no allowance having been made for turning rows, sloughs, or anything else of the kind. This field was planted early, a full stand obtained, the soil was rich and the cultivation thorough, and seemed the best in the neighborhood, and I believe

it was, but the scales and the tape line are wonderful correctors of our exaggerated estimates. The Agricultural Department Report for 1869 gives the average yield of maize in Illinois for that year at 23.2, and of the whole country 23.6 bushels per acre. The report of 1870 puts that of the United states at 28.3 per acre, and of Illinois at 35.2 per acre. The average yield of the States in 1869 ran from 11 bushels in Georgia, South Carolina and Florida to 48 in Kansas and 42 in Nebraska. In 1870 the average ran from 39 in Indiana, Ohio and Vermont, down to 14.6 in North Carolina and 8 in South Carolina.

For the reasons above stated. I am convinced these high averages are far outside the truth. During the past year I have traveled a little over the southern part of Illinois, and also over the central part. South of the line of the Terre Haute and Alton Railroad, I doubt whether the maize crop will return five bushels to the acre planted; in the central part not over twenty, and in the northern part of the State not over twenty-five bushels: say, for the whole State, an average of about eighteen bushels per acre. The crop of 1872 has been better perhaps, but I doubt very much if the average of the State would go much above twenty bushels. I confess I am a good deal gratified that the Industrial Universities of both Wisconsin and Iowa report no exaggerated yields of maize. In Iowa, the College boys grow 60 bushels to the acre, and the Wisconsin boys 52.95, and these, with scale and tape-line tests, are very good yields of dry, sound maize. It will be worth our while, perhaps, to consider what must be done to get a return of 100 bushels of maize to the acre—that is, 5,600 pounds of kernels, or 7,000 pounds of kernels and cobs both. An acre contains 43,560 square feet, and if the acre is in the form of a square, each side will measure 288.86 feet, nearly. If planted four feet apart, each way, there will be 2,719 hills. Now, to make this quantity on an acre, each hill must produce 44 ounces of ears, and each stalk must produce (provided there are three stalks in a hill) 13.67 ounces; that is, such must be the average yield of every stalk and every hill, and there must be no barren stalks, missing hills or stalks, or abortive ears; or, if they are missing, then the average of the larger and sounder ears must be so much the higher. Did any of you young gentlemen ever see a field of maize, the average ears of which weighed 13.67 ounces, or twelve ounces, or ten? Do you know how difficult a thing it is to find a dry ear of maize which will weigh sixteen ounces? I tried the other day to find five that would weigh four pounds, but was hardly successful. I wrote Mr. Tuttle, of Ohio, sending him good pay for them, to send me four of the largest ears of his crop. He did so—the four, when received, weighed 54 ounces, or 13½ ounces each. He planted his field four feet apart, each way, four stalks to a hill, and I calculated that if every stalk in every hill had

produced each an ear weighing 13.5 ounces, his crop would have made but 112 bushels to the acre, instead of 127½. But it may be suggested there were sometimes two ears on a stalk. No, I think not—the variety, the "Hackberry," seldom sports in that way, and never, when there are four stalks in a hill. Indeed the ears sent by Mr. Tuttle were so short as to suggest to every practical and experienced maize grower, that if there had been three stalks in a hill, instead of four, the yield would have been considerably greater. If a field is planted 3½ feet apart each way, there will be 3,214 hills, and each hill must give an average of 34.75 ounces, and each stalk 11.56 ounces. If planted three feet apart each way there will be 4,836 hills to the acre, and in that case each hill must produce 23 ounces, and each ear weigh 7.75 ounces, and 7½ ounces is a good deal above the average weight of the average ear of the Illinois corn crop.

But there is another consideration which goes to reduce the yield per acre—because in all these estimates one outer line of hills has been put on the outer edge of the field, in that way trespassing half the width of the outside row, on an area not rightfully belonging to the measured square. So then, our first acre would have contained really 800 feet too much, our second one 700, and our third one 600 feet. If we shall ever obtain a variety of maize that will yield two or three fair sized ears to the stalk, and bear as close planting as our one-eared early varieties, then 100 bushels per acre would be less difficult than 75 now. But until that time, and the coming of that variety, I shall look upon the growing of 56,000 pounds of any shelled maize on ten honest acres of 43,560 feet each, as the agricultural want of the age and country.

In my estimation, the belief in the exaggerated report of grain yields, current among us, and which are in a manner indorsed and substantiated by the imaginative literature of the Agricultural Department, has done immeasurable damage to the western farmer, for they have placed him in a false position before his fellow countrymen, as pursuing an occupation and calling, than which nothing could be more profitable or desirable; and one which did not in the slightest way need or desire the consideration or care of the General Government.

THE EXTENT AND VALUE OF THE MAIZE CROP.

The product of maize in the United States in 1860 had reached such an enormous reported aggregate, as to be in quantity nearly three times that of rye, barley, oats and wheat altogether, and nearly equal in weight to the total wheat crop of the whole world. However, all this is according to the census report of 1860, a work and compilation which will hereafter be regarded as one of the most wonderfully imaginative creations and productions of the 19th century. According to the census and agricultural

department report, the maize crop of the United States has gathered weight and strength after the following magnificent fashion:

Maize Crop of 1840	377, 431, 874
" " 1850	592, 071, 104
" " 1860	838, 792, 740
" " 1869	874, 320, 000
" " 1870	1, 094, 255, 000

Bear in mind, please, that the estimates for 1869 and 1870 are from the report of the department of agriculture. These reports give the yield of maize crop in Illinois in 1860 and the increase of it since, in the following figures:

	Bushels.	Acres.
Crop of 1860	115, 174, 777	.....
" 1869	121, 500, 000	5, 237, 068
" 1870	210, 378, 000	5, 720, 965

Now these figures show there must be a great mistake somewhere, for not only in Illinois, but in the whole country is the increase put down as greater, in the one year from 1869 to 1870, than from 1860 to 1869. In bushels Illinois gained only six millions from 1860 to 1869, but 89 millions from 1869 to 1870. In the United States there was but a gain of 35½ millions from 1860 to 1869, but a gain of 220 millions from 1869 to 1870. Such figures as these are so greatly opposed to the evidences of our senses, that they must be rejected, in so far as they claim to be a just estimate of the maize yield of the State of Illinois or of the United States. The estimate of 1860 I regard as too high by nearly one-half, and those of 1869 and 1870, from one-third to one-fifth. However, these estimates of the census and of the department of agriculture are the only ones we have, and are valuable for that reason. The yield of the leading grain and vegetable crops in millions, and fractions of millions of bushels, for the years named, were as follows:

	1860	1869	1870
Maize	838¾	874⅓	1, 094¼
Wheat	173—	260x	230¼
Rye	21—	22⅔	15⅝
Oats	172½	288¾	247⅛
Barley	15⅝	28⅝	26¼
Buckwheat	17⅔	17½	9¼
Potatoes	110½	133¾	114⅝

From these figures it will be seen that maize not only has maintained the ascendency it had gained in 1860, but that its production was increasing, and apparently at the expense of rye, barley, and buckwheat, which are decreasing. Of the 1625 millions of bushels of grain, and including potatoes, grown in 1869—847 millions were maize, and of the

1743 millions in 1870, 1094 millions were maize also. In 1869 there were 70 million acres in the above named crops, 37 million of which were maize; and in 1870, of the 70½ millions 38½ were given over to the maize crop. In 1870, the total value of the grain crops was $1,089 millions of which $501⅔ millions should be credited to the maize crop. In 1869 the hay crop was estimated to be worth $337⅔ millions and the cotton crop at $303⅓ millions, so that the maize crop was worth twice as much as the hay crop and as much more than the cotton crop as to include the value of the crop of tobacco. To the maize crop we owe more than to all the other crops, our beef, pork and mutton, our butter, cheese and lard, and our wool, hides and tallow. It is the source from which our alcohols and whiskeys are drawn, our starches and our vinegar, and lies at the base of all homemade and imported liquors and wines. It is the principal and main food for all animals that labor and indeed for nearly all domestic animals of whatsoever kind, and it is used in a thousand unenumerated ways, to say nothing of the comparatively trifling amount which, to borrow the traditional language of the hoosier, "is wasted for bread."

Young gentlemen, you begin to see the vastness of the subject, and to understand and appreciate how much more difficult it is to say less than to say more on this amazing subject. You have seen to what a magnificent extent the maize crop dominates over all other single crops of the country, and you will find on further examination that maize dominates to an extent equally great in the whole state and domestic economy of the United States. And let me call your attention also to the wonderful way in which, when it has attained the full measure of its growth in the months of August and September, it dominates the landscape and lifts the whole country up to its level. As when you have opened deep and wide ditches, the appearance is that the ditched fields have been elevated to the amount in hight equal to the depth of these ditches, so the level of the top of the maize fields appears to be the true and normal level of the country, and houses, barns and other structures standing on the level of the modest earth, appear to be sunk proportionately. In building you should remember this circumstance, and so lift your foundation up, that your feet, standing on the floor of the principal or first story, should be on a level with the top of the surrounding maize fields. But this is something for the architect and builder to consider, and a matter of great moment to the horticulturist and landscape gardener.

But then there is another side to this domination of our great cereal crop which has never been considered, and that is the aesthetic and moral side. How does a crop to which we in Illinois owe all, or nearly all our wealth, our reputation, and our prosperity, affect the morals and manners of our population? I use the words morals and man-

ners in the broadest and widest sense. I do not know; but I commit the consideration of this side of the subject to your accomplished and critical Professor of Mental and Moral Philosophy, confident in his ability to do it justice.

LECTURE UPON INSECTS.

By William Le Baron, M. D., State Entomologist.

I am happy to meet again so many of the young gentlemen of the State who have come up to this central seat of learning to obtain what is emphatically known as a "practical" education. The great, and rich, and generous State of which you are so fortunate as to be citizens, has contributed freely from her abundant resources the means necessary for building and furnishing the magnificent structure which is here being erected for your accommodation. She does this in order to fulfil her part in making the rising generation of her children wiser and better than those who have gone before them. The important question, what constitutes the best kind of practical education, is now exercising the deepest thought of the wisest and most experienced men, not only in this country, but in the most intelligent nations of Europe. It is the general opinion, not only of practical men, but also of some of the best scholars of the day, that there have been very grave errors in the past, not only as respects the nature of the studies pursued in seminaries of learning, but also in the modes of prosecuting them. There can be no doubt that the education of the past has been devoted too exclusively to the production of learning and scholarship, and too little to the preparation of the rising generation, for the common duties of life. We are not to understand that the learning and scholarship were not good things in themselves. They were elegant and desirable accomplishments. The acquisition of them furnished an admirable discipline of the mental faculties, or at least a part of those faculties, which, I believe it is still the opinion of most educated men, that no other training can equally supply. The great objection to that kind of education is, that it takes too much time to acquire it. It consumes too many of the freshest and best years of life in refining and polishing the mind, without fitting it to grapple with the common and necessary duties of this practical world. For this reason it necessarily constituted the education of the few. It tended to create and maintain an aristocracy of learning. As a common mode of education it is therefore inconsistent with the democratic spirit of the present age, which seeks, as far as pos-

sible, to popularize learning, and to diffuse useful knowledge amongst the greatest number of people. In availing ourselves of the greater advantages of the new education, we can well afford to do justice to what was good in the old.

Precisely what this new and more practical education shall consist in, it is not now my business to discuss, but there is at least one branch of it concerning the importance and practical value of which there can be no dispute; and that is the ancient and honorable art of agriculture. It requires but the merest glance at the subject to see that this vast and diversified department of industry is not only, in its simpler elements, essential to our existence, but that, in its higher developments, it lies at the foundation of all our material wealth and prosperity. Accordingly the prosecution of the various branches of agriculture takes the foremost rank in the educational course of this Industrial University, and every collateral study which bears upon it, and a knowledge of which is essential to its successful prosecution, cannot be otherwise regarded than as constituting a legitimate branch of this kind of education. Amongst these collateral studies, the science of entomology, in its practical relations, is found to hold no insignificant place.

The cultivation, upon an extensive scale, of certain fruits, grains and vegetables, has been followed by a very natural, though probably wholly unforeseen consequence, and that is the excessive increase of some of those species of insects which naturally subsist upon them. There is something very remarkable, and wholly inexplicable in the relative increase of the different species of insects which feed upon the same plant. Whilst the majority of species increase only to a moderate extent, so that their feeding does not seriously damage the crops, others multiply in the most alarming profusion and sweep everything before them; and this difference in prolificacy as often occurs in the case of closely allied species as in those most unlike to each other. The season just past has witnessed a number of instances of this enormous profusion of insects. The famous periodical cicada or locust, which has not been seen in Northern Illinois for the last seventeen years, has this year made one of its periodical visitations. During all this long period of seventeen years they have been burrowing beneath the surface of the ground, slowly coming to maturity, and this year they have emerged in their perfected or winged state, in countless numbers. They have made their appearance over all the northern half of Illinois and the borders of the contiguous States, and in such vast numbers in many places, and accompanied with such an incessant din of their noisy rattling notes, that ordinary conversation could not be heard in their midst. The notorious canker worm, which has held its ground in the Eastern States for at least a century, as one of the worst scourges of the apple tree, has now spread over most of the Middle and Western States. Reports have

been received this year by the Department of Agriculture at Washington, from Norfolk county in Massachusetts; from Henry, Vanwert, Defiance, Drake and Crawford counties, in Ohio; and from Jefferson county, Iowa, of serious damage being done by the canker worm, or measuring worm, as it is often called; and I have myself received accounts of its depredations from Rock county, Wisconsin, from DuQuoin, in Southern Illinois, and several intermediate places.

Another caterpillar, known as the Tent Caterpillar of the forest, has swarmed in immense profusion in Southern Illinois and Kentucky, and in two different counties of the latter State they were reported in such numbers that they had to be cleared from the railroad tracks before the trains could proceed.

That comparatively new comer, the Colorado Potato-beetle, which, though young in years, is already old in an unenviable reputation, although it appears that it is becoming somewhat reduced from its former numbers and destructiveness, is, nevertheless, still a noxious insect of the most serious character; and it has been only by waging an incessant warfare upon them that a tolerably abundant crop of potatoes has been secured.

But all other noxious insects of the season have been thrown into comparative insignificance by the enormous and wide-spread destructiveness of the notorious Chinch-bug. After having given warning of the approach of the grand army by the numerous vanguards and skirmishers, scattered over many places in the preceding autumn, they have this year come down upon us in such countless hosts that the loss inflicted by them upon the agricultural interests of the West, can only be expressed by tens of millions of dollars.

Some idea of the loss caused by the depredations of this insect, in this and the neighboring States, may be realized, when we learn that over a belt of territory one hundred miles wide, commencing in the western part of Indiana, and extending more than four hundred miles west, embracing an area of more than forty thousand square miles, the great staple of spring wheat was reduced to not more than a quarter of an average crop, and in many places wholly destroyed; and that over the same territory, barley was less than half a crop, and oats not more than three-quarters of their usual amount.

Assuming this to have been the proportional loss in the central third of the State, and comparing this with the ordinary yield, as furnished by the returns to the Department of Agriculture at Washington, we calculate that the amounts of grain actually destroyed by these insects, in this portion of our State, must have been seven millions five hundred thousand bushels of wheat, five hundred thousand bushels of barley, and three millions three hundred thousand bushels of oats; being equivalent to eight and a half millions of dollars. If for this sum we

add one-quarter part, for the damage done to corn, and to small grain north of the central belt, we shall have a total loss, caused by chinch bugs in the State of Illinois in the year 1871, of upwards of ten and a half millions of dollars.

If we assume an equal amount of loss for the two States of Iowa and Missouri combined, and another equal amount for the four States of Indiana, Kansas, Nebraska and Wisconsin, we shall have a total loss in one year, in the north-western States, of upwards of thirty millions of dollars from this one species of insect.

You see, therefore, my young friends, that those small and apparently insignificant creatures called insects, play a very important part in relation to the great agricultural interests of the country. It is in vain that we learn by long study and experience the most successful modes of agriculture; it is in vain that the heavens smile upon us with the sunshine and the dew, and withhold not the early and the later rain, if the result of all our labor and care is to be swept from our hands by the depredations of noxious insects. Fortunately, the distinct kinds of noxious insects are very few, when compared with the whole number of species.

The number of injurious species of insects in our own country may be set down, in round numbers, as about one hundred. Dr. Fitch, in his compendium of the noxious insects of New York, has made up a catalogue of upwards of 400 species. But noxious, in the sense here understood, simply means that these insects subsist upon fruit and forest trees and other plants which are useful to mankind, and includes many which are not seriously injurious, and in this general sense the catalogue might be greatly extended. One hundred species, however, would include all the insects which have been sufficiently injurious to attract general attention, or to require remedial measures; and from these, a dozen species might be selected, which have effected more damage than all the rest put together.

The whole number of distinct species of insects in the world has been estimated at half a million. The number of species inhabiting the State of Illinois could be safely put at 20,000, without including many of the microscopically minute species. The Walsh cabinet alone comprised half of this number.

Restricting our calculations then for the present to our own State, and putting the number of noxious species at 100, and the whole number of species at 20,000, the proportion of noxious species to the whole number would be as only one to two hundred. And as this vast majority of insects are not only harmless but absolutely indispensable in the economy of nature, we arrive at the important conclusion that the indiscriminate destruction of insects is both cruel and unwise, and that

the only safe rule to adopt in this matter is to spare all insects, unless we actually know them to be injurious.

We pass to consider some of the general principles which govern the treatment of noxious insects. There are two principal methods of counteracting the depredations of insects: First, by directly attacking and destroying them; and, secondly: By first obtaining a knowledge of their habits, their times and their seasons, and then availing ourselves of this knowledge, which is often only to be acquired by long and patient observation, for the purpose of destroying them in their infancy, or preventing their propagation. The former is the only kind of remedy that we have found for many noxious insects. It embraces the various methods of crushing, burning and poisoning insects, and is little other than the application of brute force, and can be practiced by any one. The other method, that of taking advantage of a knowledge of the habits of insects, constitutes more especially the province of the entomologist. The history of economic entomology presents many admirable examples in illustration of this part of our subject. We will advert briefly to a few of the more remarkable instances.

The eggs of the pernicious Oyster-shell Bark-louse have been found to hatch in the latter half of May, or in some backward seasons, in the first week of June. The young lice spread themselves over the tree for a few days, and then become fixed, and remain stationary for the remainder of their lives. As soon as they become fixed, they begin to cover themselves with the characteristic scale or shell from which they derive their name. This shell is found to constitute an impenetrable shield against all destructive applications which are not, at the same time, injurious to the tree; but by taking advantage of the brief period when the young insects are moving, or before their shell has become fully formed, the least application of soap suds, or almost any other pungent wash, is fatal to every insect which it reaches.

The Saperda Bivittata, which is the parent of the Round-headed Borer of the apple tree, also lays her eggs in the latter part of May or first of June, at the foot of the trunks of the trees, and an annointing of the tree at this time with soft soap renders the tree so repugnant to the insect, that she will not deposit her eggs upon it. The tree might be washed and scraped and labored over during every other week in the year, and all to no purpose, for want of the kind of knowledge of which we are speaking.

One of the most interesting instances of the application of entomological knowledge to the prevention not only of the injuries, but of the very existence of noxious insects, is furnished by the history of the notorious Hessian-fly. The Hessian-fly is so called because it is supposed to have been brought originally to this country from Europe, attached to the straw brought over by the Hessian troops in the Revolutionary war.

It is so small and delicate in its organization, that the least touch annihilates it and a breath blows it away. Yet this apparently insignificant fly has multiplied in such myriads, that it has rendered the raising of winter wheat, over extensive sections of the country, an absolute impossibility. Its minuteness is its protection. It is so small that it easily eludes both our sight and our grasp. Contending with it is like beating the air. Brute force is of no avail here. We must reach it by some more subtle process, or we must bring to bear upon it the results of a careful scientific investigation. The habits of this insect have been partially studied by a number of our most able and careful investigators: by Dr. Harris, of Massachusetts, Mr. E. C. Herrick, of Connecticut, and Dr. Fitch, of New York.

There are two broods of this insect in a year; but it is the full brood which damages the young wheat—and moreover, these are the parents of the spring brood—so that by intercepting the propagation of the full brood, we virtually escape their ravages. It has been found, by careful observation, that these tiny insects deposit their eggs upon the leaves of the young wheat, for the most part in the months of August and September. So that by sowing the grain so late that it shall not appear above ground till after this time, we escape, to all practical purposes, the ravages of these insects.

A man crouched down in a wheat field, with a lens or a pair of magnifying spectacles before his eyes, watching to see how and when flies lay their eggs, would seem to be engaged in about the lowest and most useless occupation that could well engage the attention of a rational being. Yet it is upon the knowledge thus obtained, and thus only to be obtained, that rests the production of one of the great staple crops of the country and of the world, and upon which we, in a great measure, depend for our own and our children's bread.

It has been proposed to apply this principle to the case of the Colorado Potato-beetle, and by planting only very early or very late potatoes, to cut off, for several of the summer months, the supply of abundant and congenial food upon which these insects mostly depend. The great difficulty, in all such cases, is to procure concert of action amongst farmers. It has even been suggested to secure this end by legislative enactments, with penalties sufficient to insure obedience to them. But it is questionable whether the enforcement of such laws would not cause greater distress than a temporary scarcity of potatoes. If, however, it should be found that this destructive insect is likely to increase instead of diminish, as we now have some reason to fear, some such method may have to be resorted to, and would, no doubt, prove a very effective if not an absolute remedy.

The questionable point in such an experiment as this is, whether a number of these insects, sufficient to propagate the species, would not bridge over the gap, by feeding upon other plants of the Solanum family.

I cannot close this lecture without saying a few words in behalf of this extensive and important portion of the animal creation. We are so much in the way of seeing the damage done by insects, and speaking and writing about it, that we are liable to adopt the idea that the so called noxious insects have something evil in their nature, and that they are sent as scourges to afflict or punish mankind.

Some of the popular names which have been given to particular species of insects, such as the *bogus* chinch bug, the *rascal* leaf crumpler, and the *hateful* grass hopper, are calculated to confirm this idea. All such notions and such epithets are incorrect, and should not be indulged in. Injurious insects are no more malignant in their nature than others, and, indeed, differ from them only in their remarkable prolificacy, or powers of propagation—and this we ourselves have incited and encouraged, by furnishing them with a superabundance of congenial food. If insects constitute a great power in the world for harm, they are a still greater one for good. They are, to a limited extent, directly beneficial to mankind. They furnish us with some of our choicest articles, both of utility and of luxury. They yield us silk, and honey, and the richest dyes. But it is in the economy of nature that they hold an all important and indeed indispensable place.

They constitute one of the instrumentalities for the fecundation of plants. In their search for honey, they carry the fertilizing pollen from flower to flower. It has been shown by Mr. Darwin and others that were it not for the agency of bees many flowers with deep corollas would fail to become fertilized, and would, therefore, cease to exist. But the most important office of insects in nature is the humble, but indispensable, one of scavengers. They hasten the decomposition of decaying animal and vegetable matter. It was one of the sayings of Linnæus that three carrion flies, with their progeny, will devour a dead horse in less time than a lion can. And you have only to walk through the woods, and see how the prostrate logs are riddled by ants and borers, to be convinced of the efficiency of these small, but numerous and busy, agents in hastening decomposition, not so much by what they eat as by laying these substances open to the action of the elements. If it were not for this agency, fallen trees, which now decay in two or three seasons, would remain for an indefinite period, and the forest would become unsightly and impassable. But now, no sooner has a tree or branch lost its connection with the living world than thousands of nature's tiny laborers seize upon the unsightly incumbrance, and, with their curious array of augers, saws and pincers, soon reduce it to a mass of decayed vegetable matter, from whose moldering surface spring the orchis and

the windflower, the wild rose and the violet, and nature is clothed again with verdure and with beauty. Even the destructiveness of what we call noxious insects is only an example of nature's method of preserving the balance between the animal and the vegetable creations. This we can easily understand if, instead of wheat or some other valuable product, it were some useless or noxious weed that these insects were destroying. A striking instance of this kind is the thistle caterpillar. So that what to our narrow and selfish vision appears to be a solecism and a discord in nature is, in reality, only a slight eddy or backwater in the onward flow of the everlasting harmonies.

OUR RAILWAYS AND OUR FARMERS.

DELIVERED BEFORE THE AGRICULTURAL CONVENTION AT PITTSFIELD, PIKE COUNTY, FEBRUARY 7, 1872, BY W. C. FLAGG.

The nineteenth century is the age of association. Co-operation, by which the corporation takes the place of the individual in commerce, transportation, manufactures and most other social movements, is the great feature of the time. The accumulated wealth of great combinations of men and money moves with almost the power of governments, and with far more celerity and promptness, through modern society. Pass along our great lines of river and railway transportation, visit our cities and their great banking houses, insurance companies, manufactories, commercial houses and lumber yards, and every man you meet is a part of some great organized system whose hands reach into every corner of our country, and even into remote quarters of the globe. One great exception may strike you as you gaze upon the sliding panorama of field and forest that glides past your car window. The men who plow the fields and drive the reaper, who herd the cattle and make the corn, who freight the long trains with produce and in turn purchase and consume the return products of other States and other climes, each stands isolated, almost by the very nature of his calling, amidst the great combinations of capital, enterprise, intellect and, it may be, rascality that surround him.

Thus the farmer, the great producer and the great consumer of the world, stands in a somewhat unpleasant relation to the commerce, and especially to the common carriers, of our modern life. He feels that he is laboring at a disadvantage in selling his wheat and shipping his cattle when he must deal so much, single-handed, with wealthy and

monopolizing corporations. Especially is this true in his relation to the railway corporations, that have in these latter days furnished the most apt illustrations of the power, the unscrupulous greed and the *dis*honor among thieves that may work under the guise of a corporate name.

I wish to be just, however, and, to begin, will say that I do not consider one railway management any more selfish or corrupt than an individual enterprise would be in the same hands. The Erie Railway Company has, certainly, not been worse than the disreputable firm of Fisk and Gould, nor the New York Central, with its manifold waterings of stock, any worse than Commodore Vanderbilt. If you or I had a monopoly of a similar character, I am inclined to believe neither of us would have the reputation of furnishing its advantages at a low margin of profits; and, very likely, the reputation would not be undeserved. It is human nature everywhere to make use of our advantages to our own profit without due consideration of what is exactly fair or just; and the railway corporations form no exception to the general rule. To say that corporations have no souls does not cover the case.

There are in Illinois, built and building, over six thousand six hundred miles of railway, which is one mile of railway, not counting sidings and double tracks, for every four hundred inhabitants and every nine square miles of territory. If these railways were regularly distributed, and ran in one direction, the farthest distance that any person in the State would be required to go in order to reach a railway would be four and a half miles, and the average two and a quarter miles, if the population were evenly distributed. Yet, to reach the ratio of mileage to territory that exists in Massachusetts, we must have, according to Mr. Poor, nearly eleven thousand miles of railway. Nor is the end here. The character of the surface and soil of our State renders it extremely probable that *tramways* will run upon our principal highways, connect with railway lines in every direction and supercede the plank roads and the macadamized highways. They are less expensive in construction, and only require one-quarter as much power. Thus, whether we look at the present or the future, the railway interest is very large, and seems but to have begun its work.

These railways are, and practically will be, monopolies, at least all experience thus far has shown them to be so. Competition between rival lines will not for any long period be the means of compelling them to charge low rates for fare or passengers. They will and do avoid this by mutual agreement, by consolidation, by pooling their earnings. If they run counter to the interests of the public they must be made to conform to its interest by the interference of Government, or the not less potent power of indignant popular opinion.

Assuming the truth of these two propositions, which I think I need not stop to argue, I will ask you to look at a few facts, drawn from

our railway reports and from the observation and experience of our people.

Our railways have, as a rule, cost but little to the persons or corporations controlling them. They have been built like the Illinois Central, by donation of lands, by liberal purchases of stock, that were all swept away by foreclosures of mortgage, and, finally, by direct gifts, made by counties, cities and towns. The commissioners of railways and warehouses tell us that these latter bonuses amount to from five to eight thousand dollars per mile, and supplemented by first mortgage bonds, furnish an average amount of over $21,000 to the mile, or sufficient to build and equip the roads without the payment of a dollar of stock on the part of the company.

Thus the companies who run railways have mainly, in one shape or another, received large local aid, and represent either an entirely fictitious stock or a stock that they have bought in at low rates, and on which they can not equitably claim a higher rate of interest. Indeed we might almost assert, as a general proposition to what is certainly true of a large number of our Illinois railways, that equitably their earnings should be restricted to such a sum as will pay their running expenses and maintain their equipment, giving the traveling public the advantage of the gratuities donated by counties, towns and individuals along their lines.

Further than this, we might expect that, with increase of population and travel, the rates of fares and freight would diminish, so as to furnish cheap transportation for the masses, and that this might be done without materially diminishing their receipts or impairing the rate per cent. on their fictitious or real stock. English experience has shown us that on railways costing in construction from two to three times as much as our own per mile, that coal is carried for a charge of one cent per mile per ton at a cost of one-third of a cent, and passengers at one-half of a cent per mile, with little or no loss in dividends and at considerable absolute profit. This is in a country where the running of a train costs sixty-three cents per mile, whilst five leading railroads in our State show an average of about ninety cents per mile, or only fifty per cent. greater; so that it stands to reason that on our leading roads a passenger fare as low as one cent per mile and freights at one and a half or two cents per mile would pay expenses, and a fair rate of interest on the capital actually invested, that is not gratuities granted by counties, cities and towns along them, that ought to have the advantage of low rates.

But what are the facts? By examination of old railway guides I find that in 1853, the old Sangamon and Morgan railroad was charging four cents per mile for passenger fares, whilst the Chicago and Mississippi and Galena and Chicago Union were each charging three cents. In

1859, six years later, ten roads averaged three cents per mile, the maximum being three and a half, the minimum two and a half cents per mile. In 1865, six years later, at a period of considerable financial inflation, the average of seven Illinois railways were three and two-sevenths cents per mile. In 1871 we found on eight railways running from St. Louis through Illinois, that the average charge for way fares had reached nearly four and a half cents per mile. Thus, in the face of a large increase in the number of passengers and of the purchasing power of money, the charges for way transportation have advanced not less than thirty-three and a half per cent.

It is but just to add that the average passenger rates, including *through* passenger, are considerably lower than the rates named: The average fares on the Chicago and Northwestern are as low as three and one-fifth cents per mile, and the average of four leading roads is less than three and a half cents per mile. But there still remains a large margin between cost and charge.

I have no exact figures to show the advance in charges for freights during the last ten years, but from facts familiar to most of us it is fair to conclude that they have advanced upon the average not less than fifty per cent., and in special cases of discrimination against certain points there has hardly been any limit to extortion. Taking all the freights on three of the leading roads westward from Chicago the average has been two cents and six mills per ton per mile, which are not only unreasonable in gross but are accompanied by extreme and unfair discriminations. For instance, a miller at Lebanon, on the Ohio and Mississippi road, may be charged fifteen to twenty cents per barrel more on flour sent to New York than he would be if his mill were at East St. Louis, and although he may be charged reasonable rates in themselves considered, his power of competition with his more fortunately situated rival, is utterly destroyed by an arbitrary rule. A miller at Carlinville, on the Chicago and Alton road, found it profitable to ship flour to Alton, some thirty miles distant, and then have it shipped back past his own door to Chicago, rather than ship it direct to that point. A dealer in wheat, at Edwardsville, on the St. Louis branch of the Toledo, Wabash and Western railway, is confronted with the fact that he may ship grain eastward along the line of that railway at lower rates than he can ship it westward to St. Louis, thus discriminating in favor of the eastern and against the western market, although freights westward should, under the law of supply and demand, be the cheapest, inasmuch as the west ships a greater bulk eastward than the east ships westward. At Elgin, on the Chicago and Northwestern, the charge for carrying milk forty miles, to Chicago, is two and a half cents per gallon, against one cent before the war. This, I suppose, was an express charge, but as this is founded on the freights charged express

companies under the same management, we must trace the extortion to the same source. At the same point merchants must pay as high freights from Chicago to Elgin as they have already paid from New York to Chicago, although one distance is forty miles and the other is but little less than one thousand. Manufacturers at Elgin can not put their goods into the Chicago market at a less expense than the manufacturer in the east; and thus the railway corporations, chartered by the State for the public service and convenience of its inhabitants, crush out our home industries for the benefit of foreign, and, in so doing, cut off their own resources.

Thus we find high charges in passenger and freight transportation where the capital invested calls only for moderate returns. The result is that many of our railways have been earning over $10,000 per mile per annum. Poor even gave the average earnings of all our railways at that amount. Sixty-six per cent. of this, on the average, being consumed by running expenses, a balance of one-third of that amount, or $3,333, remains as interest on an average amount expended (not funded) of $20,000 to $25,000 per mile. So that, if all the subscribers of moneys got their dues, they would have an interest of twelve to sixteen per cent. per annum. The late report of the Railway Commissioners does not bear out the figures of Mr. Poor, but shows that the above statement is true, or nearly so, of several leading roads as to their gross earnings, and that the running expenses are a good deal below his estimate, or from fifty-five to fifty-eight per cent. of the gross earnings.

It is not in place here to more than allude to the fact that these extravagant demands made upon the public too often do not enure to the benefit of the holders of stock, but are expended in extravagant salaries, wasteful management and, if Western practice has followed Eastern precedent, in the private schemes of railway officers. The watering of stock, though a crime against the public, might be considered profitable to the shareholder; but the manipulations of Fisk, Gould and others suggest the dark possibility of the lack even of honor among thieves. For all this treachery, dishonesty, carelessness and bad economy, the public must pay all that adroit and unscrupulous management can compel it to do.

These are the general facts concerning the railways of our State. How do they affect the farmer? The good effects of railways are these: *First*, that the farmer has, comparatively speaking, a cheaper and easier method of transportation. One English authority places the comparative cost of transporting a ton of freight one mile as twenty-six cents on an earth road, eight cents upon a canal and two and two-thirds cents upon a railway. However extortionate, our railways furnish a cheap and speedy method of moving produce compared with the old days of

the wagon. This is especially true of farmers remote from the great rivers and cities.

Then, railways equalize and make common the advantages of all parts of the country, causing a rise of real estate in hitherto remote neighborhoods, and making lands, if of equal fertility and climatic advantages, of equal worth. Thus the farmer is benefited, where he desires to sell or rent, in the rise of real estate. If he have coal or other mineral wealth upon his farm, there is a better chance that it will be developed and utilized.

Railways, again, wonderfully quicken and develop the settlement of new regions. The pioneer farmer can now carry with him nearly all the appliances of modern civilization, and the telegraph and the daily paper go with him to the remote canons of the westward mountains, and keeping him abreast and informed of the progress of his race, lighten the solitude, and forbid lethargy and lack of sympathy with his kind. So we transplant whole colonies of intelligent men and women into remote wildernesses, but hold and keep them in rapport with lines of railway stretching toward the Pacific coast.

But, probably, railways are most valuable in quickening the life of communities where they penetrate. They are the great civilizers of the age. They bring new facts, new ideas and new sentiments. The whirlwind of smoke and steam that hourly bears along the traffic and the people of other States and distant cities is a perpetual stimulant to the dweller by its path. It awakens new emotions and new aspirations in the minds of youth. It brings in new people. It carries the old class abroad. It brings, or suggests, new fences, improved dwellings and better implements of agriculture. It suggests shops and manufactories, schoolhouses and churches, and broader and more catholic views to underlie them. It brings new politics, and absolves men from the "straight ticket." Whatever be the faults of railway officers and managers, the railway is a wonderful factor in the product of our modern civilization.

The complaint that nearly all our communities have to make is not against railways, but against railway managers. It is not that the railways are worse than the old systems of earth roads, canals and rivers, but it is that corporations chartered as public carriers for the common benefit of our people are made, in unscrupulous hands, the basis either of gambling in stocks or of extortionate taxation. The following are the chief counts that our farmers have to make against the railway companies as managed in this and other States:

First and chiefly, an irregular and often extortionate system of freight charges. "For instance," to quote Charles Francis Adams, Jr., "Chicago is the great produce market of the country, and New York is its commercial center. The distance from one point to the other is a thou-

sand miles. In these days of fierce competition, five cents a bushel is no small fluctuation—loss or gain—for the dealers in corn and wheat. As a part of the transportation tax between Chicago and New York, this important variation of five cents a bushel represents the merest trifle more than one mill and one-half per ton per mile. To the producers of a very large portion of the interior of the continent, therefore, a matter of two mills a ton per mile in freights must necessarily involve the whole difference between a profit and a loss on their annual industry."

According to Rufus Hatch, it costs but forty cents per hundred, or twenty-four cents per bushel of wheat, to carry it from Chicago to New York. This is $8 per ton. Yet the ordinary charge, according to the same writer, is two and one-half cents per mile per ton, or $25 per ton and seventy-six cents per bushel, most or all of which difference must be paid for by the consumer, and lost by the producer. Worse than this, Mr. Adams tells us that in 1869 freights between the same points fluctuated between $5 and $37.50 per ton, going a little below cost of transportation in the one case and far above it in the other.

Thus producer, trader and consumer are subjected to the fluctuations of charges often changeable, and nearly always extortionate, resulting from competition, greed and short-sightedness. Those who remember the dangerous effect on honest trade and labor, produced by the depreciated currency of war times, will not need to be reminded how gamblers riot and honest men stand aside in such a condition of things as this.

A second, and perhaps in its consequences a worse evil so far as non-competing points are concerned, is *discrimination* as such without reference to the great expense it involves. To pay high prices for freight because it has been carried at low rates for others, to be charged a higher rate for a shorter distance, is at once vexatious and destructive. It saps the enterprise of individuals and the prosperity of towns. It ruins by indirection. "The question of the manner in which the amount is raised," says Adams, "is even more important than the amount itself. For it may well be that a tax not in itself excessive may be raised in an annoying and vexatious manner, or so as to oppress one locality at the expense of another; or it may be exacted in payments which fluctuate wildly at different times, destroying all basis of sound business calculation, or it may be regulated so as to exact the greatest compensation possible for the least possible service; or finally it may be calculated to produce a fixed and reasonable profit, and to discourage all business development in excess of that easily able to pay such profit."

This last expression suggests a third count against the railway companies, less blameworthy, but not less injurious in its effect in many communities. Perhaps it is not the duty of private corporations, but it certainly ought to be of all those as public in their character as railway companies, to look at the extent of accommodations furnished the public, as well as the amount of profits returned. Josiah Quincy tells us

that in one case in England first-class passengers were carried at the rate of fifty-four cents per head for one hundred miles or not quite half a cent per mile, whilst second-rate passengers were carried for thirty-four cents the one hundred miles without affecting the profits. Of course a much larger business was required—more trains and more employees—but experience has demonstrated here and elsewhere, that public convenience requires what railway managers lack the interest or nerve to furnish—cheap and abundant rather than costly and exclusive modes of conveyence—both for passengers and freight. Railway companies will not perform the duty devolving upon them through the acceptance of their charters unless they furnish the greatest amount of transportation at the lowest rates compatible with a fair remuneration to themselves.

The great problem for State legislators to solve is, how to remedy the abuses growing up under the railway system without destroying its efficiency. In this country we have pretty generally given the railway companies free course and relied on competition for reasonable rates, or, more likely, thought nothing about the matter. Neither railway companies nor State governments foresaw what we now know; and until within a few years we have been inclined to rely upon competition, and the law supposed to govern common carriers, for remedies against abuses. We have found, however, that neither competition, ordinary law, nor enlightened self-interest have much affected our railway corporations. English experience is very like our own. On the continent, where governments have either built or patronized railways, the results appear to have been more satisfactory. The public are more cheaply and satisfactorily served. In Belgium, by owning and controlling a few main lines of roads whose rates were kept uniform and unchanged, government has been enabled to keep down the charges on roads owned by companies. In England, and even in Massachusetts, the propriety of condemning and taking possession of one or more railways has already been seriously discussed. The precedent of postal service has been brought up as showing that it is quite possible, even under our form of government, to secure tolerable railway service without exorbitant cost to the public, and certainly with no more dishonesty and far less discrimination than attends its management in private hands.

Our Constitutional Convention of 1870 undertook, for the first time in the history of our country, to provide against railway abuses. Whilst they did not probably do the best thing, nor all that can be done, they deserve the high credit of making a first effort in that direction by

1. Prohibiting special charters.
2. Prohibiting consolidation.
3. Declaring railways public highways.
4. Requiring the General Assembly to pass laws establishing reasonable maximum rates of charges.

5. Prohibiting the watering of stock.

6. Requiring the General Assembly to pass laws to correct abuses and prevent unjust discrimination and extortion.

The present General Assembly undertook last winter to pass suitable laws in reference to passenger rates and discrimination in rates of freight, and will probably pass others before the expiration of the session. All of these must probably undergo the scrutiny of the Supreme Court of the United States before they can be considered as valid and before many railway corporations will submit to their requirements. The provision of the National Constitution that no State shall pass any law impairing the obligation of contracts, will be cited to sustain the railroad companies as against legislative regulation of freights and fares.

In a case in many respects analogous, in which it was decided that the State of Missouri could not, under the provisions of its new constitution, tax the Washington University, chartered for simple educational purposes by prior law, it seems to have required all the sympathy that a public charity of the kind would naturally awaken to secure a decision in favor of that institution. Only a bare majority of the judges decided in its favor. It seems highly probable that when the railway company takes the place of the elemosynary institution, any well framed law regulating fares and freights will hold against a corporation created for the public use on payment of just dues. If the Supreme Court should fail, the constitution, or the judges, must be changed; for the popular feeling of indignation grows too strong to be resisted.

But I need not pursue this branch of the subject. The practical question is, what can be effected beyond what has been done by statute law or otherwise. We have now on our statute books a law forbidding corporations from charging more for a shorter than a longer distance upon railways—a law which covers so many abuses, and is so reasonable in its demands, that it can hardly fail to stand the test of the courts. Another law, less satisfactory, in my opinion, endeavors to fix passenger rates by classifying railroads on their gross annual earnings per mile; but as a large part of the gross earnings of every railroad come from freight charges (amounting to seventy or seventy-five per cent. of the whole), such classification is probably made upon a wrong basis, even if otherwise correct in principle. The law may stand the test of the courts, and fix the principle that the legislature has the power to regulate fares and freight, and so far will have its value; but it leaves a wide field for abuse within its restrictions.

The drift of thought with those who have given the most attention to the subject is toward the purchase or condemnation of one or more roads by the State, and running them at such rates as will compel roads run by companies to lower their charges. There are manifest difficulties in the way. State officials may be incompetent or dishonest in control

of railways; but we may safely compare our canal trustees, or even the management of the Erie canal, with the most honest doings of Fisk and Gould. Moreover, State boundaries cut up railroads awkwardly, and may prevent an application of the remedy beyond our own borders, however much needed. This, again, suggests the owning of railways by the General Government in order to secure regulating lines from the interior to the seaboard; and this, too, though foreign to the thoughts of the people, is not so impracticable as many may regard it. Three leading lines across the continent owned and controlled by Government, and run with as fixed and uniform rates as the post office, would, probably, render service to the producer and consumer far beyond the evils that would result.

But to return to the State, and the influence it can exert by owning one or more railways. We are told that the Erie canal not only lowers freights on the New York Central, but through that and other competing lines has a manifest effect even on freight charges upon the Erie railroad. Our own Illinois and Michigan canal has its effect, and the improvement of the Illinois river by a system of locks and dams is desirable to increase this influence. Both of these canals have been managed by the State, with a uniform system of reasonable tolls, and have furnished a free field for competition to all who wished to place boats upon their waters.

Take a railroad so situated as to compete with the greatest possible number of railways, and, taking complete control of it by purchase or condemnation, fix uniform and low rates of fares, and some excellent lessons in enlightened self-interest might be taught our railway corporations.

This is no fancy. It is European experience, as Mr. Adams tells us: In Belgium, "the government lines, managed by a bureau, at the head of which was a Cabinet minister, ran side by side with private lines owned and operated by companies. * * * It led to a new form of railway competition, which gave the Government, without recourse to legislation, a complete practical control over the railroad system as a whole. * * * The power of combination was destroyed by the introduction into the system of an element which would not combine. In 1866 the practical effect of this novel form of competition was stated by the Belgian minister at the head of the bureau in these words: 'The state railways thus find themselves placed in constant comparison with the railways worked by private companies; on the one hand stimulating them to general improvements, and on the other hand acting as a sort of check against any attempt to realize extravagant profits at the cost of the public.'"

This method had then been followed ten years. When the gross amount of receipts from freights decreased the rates were lowered, and

the result was a large increase in profit. The result was, in the end, a lowering of rates not less than twenty-eight per cent., at a saving to the public of millions of dollars. This was the democratic result of a monarchical government's action. The *people* received the profit—not the Vanderbilts or Scotts, as under our republican theory.

Passenger fares, under the same system, were made as low as one cent per mile, first class, and seven mills per mile, second class, for distances exceeding 155 miles. The amount of travel nearly doubled where heavy deductions were made.

I do not know that in Belgium or elsewhere the experiment of Government owning the roads, and permitting companies or persons to run cars over them for fixed tolls, has been tried. This is something worthy of consideration and experiment, and is suggested both by the practice of our State canals and even by our existing railways in their arrangements with the white, blue and other "colored" lines.

Something, evidently, must be done to secure the people from a tax that goes to increase and intensify the wealth of one class, and to impoverish and oppress another. More than any tariff or excise, necessitated by governmental needs, does it make the "rich richer and the poor poorer," without the consolation of its being well spent in diminishing the national debt, but, rather, spent in the tasteless luxury of successful and unscrupulous railway gamblers. When the farmer must pay, beyond the fair cost of transportation, a tax of *ten cents per bushel* on his wheat, can we wonder that he should be, at least, as indignant as he is against his own representatives, who tax him nine mills on the assessed dollar? The consumer's case is not much better, and the trader suffers more than he is willing to own. "Transportation," says Mr. Adams, "is simply a distribution of wealth in existence; and the cost of distribution constitutes a tax on consumption, levied indifferently on the producer, the manufacturer and the consumer. This tax must necessarily fall upon all parties, though in unequal portions very difficult to ascertain. Could it be wholly abolished, and breadstuffs be transported without cost to London, the exchangeable value of flour would rise in Chicago, and fall in Liverpool. Society would then at once be relieved of a tax in comparison with which all the imports of governments are trivial. In like manner, anything which adds to the necessary cost of transportation aggravates the tax, and anything which diminishes it removes one more burden from human toil."

Railway reform, fellow farmers, is, then, not only the cause of one class, but the cause of the people. Hungry mouths demand it, and unpaid labor echoes the cry. The great physical fact of the century, steam locomotion, must and shall serve the cause of right and human weal, and the railway kings be dealt with as other kings have been before them.

SEWERAGE.

By S. W. Shattuck, Champaign.

The Sewerage, Irrigation and Drainage questions were of importance two thousand years ago, will be two thousand hence, and, what is of more importance to us, are such now.

They are intimately connected, the border lines of any one being found on the other, but it is to the first that especial attention at this time is asked.

I believe that cleanliness is next to godliness, that proper sewerage is the basis of all sanitary reform, also of great agricultural improvement.

Our question, like other important ones which have occupied the attention of mankind for a long time, has many accepted solutions, none of which, though, are universally received, but, as a writer in the English Journal of Science, in 1866, said: "Men of science and men of practice rarely work together without compassing their common object; and the conspiracy of modern chemists and engineers, with modern agriculturists and sanitarians, will assuredly form no exception."

The question may be stated thus: What is the best method of disposing of the human excrements, slops and waste water inevitably present with human habitations?

Many writers upon the subject deal with the first part of the question only, others with the second only, another class regard it as a sanitary question, while still another as an agricultural one.

I propose to notice,

1st. The leading forms of sewerage from an early time to the present.

2d. The results from a sanitary point of view.

3d. The results from the agricultural stand point.

If you look in Deuteronomy, chapter 23, verse 12-13, you will find this passage, as a portion of the Mosiac law: "Thou shalt have a place also without the camp, whither thou shalt go forth abroad; and thou shalt have a paddle upon thy weapon; and it shall be, when thou wilt ease thyself abroad, thou shalt dig therewith and shalt turn back and cover up that which cometh from thee." A good regulation, certainly, for a roaming body such as the Jews were when it was given, but when they had become a great nation and Jerusalem one of the principal cities of the world, we know from the ruins of to-day and history, that important sewers in rock were constructed to carry the sewerage of the temple and of the city in general, into large pits. It is supposed, from the location of these, that the sewerage was used for irrigating the royal gardens.

But it is in the ruins of ancient Rome that we find remains of a grand system of city sewerage.

The Cloaca Maxima, the main sewer of the system, built some 500 or 600 years B. C., was 17x19 feet in cross section. It conveyed the sewerage matter in general, of Rome, under ground, to the Tiber; the agent of carriage in this case, and that of Jerusalem, being water, moved by the force of gravity.

This example two thousand years ago has been followed by most of the large cities of England, and a portion of the continental ones of Europe. But it was not until the first part of the present century that this degree of ancient civilization was arrived at by the modern world. Only within the last thirty years was that detestable invention of civilization, the cess pool, generally abolished in London.

It is said that within six years, commencing in 1844, more than 30,000 of them were abolished in that city.

The cities and many of the largest towns of England followed, so that in 1857, 102 cities and towns had introduced sewerage by water, and 100 more had applied for power to do so.

All of the large cities, and many small ones of the United States, have also adopted this method, while those which have not arrived at the dignity of having water works, and hence not able to adopt it, content themselves with cess-pools, cleaned out, it may be, once a year, but more often not, the capacity of the pits generally deciding the matter. The more open the soil, brick work, or other material forming it, the longer does the health-destroying, death-giving arrangement go uncleaned.

Though the cess-pool is a common method of sewerage in Europe, in those towns and cities that have not sidewalks, the matter is more guarded than in this country—strict rules, as to the size, form and materials of the pits, method of cleaning out and disinfecting them, being generally enforced.

Another method of sewerage, much in use in France and Germany, is by means of moveable receptacles, which are cared for by the proper parties at stated times.

The dry earth system comes under this class. It depends upon the fact that dry earth is a complete deodoriser of human excrements, about three or four parts of earth to one of excrements being required.

The Chinese and Japanese use moveable receptacles, but pay little attention to disinfecting.

In Holland, the city and town house sewers connect directly with the canals, along which the houses are generally built. These canals have thus become large open sewers of the worse kind. But, as a writer on this subject says, "this extremely clean people wash all and everything, so it seems they also wash their solids before using them as manure,

for they actually dredge them out again from the canals by means of scooping nets, and then convey them in boats to their lands."

Still another method is that called the pneumatic system. In this system the privies of the houses of a town or city are connected by iron pipes, with iron reservoirs at the intersection of streets.

Once in twenty-four hours the air is exhausted from the pipes and reservoirs, the proper valves opened, when the pressure of the air forces all excrements in the privies to the reservoirs, from which it is taken by the means of the same principle, then taken to the country in tight barrels and placed under the surface by the use of a peculiar plow. The details of the system are too numerous for our attention at this time.

The following notices of it appear in London papers:

Engineering, of November 2, 1866, says: "A critical examination will show that they (the features of the system) are the essentials of what all engineers, who have made the sewerage of towns their study, and of what all farmers acquainted with agricultural chemistry have pronounced to be most needed. Combined they form the realization of one single design, namely, that of rendering human excrements useful instead of dangerous."

The Lancet, March 30, 1867, says: "Whilst the Metropolitan Board of Works is spending its millions in carrying the diluted sewerage of the metropolis either into the river or into sandy wastes, where its very quantity renders it difficult to manage; and while, on the other hand, the Rev. Mr. Moule, aided by Dr. Hawksley, is trying to bring mother earth to the rescue of her children, our neighbors at the Hague have inaugurated an entirely different system of ridding themselves of the sewerage of their city, whilst carefully utilizing every particle of it in the cultivation of their fields.

That this amount of rich and concentrated manure would be highly prized by the agriculturist can not be doubted; and the only weak point in the system appears to us to be, that no provision is made for the water used for domestic purposes, and which would certainly find its way in great part into the drain pipes, as a constituent of what is ordinarily termed "slops."

The "Lancet" and "Engineering" are each the leading paper of its class in England, and this country.

In considering the sanitary aspects of our question, I adopt the following as my standard of comparison:

All sewerage should be disposed of so as not to pollute the air we breathe, or the water we drink.

I am tempted to pass as unworthy of notice, from a sanitary point of view, that method which is most generally used, the cess-pool. But the facts, that it has so much evil in it, and its general use, will not allow such a course.

I see nothing which is good in it, that could not better be gained at the same expense in some other way, hence the charges against it shall be stated immediately. It is the means of polluting the water we drink and the air we breathe: yes, the very ground around our homes becomes charged with poison.

The evils resulting from this condition of things are too well known by sad experience. The cholera and typhoid fever, or as they are sometimes called, filth diseases, are some of them.

A great deal of evidence might be cited to prove these statements. The following must suffice:

In an address before the "National Association of England for the Advancement of Social Science," in 1864, Mr. Rawlinson, the chief sanitary engineer of England, said: that by the abolishment of cess-pools at C——n, a place of thirty-six thousand inhabitants, the death rate had been reduced from twenty-five to sixteen in each one thousand; at Worthing, a place of six thousand inhabitants, from twenty-five to fifteen and one-half in one thousand; at Lancaster from twenty-eight to twenty-two, etc.

See what the health commissioner of New York says:

"The causation of typhoid fever, though long enveloped in obscurity, is now well known. It is one of the so-called 'filth diseases' of modern sanitary writers. Its most ordinary exciting cause is air or drinking water, befouled with excremental matter." * * *

In a small German settlement in the upper part of the city there was a severe outbreak of dysentery and typhoid fever. A physician, called to attend some of the cases, set to work to find out the cause. On inquiry as to the water supply, he was directed to a spring on low ground in the midst of the settlement, so situated as to receive the surface drainage. The water was pure and sparkling to the sight and taste, and was loudly praised by the owner of the spring. A quantity put in a bottle and allowed to stand a few hours, threw down a thick sediment of most offensive matter, which, on being tested, was found to be as purely excrement as if it had been taken from a privy. The people ceased to use this water, and the epidemic ceased at once.

While visiting in an interior township of this State, famous for healthfulness and the beauty of its scenery, I became interested in the history of a family which was suffering from typhoid fever; of eight members, five had perished, and one was then fatally sick. On visiting the locality the house was found situated on an elevation, and all the surroundings were admirably arranged for health. One could readily believe the statement that there had not been a case of sickness in the house for twelve years. The following history of the present sickness was given: A few weeks before the fever appeared the pump in the well broke, and the farmer being driven with his work, neglected to have it

repaired. Meantime the servant brought the water from a spring at the foot of the hill, which soon became low owing to the drought. He then resorted to a small brook, and from this source the family was supplied for two or three weeks. This stream, higher up, ran through several farm-yards and received the surface drainage. The first symptoms of poison by water was slight nausea and a mild diarrhœa; after several days a typhoid fever in its worst form was ushered in. Of the entire family but two escaped an attack, and they did not use the water. An examination of this water revealed a sediment of excremental matter."

Many of you, no doubt, would assure me there is no danger, in your case; that your cess-pool is at a distance from the well and house; that its location is much lower, etc. Do not deceive yourselves; the contour of the surface of the ground gives little or no indication of the veins and arteries below, that convey the water to your well. Any of you no doubt can call to mind facts which will bear me out in this statement.

The water carriage system of sewerage is the only one that provides for the stops and surface drainage as well as excrements. It has much in its favor when carried out as is now being done in England, but as it existed in Rome in ancient times, and in the cities and towns of Europe until within a few years, and in this country still, is better than the cess-pool, but not what is required; not what our civilization, in other respects, demands. Its aims were purely sanitary, but were not far reaching. The location, only, of the trouble was changed. The filth was removed from Rome, only to pollute the waters of the Tiber. Some of the fairest portions of the shores of the Mediterranean sea, once as healthful as any in the world, are now uninhabitable, because of the complete pollution of the water and air by the sewerage of cities and towns. Many locations in England were, less than ten years ago, on the open road to a like condition. Some of the rivers were so polluted by the sewerage of the towns that a high authority stated, at a sanitary meeting, he had seen birds cross a river upon the filth collected on the surface of the water. At last the strong arm of the law interposed making it criminal to empty sewers into certain rivers, or their tributaries within three miles of the main ones. Even before this, public opinion had condemned the water carriage system as thus carried out, and demanded to some extent a return to the cess-pool. Mr. Rawlinson, before referred to, said in 1864: "The improved sanitary condition of some of our cities and towns may be thoroughly investigated, and the question be again asked 'Shall we return to cess-pools?' The modern sewering of towns and drainage of houses has, no doubt, led to the fouling of streams and rivers; but, and this must be fully considered, the value of human life has been increased in proportion as cess-pool and cess-pit have been abolished and water-closet refuse has been removed in water."

It was at this crisis, when cess-pools seemed likely to get the upper hand again, that the happy idea of using sewage for irrigation was prominently brought forward. It is a well known fact that a portion of the sewage of the city of Edinburg has thus been used for over two hundred years.

In an address before the "Society of Arts," England, in 1867, J. Bailey Hutton said: "Of all methods of purification, the application of sewage to land is the only one to which science accredits the power of arresting objectionable matter, though the mode of application is found to govern the extent to which the process succeeds. Sewage discharged from towns by gravitation, or lifted by mechanical power to higher grounds, if it passes simply over the surface of the land, without passing through it, retains a large part of the noxious matter, and cannot be considered to be in a fit condition to mix with river water used for drinking.

"This view applies with increased force the nearer the irrigated lands approach the river.

"The absorbent powers of vegetation are, doubtless, very great, but they are not sufficient in themselves to appropriate the impurities held by water in suspension as well as in solution. Moreover, vegetation has not equal vital powers all the year round to seize and appropriate the fertilizing elements which are its food. It has its seasons of rest as well as growth, and at such times its extractive and retentive capabilities are very small. When vegetation, however, grows on a deep bed of free-soil, through which the sewage can descend and percolate after satisfying the vegetation, we possess the best means of purification, its perfection depending quite as much on a sufficient depth of sub-soil, through which the effluent water must descend, as upon the action of vegetation."

Sewerage by means of movable receptacles is generally objectionable. Drinking water is not often polluted, but in most methods under this class the air is contaminated.

The dry earth method, when properly carried out, is an exception. It meets our sanitary requirements so far as providing for the excrements. It has met with considerable success in Europe and in the United States. The following is an extract from the report of the Massachusetts State Board of Health: "In the country it will be invaluable; and whenever, in private houses, cholera, or typhoid fever, or any contagious disease may occur, there should this principle involved in the earth closet be adopted." The gentlemen making the report could not have had in mind the old adage: "An ounce of preventive is better than a pound of cure."

The agricultural view of our question is, what exchangeable value has sewage as a manure?

That the human excrements contain the elements for a valuable manure has long been recognized, and acted upon to some extent, especially in Japan and China, in which countries but little other manure than this is used; and yet the population of these countries is said to be over 500,000,000, or nearly one-half that of the world, upon a small portion of it. Until within a few years, little attention, comparatively, has been paid to making use of this manure in England or in the United States, the main idea having been to get rid of it. Most of the nations on the continent may be placed between the extremes I have named.

It may seem uncalled for, yes, even foolish, to speak of the value of human excrements in a country where they cannot be given away—where it is only by the addition of a few good dollars in each case that you can have the privies cleaned out—where the land is already rich enough, and will not wear out, as many persons seem to think. But I will venture to say a few words, remembering that I am not speaking for the present only.

The average amount of excrements per annum for each person of a general population is about ten cubic feet, of which the solids form one-tenth and fluids nine-tenths in weight. The two amount to 630 pounds. Chemists tell us that these 630 pounds give ammonia, in the solids, 1.49 pounds; in the fluids, 9.38 pounds; total, 10.87 pounds of ammonia, after allowing for loss by evaporation.

If the 630 pounds were reduced by evaporation to the dry condition of guano, we would have 50 pounds of residum, 20 per cent. of which would be ammonia, while only 8½ per cent. is found in guano. Also that one pound of human excrements is equal to thirteen pounds of horse dung, or to six pounds of cow dung, in fertilizing qualities.

Could we but place human excrements into as good a form for handling as guano is, there is no question but there would be as ready a demand for it. In some of the older countries they have a market value. In Nice and Geneva the farmers of the surrounding country contract with protestant householders for the excrements collected in their cess-pools at the annual rate of $1.00 per head, to catholics in general, only 80 cents per head is paid. In Antwerp, a city of over 100,000 inhabitants, the sewerage is sold for about $20,000 per annum.

These are exceptional cases. Generally the removal of human excrements from cities and towns is a source of expense, hence often left undone.

Excrements taken from cess-pools and movable receptacles, when not used directly upon lands, are generally prepared for such use by evaporation, natural or artificial, or treatment with solid deodorizers. The result of the first method, after being ground to powder, reaches the farmer under the name of powderitte, in forming which, nine-tenths of the excrements have been wasted. A modification of this method is called

the "Eureka process," in which the excrements are collected as produced, the soluble gasses fixed, when the whole is subjected to a great heat for freeing the water, then mixed with dry substances, such as ashes or coal and bone dust, ground up, and sold, if possible.

Messrs. Lawes and Gilbert, the well known experimenters in manures, state that in a sample of this kind, but one to two per cent. of ammonia was found, so that it would be of little use unless applied in very large quantities to the acre. In the treatment with solid deodorizers, lime, coal ashes or dry earth are generally used.

The use of lime is a bad practice for the interest of the agriculturist, as ammonia is thus set free. The use of coal ashes has not this objection, but it has a still greater one, if possible; a large amount of useless, if not injurious substance is mixed with the excrements, making them of but little value to the farmer, as convenience of application must be one element of value of any manure.

The dry earth method presents a better case. We find in it, as a result of a most satisfactory sanitary measure, a valuable manure. It would almost seem as if the "working together of men of science and men of practice" had given important results.

Prof. Johnson, the leading agricultural chemist of the United States, says: "I am myself familiar with the use of dry earth as a disinfectant and a drier of facies. Nothing can be more instant and efficient than its operation, and its use has every sanitary advantage. The agricultural aspects of the subject is of the highest interest and importance. The earth closet enables us to effect a more than Chinese economy of our night-soil and urine, in combination with the utmost cleanliness, convenience and cheapness.

The best method of *utilizing* the sewage of towns where the water carriage system is in use, is the phase of our question which has received the greatest attention for the last ten years in agricultural circles, especially those of England, but which does not seem settled. This statement may be made, though. No attempt hitherto made to extract a useful manure from this form of sewage, which could be applied in a solid form, has proved anything but a failure. The reason of this is evident, with the fact before us that the greater part of the value of excrements, as a manure, is the ammonia, and that, to quite an extent, this is taken up by the water, which is generally 300 parts to one of excrements, also that no way has yet been found of precipitating this ammonia. Under these circumstances the use of this form of sewage for irrigation, seems about the only resort. The advocates of it are numerous and enthusiastic. Under favorable circumstances, where the sewage can be conveyed to suitable fields by gravitation, as is the case at Edinburg, paying results are had, but such, I believe, cannot be usually had.

The effects of using sewage in large quantities for irrigation, are surpassing. Mr. Lawes says, "I know from experiments, in using dry manure, each addition after a certain amount applied does not increase the produce in proportion; with double or triple the amount of ammonia, you do not double or triple your produce.

There is no proof in these sewage experiments that we have exceeded the profitable limit. We have gone up to 7,000 tons a year, (per acre,) and the produce is pretty nearly in proportion to tho quantity of sewage used. The largest produce I ever obtained in these experiments with an enormous quantity of dry manure, was about 12 tons of grown produce to the acre. The quantity obtained by sewage irrigation, was 33 tons." I will leave the question at this point, but, if the public interest demands such a course, will further develop it at a future time.

REARING AND FEEDING STOCK.

By E. L. Lawrence, Head Farmer at University.

In the early ages of the world, the care of flocks and herds, and the tilling of the soil, formed two distinct occupations. Thus Cain appears as a "tiller of the ground," while Abel was a feeder or "keeper of sheep." And to this day in warmer climates, and in less enlightened communities, that division of labor is still maintained. In our own land, stock rearing is, or should be, so intimately connected with the whole economy of the farm, that in speaking of one, its relations with the other are such, that it becomes necessary to consider both as one subject.

In a work styled "Boke on Husbandrie," published in England near 350 years ago, may be found this declaration: "A husbandman cannot thryve by his corne alone without cattell, nor by his cattell without corne." This sentiment is as good to-day, and as true, as when first uttered, and having stood for so long time without refutation, may now be considered as thoroughly established.

It may be well to consider, first, how stock rearing may be so conducted as to diminish, and how made to increase the fertility or productiveness of the farm.

I shall consider this as an axiom, or self-evident proposition, so evident that no demonstration is needed to establish its truth: that that system of farming, however large the seeming profits at first may be,

that tends to lessen or diminish however, show the productiveness or fertility of the soil is ruinous in the end. And on the other hand, that practice, although the profits may appear small, that leaves the farm at the end of the year better than at the beginning, is to be commended. The first draws from the capital to make large dividends; the second adds to the investment year by year.

I suppose I shall be safe in saying, that three-fourths of the animals fed for slaughter in this State, are fed in the open lot, the feed in most cases being thrown upon the ground; the rule often being "one acre of feed lot and two hogs to each steer." In times past when the feeder cleared, by feeding from six months to a year, from 25 to 100 per cent. on his investment, this would not be so objectionable as at the present, when the balance is so often on the wrong side of the ledger. It is well now to look further and see, if, while the purse remains unfilled, at the same time we are not robbing the soil, continually taking away and restoring next to nothing.

I think that experience will show, that where animals are fed in the way just described, that instead of increasing the productiveness of the feed lot, the opposite is the result. The droppings and wastings from the cattle will but illy compensate for the damage done the land by their continued tramping. Especially is this so when the ground is soft and wet, as is the case a large part of the time in the region where most cattle are fed for market.

On farms where hogs are fed alone, the yard is smaller, and in wet times corn is thrown into mud so deep that it will entirely disappear, and has to be fished out by the animal, and large quantities of filth must be consumed with the food. This practice of feeding is, in my opinion, one of the prime causes of hog cholera. In both these cases all the manure is worse than wasted.

I conclude that any farmer following directly or indirectly the plan just described, will find that his farm will be poorer at the end of each year.

How cattle feeding may be so conducted as to not only keep up the fertility of the farm, but increase it each year, I will now attempt to describe.

Stables should be provided for horned cattle as well as for horses, and will be found to pay equally as well. Sheds should be provided for sheep, that may be opened or closed as the weather is warm or cold; and good, tight, well ventilated pens for hogs, with plank floors, and not over eight or ten hogs in each pen, less would be better than more.

Pliny says, while speaking of planting trees as a means of protection against high winds, "Men should plant while young, and not build till their fields are planted, and even then should take time to consider, and not be in too great haste. It is best, as the proverb says, to profit

by the folly of others." Planting trees should be in order at all times. But I would say, build while young, and enjoy the benefits derived from the judicious expenditure through life, and while we may profit by the "folly" or failures of others, it is best to profit by the *success* of others.

I would advise, in reference to building a barn, to commence the plan from the inside and build out, and not make a shell first and then divide off the inside space to suit, as is often done.

Stancheons I think best for dairy cows, with sloping floors, and a four inch drop about five feet from the stancheons. Milch cows should be fed at least eleven months in the year, and I like the plan of always milking in the stancheons and giving a feed at the time of milking.

I have tried the various ways of fastening stock or feeding cattle, with ropes around the horns, straps around the necks with snaps and sliding rings and with chains around the necks; and also the plan of making box stalls, one for each animal, with doors to close and fasten each without tying. The stalls have given perfect satisfaction and cannot be too highly commended.

With plenty of stable room and the straw raised on the farm stacked near the barn, and plentifully used in the stalls, sheds and pens, a sufficient amount of manure will be made, if properly applied, and the amount of stock kept corresponds to the size of the farm, to keep the farm rich and productive.

And here it may not be improper to digress to give my own practice and experience in applying manure.

I have made a practice of taking the manure directly from the stable, or haul out what is in the yard, as it comes from the stable, once a week or oftener, to suit circumstances, on land intended for corn for the coming season. In this way nothing is lost by decomposition, which takes place in the soil where it does most good, and I think less is lost by being washed away by the rains than would be were it allowed to lie in the yard and rot. On land only moderately rolling, nothing will be lost, except in case of a heavy rain when the ground is frozen. I have succeeded in raising the best of corn on land thus treated, and the land is left in most excellent condition for another crop.

Last spring, on the University farm, I found a large pile of very coarse manure, mostly straw any hay, which was imperfectly rotted in places only. This was spread from the wagons and plowed in, and the land planted in potatoes. As this did not quite cover the piece, (two acres,) some thoroughly rotted manure was applied on the remainder, and the land treated in every other respect alike. On that part where the coarse manure was applied, the yield was more than double the other.

The advantages of this practice are briefly these:

First—The manure goes into the soil the same year it is produced, and thus a saving of one year's time is made.

Second—A large share is hauled out in winter when farmers are least occupied.

Third—It is worth double, as a whole, that that remains in the yard till the next fall.

I would like to crowd in a word against the practice of throwing manure out at the stable windows. It should in all cases be run out on a wheel-barrow, to a pile away from the barn.

I have thus given this branch of my subject a prominence, for the reason that I believe it to be of vast importance that we keep our farms rich and fertile; and that this should be one of the first aims of the feeder. It is a guard against drouth and wet, heat and cold, and also against the depredations of insects. To have our farms up to the maximum in fertility, they must not be too large, but should be well but not too heavily stocked with horses, cattle, hogs, and sheep.

The Roman orator Curius said "he was not to be counted a good citizen, but rather a dangerous man to the State, who could not be contented with seven acres of land," and the law actually limited the land holder to that amount. Afterwards it was extended to fifty acres, and finally to five hundred. With the increase in the size of the farms, the power and glory of the empire decreased.

I have recommended stalls and pens, as the proper place to feed stock, in place of feeding in the open lot. Not the least of the benefits gained by this, would be to diminish the numbers of animals fed, and cause the farmer who raises the calves to keep them on the farm till they are fit for the city market. Men could not be found who would build stalls for 500 or 1,000 steers, or pens for several hundred hogs. We have in many cases been in the habit of keeping too much stock for a distant market. We should make the numbers less, and by improved breeds and improved feeding, summer and winter, make a less number of cattle and hogs pay a greater profit. We have the past season received much less money for a large crop of hogs and cattle, than we did the year previous for a much smaller crop. We seem to be straining every nerve to add acre to acre to double and treble our productions, forgetting that we make more money from a small crop than from an extraordinary large one. When we add ten per cent. to an average crop, we at least diminish the price of an average crop thirty per cent. And a decrease of ten per cent. will increase the price thirty to fifty per cent. I venture to say that those dreaded scourges of hog cholera, Texas cattle fever and chinch bugs have put more money into the farmer's pockets, on the whole, than has been lost by their depredations. Nature seems to have stepped in to prevent our utter destruction. As all other classes in our midst

prosper with the farmer, it is no advantage to those not producers to get their supplies at a ruinously low price. A market overstocked with the products of the farm, will for the time benefit the railroads and those in the cities, who store, handle and gamble in our products, a class on which the farmer is not apt to bestow a great amount of sympathy, but as I have before stated, is a damage to the farmer.

Farmers are the only class who encourage everybody to join them in glutting the markets with their products. All other classes will try to make the supply correspond to the demand. We have not turned our thoughts in that direction. Instead of directing everything to an overplus of production, I would say, let us encourage consumers to come among us. Were we to save the amount paid for freights, cartage, profits, commissions and insurance, to take our products one-third the way around the globe, and make the same saving on commodities returned to us, we should then begin to occupy the position that was designed for the tillers of these fertile prairies.

We have displayed a wonderful amount of energy in building railroads, that we might convey our products to the seaboard, and now are trying to control these roads. If the same amount of energy and capital were directed to make a market at home, our interest in railroad freights would be much less. If a much larger amount of our beef and pork was consumed at home, this would make room for the little we should send away, and we might ship to other markets at a profit. The farmer gets his profit from the few last cents on the price of a hundred pounds of beef or pork. This sum taken off, the less he has to sell the better.

We are said to possess the richest land that the sun looks down upon; and yet the owners of this soil are compelled to send off their fat, sleek, "ripe" steers to feed men not half as deserving as the farmers of Illinois, to say the least, and we take up with the "bobtails," the "lop-horns," the "scalawags" and old cows that have had the last drop of juice wrung out of them, and old bulls and stags that had ought to be sent to New York, to feed their Tweeds and Connollys, or else to Joliet to feed prison convicts. Brother farmers, these things ought not thus to be!

I think that every bushel of corn that we raise and sell off the place for less than seventy-five cents, is at a loss; or if fed on the place, we should realize directly fifty cents a bushel for it to raise at a profit. This loss may not be directly felt in the first case, but may be a loss for all that, in that we are each year rendering our land less productive, when we raise corn for a distant market.

I noticed in the "Prairie Farmer" of Jan. 27, an article headed "Corn meal as a fertilizer." It starts off thus: "The production of maize upon the fertile prairies of the west, to be used as manure to sustain the fertility, or increase the productiveness, of garden fields in the valleys of New England, promises to become an important branch of agricul-

tural industry." While this may speak well for the enterprise of the New England farmer, or gardener, it speaks volumes of disgrace to the western corn grower. I know not but they will one day ship off our fertile soil itself, to cover up their rocks and hard-pan, and leave us to cultivate blue clay or whatever sub-soil we may find.

I can see a great advantage to be derived from the scientific and practical education given at agricultural colleges and universities, as here men are being educated in such a manner that they are qualified to superintend manufacturing enterprises. There is capital here already, and more will come, when we have men to manage the enterprises to advantage. They may be found among the graduates of our university. When we become a manufacturing people like New England, we shall not then send our corn 1,000 miles to be used as a fertilizer, but shall find use for it at home.

I am told that we cannot become manufacturers, that this is an agricultural State, etc. I will quote from "Geological surveys of Illinois," Vol. 1, pp. 48 and 49: "The steam engine has become the indispensable agent of productive industry throughout the civilized world, and that country which possesses the greatest facilities for the cheap generation of steam power, all other things being equal, will inevitably take the advance in commerce and manufactures, and must consequently progress with rapid strides on the highway of national wealth and power. * * * * The coal bearing strata, or coal measures, cover more than two-thirds of the surface of the entire State, comprising a larger area of coal lands than can be found within the boundaries of any other State in the Union."

When our scientific men tell us these things they must expect that we will grow restive under a system that takes all the profits from our productions to take them to market.

It may be thought that I have wandered from the subject assigned me; but I hope not. We spend three or four years to raise a steer and fit him for market, but the day of great importance is the market day, the day above all others. Then we may learn if our years of labor have been remunerated or not.

With regard to the proper division of the farm, so as to give the best results, by apportioning to pasture, meadow and the plow each the proper amount, so as to establish a rotation of crops, I think we should have, where all the farm is under cultivation, one-half for the plow, one-fourth for pasture and one-fourth for meadow. Pastures should be more than abundant; we are apt to allow our pastures to be fed too close, and deprive animals of the benefits derived from good pastures, and also damage the lands. I am satisfied that the summer months is the time that animals should put on growth and fat, and winter feeding, while it may accomplish much, will always be expensive.

The hap-hazard ways practiced by many feeders should be abandoned by all. The feeder should know at least once a year, by invoice, what his stock is worth, and then by keeping accounts of feed and labor, he may know when sale is made how the account stands. If there has been a profit in the operation, it will be gratifying to be informed of the fact. If a loss is suffered, it should be noted, that we may guard against its repetition.

Many feeders pay too little attention to cleanliness in stables, and in some where cattle are kept, filth is allowed to accumulate to such an extent as to be almost past endurance. If the famous Augean stables wherein 3000 oxen had been kept for thirty years, had been in a worse condition, the rivers Alphus and Peneus would have been altogether insufficient to have wrought their purification. Nothing short of our own Niagara could have accomplished the task. Cleanliness in stables may be next to godliness, as well as elsewhere. There is no danger of scraping or sweeping the floors too closely, or of using too much straw for littering.

Stables should be high, light, well ventilated, and have plenty of room. Most basement stables are too much in the ground, and windows for light and air are too small. It is better to construct a roadway to go up to the drive floor, than to dig so deep into the ground. Two feet in fifty is enough descent in the ground for a basement barn. They are often built and give good satisfaction on level ground. I consider the basement plan as the only correct one.

I have fed cattle on meal, mixed with cut straw, and on meal and hay each fed separate, and on corn in the ear and hay and straw. I think there is a saving of 25 per cent. by feeding meal in preference to corn in the ear. When the meal is mixed with cut straw or hay, the saving is greater. I have fed cooked food to only a limited extent; from my own experience, and that of others, I am satisfied that the same amount of corn, ground, and hay and straw cut, and the whole steamed, will produce double the amount of flesh that it will when fed unground and raw.

In feeding corn meal, great care is required to guage the amount, to give all animals will bear and no more. The experienced feeder can easily tell when too much meal is fed. The stomach becomes soured, which will be detected by the smell of the breath, and the whole stable will become scented. There is not that danger of feeding too much where the meal is fed with cut hay or straw.

We are now making arrangements on the university farm to grind and cook food, and propose to test by experiments the various methods of feeding. By keeping a strict account of weight of animals and weight of food consumed, also the value of labor expended, and continuing for three or four years these experiments, we hope to arrive at definite conclusions as to the merits of the different practices in feeding.

The want of a suitable supply of water for stock, has been a great drawback with many feeders the past season. The dullness of the market, perhaps, may be accounted for, by the forcing of so much stock on the market from regions where water for stock has failed. As our prairies are growing dryer each year, this want will be more and more felt, till measures are taken to insure a supply against any contingency. The prairie creeks and ponds, artificial or natural, are about as reliable as some of the Chicago Fire Insurance Companies. They are good when not wanted, but fail entirely in time of need.

At any place where a never failing fountain may be reached by digging 100 feet, this want may be supplied, at not a very heavy cost. With a suitable pump, a wind-mill with ten feet wheel will pump water 100 feet for one hundred head of cattle. A tank should be provided to correspond to the depth of the well, and also to the amount of water wanted. I estimate that for a well less than thirty feet deep, a tank should hold as many barrels as the number of cattle to be supplied. Thus a tank holding fifty barrels will water fifty head of cattle at all times. If the well is 100 feet deep, a tank should hold 100 barrels for fifty head of cattle, and so on.

The mill can easily be arranged to pump the tank full and then stop till water has been taken out, and then commence operations again. This may best be accomplished by suspending a bucket in the well with a leak in it, to be filled from the outflow of the tank. The tank is filled and overflows, the overflow fills the suspended bucket, the added weight in the bucket turns the mill from the wind; the water leaks from the bucket, the mill starts and the operation is repeated.

In June last I had a well dug on the University farm, and put up a mill and provided a tank holding sixty barrels. Sixty-three head of cattle and ten horses were supplied with water through the summer, with never less than thirty barrels in the tank.

It should be borne in mind that where a mill is used, a much greater amount of water may be obtained than could be, if the water was pumped by hand; and also, that a large well is not needed—the mill pumping slow, and pumping a much longer time than would be practical in pumping by hand.

I find, by referring to my books, that the cost of the whole thing, mill, freight on same, tank painted, derrick painted, the well bricked up, the pump and the discount made to the University on the mill, amounts to $238 50. It will certainly pay the interest on $1,000 each year.

The mill, as now arranged, is perfectly self-regulating in every respect, and I think will stand in any gale where an ordinary building is not blown down.

In conclusion I would say: Supply animals with pure water; feed regularly and bountifully; treat kindly; give salt at stated periods; cul-

tivate a love for your calling. If to your mind there is another occupation under the sun that has more attractions than that of farming, fall out of the ranks and we will close up and send you to the rear. Exercise judgment in all you do. There is no occupation, calling or profession known to men, that requires the exercise of so many of the qualities of brain and hand, that go to make up the perfect man as designed by an all-wise Creator, as that of farming at the present time. The farmer should have the skill of the mechanic and engineer; the tact of a lawyer; the sagacity of a judge; the capacity of a governor; the perseverance of a saint, and the faith of a christian; all these combined with the powers of a Hercules. The proud motto of the University is "Learning and Labor," that of the young farmer should be "Brains and Muscle." While an opportunity to cultivate the former should not be neglected, the latter must not remain undeveloped.

The farmer should give his attention to his business. Farming by proxy seldom pays. It is said to be a good business that will run itself. Farming is not good enough for that. Trust not the entire care of your flocks and herds to any one. Let each animal know his master's face, and see it at feeding time. This has a wonderful effect. While it tends to give the animal a quiet eye, a contented look and a sleek coat, it also tends to give his owner a goodly balance at the banker's.

"OUR HOMES AND THEIR ORNAMENTATION."

By W. C. Flagg.

"The corner-stone of the republic," said Dr. Eliot, in one of his sermons, "is the hearth-stone." The truth thus proverbially expressed—that the enduring nation rests down on the virtues and habits fostered by the fireside—suggests the importance of my topic, and will justify me in attempting to specify some of the considerations that should guide us in the building and beautifying of our Illinois homesteads.

The homes of Illinois are emphatically its country homes. Nowhere does the agricultural interest so predominate, and so large a part of the population cultivate the soil on so large an area of territory. To make these country homes as they should be, the nestling places of warm affections, remembered and sought in mature years, the nurseries of modest virtues and refined sentiments, they must first of all, of course, be the homes of intelligent and conscientious men and women; but they must also, in a lower but hardly less important way, delight the eye and

satisfy the desire for the beautiful, as well as the love of domestic quiet and comfort.

The building and finishing of our rural homes affects not only many persons, but the influence extends through many years and affects them greatly. The impressible child, that spends all the formative period of its life in the home of its parents, is strongly marked by the influences surrounding it, either for good or evil. I suppose, if we knew the full extent of exteriors upon the mental and moral growth of our children, we should shrink from the responsibility that we have assumed in their nurture.

Before entering upon the direct consideration of the principles that it seems to me should guide us in making our homes beautiful, it may be well to specify the conditions under which the attempt must be made.

1. Our continental climate is one of extremes—of heat and cold, of alternate drought and wet. A house in our prairies, therefore, should be built with reference to shielding us against these changes and extremes. The walls should be brick, stone, or, if of wood, made proof against the sudden invasions of winter's cold and summer's heat by filling in with brick, double boarding, felt paper or other means. The unusual heat of our summers requires higher ceiling than in more northern and seaboard climates, and verandahs about the houses. Attic rooms, or even half stories, are undesirable, from their warmth in the summer months. Broad eaves are wanted, because they keep the house more in shadow, and shield the building from driving storms.

2. The conformation of our prairie country, with a few exceptions, is that of a plain, and the landscape shows long lines of gentle undulations, interspersed with groves of round-headed deciduous trees, suggesting the distinction of Price and Downing between the beautiful and picturesque. Ours is a beautiful rather than a picturesque country.

3. Our chief material for building, taking the whole State into consideration, will be brick. The northern pineries cannot, for many years longer, supply building materials at prices low enough to compete with brick, and stone is not sufficiently accessible nor sufficiently manageable in building to be used to any great extent.

4. Our economical wants are, a house, convenient of access from the highway, and as centrally placed in the farm as may be, with ornamental grounds, moderate in extent, in which trees, hardy shrubs and grass, as at once the most pleasing ornamentation, and the most easily cared for, shall be chiefly relied upon. In a new country, with so much to be done on limited amounts of capital, in reducing a farm to a good state of tilth, all reduction of labor and cost are stubborn necessities to be taken into careful account.

These considerations all point to the Italian style, as modified by our native architects, as best suited to our wants. Its high airy rooms,

without attics, its wide eaves and verandahs, suit our summer climate; its horizontal lines harmonize with our landscapes; it is more economical in its structure and capacity, with almost equal irregularity and picturesqueness of outline. And this is the conclusion of Downing, who speaks of it as best adapted to our climate, our landscape and our domestic wants.

The grave objection to the gothic style is that it requires sleeping rooms in the roof and expensive details in ornamentation. And Henry Ward Beecher condemns the pure Grecian in the following characteristic words: "We abhor Grecian architecture for private dwellings, and especially for country homes. It is cheerless, pretentious, frigid. Those cold, long-legged columns, holding up a useless pediment that shelters nothing and shades nothing, reminds one of certain useless men, forever occupied with maintaining their dignity, which means their perpendicularity."

The site of a house must be first healthy, and, as I have said, convenient of access. "He that buildeth a fair house upon an ill site," says Bacon, "committeth himself to prison."

Armstrong gives some good hints, which, *mutatis mutandis*, are worthy of our consideration:

"Avoid the mournful plain,
Where osiers thrive and trees that love the lake.
* * * * * *

"Mark where the dry champaign
Swells into cheerful hills; where marjoram
And thyme, the love of bees, perfume the air;
And where the cynorrhoden with the rose
For fragrance vies—for in the thirsty soil
Most frequent breathe the aromatic tribes.
There build thy roofs high, on the basking steep
Ascend; there light thy hospitable fires,
And let them see the winter morn arise,
And summer evenings, blushing in the west;
While, with umbrageous oaks, the ridge behind
O'erhung, defends you from the blustering north,
And bleak affliction of the peevish east.
Oh, when the growling winds contend, and all
The sounding forest fluctuates in the storm,
To sink in warm repose and hear the din
Howl o'er the steady battlements, delights
Above the luxury of common sleep."

The sum of which old fashioned poetry is, that we should build on a dry site, sheltered from the bleaker winds.

If possible, our farm houses should front south or east, with the farm buildings on the northwest, back, and upon side of the house, so as to be reached by side road or lane, which may also furnish access to the rear or side entrance to the dwelling. It is not necessary to say to the present company that a large hog lot in front of the house, although sanctioned by long usage among some of our early settlers, does not

gratify the aesthetic eye or nostril, and is distinctly *not* a thing of beauty and a joy forever.

The distance from the road or street should be as great as convenience will permit. I find a popular desire to see, and know when seen, everybody that passes, to be the chief thing that prevents our farmers from building as far away from the highway as a proper taste would justify. Then, convenience of access makes it desirable for many to build so near the highway that a person alighting from a vehicle can conveniently walk to the house and return. From fifty to one hundred yards, however, is generally a convenient enough distance, and will remove one from most of noise and dust of the highway, and give a good deal, if not enough room, for ornamental planting.

Let me now speak of *out-door* ornaments.

1. In the architecture of the dwelling itself, a very little change and additional expense will often help appearances wonderfully. Wide eaves look better than narrow ones; larger windows and not many of them, better than small and numerous ones; a broad verandah more attractive than a scanty porch. Then, as to the outside coloring, a dazzling white is to be avoided, and pleasant tints of cream color, coffee color and the like, to be preferred. But I need not insist upon this, as the older fashion, of white houses with brilliant green blinds, is no longer so generally followed as when first attacked by Downing.

2. In the out-buildings. It seems best to have these conform in architecture, coloring, etc., to the dwelling, so as to seem accessories to it.

3. In the grounds. I have intimated that grass and trees, as Willis once said, are the cheap but comely ornaments of the farmer's grounds. These grounds should not be limited. In the west land is as yet cheap enough to enable every farmer to devote at least a few acres to this purpose; and, by merging them into surrounding pastures and woodlands, there need not be much that is not useful as well as ornamental. By planting so sparsely as to permit a free use of the mower, these grounds can easily be kept smooth and presentable. Accordingly, I would first plow and thoroughly cultivate the future ornamental grounds, and endeavor to have the trees and shrubs in the ground and receiving the benefit of such cultivation. Then I would sow the grounds to blue grass, which is still reckoned the best lawn grass.

As to annual, or even perennial herbaceous plants, as a rule they involve too much labor. Yet I would defer to the distinguished precedent of the Rev. Mr. Stiggins, who after expressing the opinion that "all taps is vanities," upon further importunity replied that, "if there is any one of them less odious than another it is the liquor called rum—warm, my dear young friend, with three lumps of sugar to the tumbler." So, after deprecating the use of annuals as too expensive, I would add

the words of Downing: "The modern taste of discarding any set flower garden, and, instead of it, arranging the beds of choice perpetual blooming plants in and around a small lawn, in graceful and harmonious forms, is by far the most satisfactory in a majority of cases." As Beecher says, although as a temperance man, he cannot commend its use, "if you *will* make cider make it good." If you will plant flowers grow them in the lawn.

Perennial and other climbing plants, such as the ivy, the ampelopsis, the grapevine, the prairie rose, etc., are beautiful and not troublesome. The lilac, the snowball and other flowering hardy plants are still more manageable.

In my observation, the larger trees and masses of trees, where the grounds are limited, and probably generally, have the best effect when used as a back ground for the dwelling, and perhaps for other buildings; whilst the grounds between the highway, or other front point of view, and the dwelling, are best planted with shrubs or low trees.

As to particular species of trees, etc., tastes vary. Homer, when he describes the grotto of Calypso, plants the "alder and poplar and sweet-smelling cypress" about it, and "soft meadows of violets and of parsley." Theocritus, describing a rural scene, introduces the poplar and elm. Virgil says: "The ash is fairest in the woods, the pine in the gardens, the poplar by the rivers, the fir on the lofty mountains." Our modern and American experience inclines us to place the Norway spruce of evergreens, and the white elm, among deciduous trees, among the first. "No other tree," says Mr. Beecher, "is comparable to the elm. The ash is, when grown, a fine tree, but clumpy; the maple has the same character. The horse-chesnut, the linden, the mulberry and poplars (save that tree spire, the Lombardy poplar,) are all of them plump, round, fat trees, not to be despised, surely, but representing single dendrological ideas. The oak is venerable by association; occasionally a specimen is found possessing a kind of grim and rugged glory. But the elm alone, monarch of trees, combines in itself the elements of variety, size, strength and grace, such as no other trees known to us can at all approach or remotely rival. It is the ideal of trees, the true Absolute Tree."

But I pass from this point to speak of the adornment of the *interior* of our houses.

1. First I would deprecate the clumsy and heavy mouldings we have had so much of from our Chicago shops during the last few years, in the finish to our homes. We want beauty of proportion and simplicity of detail, which looks better and does not catch in intricate crevices so much inextricable dust. Then I would abjure paints, and varnish the interior wood work. Even pine looks better finished in this way, and the cost is no greater.

2. Coming to upholstering, I find an apparent want of taste in most of our dwellings, that argues either singular aesthetic defects or a wonderful subservience to fashion. I hardly feel able to point out the details of the fault, but will suggest that the figures on our paper hangings and on our carpets are apt to be too large—their colors too flashy, or not well contrasted. I believe we want in papering, light colors for cheerful rooms—buff, with a very little green, for instance. Carpets, in small patterns, with a prevailing color of green, with a smaller portion of black, seem to me to be handsome.

3. The question of furniture is a grave one in these days of veneering, when solid wood and simple forms are rare, and gaudy, and costly, and tasteless devices of disguised soft wood abound. Our countryman, Bruce, in his description of the interior of a house in Hamburg, indicates a better way: "The furniture was simple. There was no grand display of gilt and crimson anywhere; and it was evident very little had been laid out on mere splendor. Yet one could notice how carefully even very common implements had been chosen in reference to grace of form. The candle-stands, and even the pitcher and the common vase, had something extremely graceful and almost classical in their shape. The designs of the music-holders and of the table ornaments caught the eye at once. Every article seemed to have a meaning."

4. An important consideration, in these days of cheap lithography, etc., is the works of art that may be purchased by persons of small means. Go into any backwoods cabin or prairie shanty, and you will find gaudy portraits of Elmira or Edward, decked in the latest extremity of fashion—so universal is the aesthetic hunger and so unintelligent in its choice. The chromos of Prang—such as his Quails, Whittier's Home, California Sunset, etc.,—would open vistas of dreamland to the groping sense, with a little teaching. Take, especially, those that idealize and render more attractive the somewhat hard and prosaic facts of rural life, and who can doubt their influence for good? Rosa Bonheur, Landseer and Herring make our farm yards beautiful in their animal paintings.

I have thus touched upon the chief considerations that I think should guide us in making our homes pleasant to the aesthetic sense. I have not spoken of the higher uses and wants of home life, which would demand a separate paper for their proper treatment. The intellectual and moral culture that the dweller in the country needs for his best development, and the proper nurture of his children, would be an interesting topic, if wisely treated; but I will not trespass upon your patience further.

But to build our rural homes beautifully, to deck them, within and without, with pleasing ornamentation, is no mean object. When I vis-

ited Rochester a few weeks since, I expressed my admiration of the pleasant home and floral surrounding of one of our leading horticulturists. I was struck by the reply: "We must spend the greater part of our lives in business; therefore, to enjoy life, we must make our business as pleasant as possible." This saying is worthy of all acceptation, but one that we Americans, in our haste to get riches, woefully neglect. Our homes go unpainted, our lawns unshorn, our orchards and ornamental trees unplanted, that a few more acres of corn or wheat may be sown; and our wives, our children and ourselves, finding no attraction in bare acres and an unsheltered homestead, look longingly even to the petty excitement and gossiping scandals of the village as a relief from the ignorance and *ennui* of the farm. Yet God made the country and man made the town; and, doubtless, to the truly educated, the book of nature that country life offers us is more attractive than the more monotonous pages of human life. Man may be a proper study of mankind, but not, except in his higher phases, a very profitable or improving one; and the home life of the farm house, vivified, beautified and idealized by rural taste, is the fortress of the social and political virtues that purify society and make the firm basis of our republican democracy.

PEDIGREES OF THOROUGHBRED CATTLE,

PURCHASED AND DONATED IN 1871.

SHORT HORNS.

(See American Short Horn Herd Book, Vol. XI, p. 51.)

11,341. BARON LOUANJO—(Bull).—Red; bred by J. H. Pickrell, Harristown; the property of Illinois Industrial University, Champaign, Illinois. Calved January 27, 1871; got by imported Baron Booth of Lancaster, 7,535; out of Louan 37th, by Burnside, 4,618; Louan 19th, by Duke of Airdrie, 2,743; Louan 7th, by Orontes, 2d, 1,966; Louan 6th, by Golddust, 534; Louan 4th, by Prince Albert 2d, 857; Louan 1st, by imported Otley, 4,632; Cambria by Bertram 2d, 3,144; Virginia 2d by Bertram, 1,716; Lucilla 2d by Memnon, 1,223; Virginia by General, 272; Rosemary by Flash, 261; Red Rose by Petrarch, 488; Bright Eyes by Alexander, 20; Acomb by Traveller, 655, by son of Bolingbroke, 86.

(See American Short Horn Herd Book, Vol. X, p. 865.

SUPERIOR 7TH—(Cow).—Red and white; bred by Harvey Sodowsky, Indianola, Vermilion county, Illinois; the property of the Illinois Industrial University, Champaign. Calved, April 5, 1870; got by Laudable, 5,870, out of Superior 2d, by Peter, 5,070; Superior 1st by Young Locomotive, 1,143½; Fanny Wells by Goldfinder, 2,066; Helen by Bertram 2d, 21; Ruby 2d by Bertram, 1,716; imported Ruby by Young Dimple, 971.

DEVONS.

(See American Devon Herd Book, Vol. III, p. 66.)

660. RED COAT—(Bull).—Calved, May 15, 1871; bred by W. C. Flagg, Moro, Madison county, Illinois; the property of the Illinois Industrial University; sire, Olaf, 628; 2d sire, Worth, 377; dam, Fulla, 979, by Kormak, 576; 2d dam, Breda, 49, by Red Path, 101; 3d dam, Lily, 207, by imported Herod, 214.

(See American Devon Herd Book, Vol. III, p. 164.)

1,150. MINNEWAWA—(Cow).—Calved, July 23, 1870; bred by Michigan State Agricultural College; the property of the Illinois Industrial University; sire, Prince of Wales, 317, imported; gr. sire, Havelock, 425, E; gr. gr. sire, Palmerston, 476, E; gr. gr. gr. sire, Eclipse, 190; gr. gr. gr. gr. sire, Nelson, 83; gr. gr. gr. gr. gr. sire, Quartley; Prince of Wales, 105; gr. gr. gr. gr. gr. gr. sire, Prince Albert, 102; gr. gr. gr. gr. gr. gr. gr. sire, Hundred Guinea, 56; gr. gr. gr. gr. gr. gr. gr. gr. sire, Sillifant, 120; gr. gr. gr. gr. gr. gr. gr. gr. sire, bred by M. Quartley; dam, Eveleen 5th, 466, by Cayuga, 602, 587, E; gr. dam, Eveleen, 691, imported by Earl of Exeter, 38; gr. gr. dam, Ruby, 1,035, by Favorite, 43; gr. gr. gr. dam, Pink, 952, by son of Pretty Maid, 366; gr. gr. gr. gr. dam bred by Mr. John Halse.

AYRSHIRES.

AMPHION—(Bull).—Red and white; bred by W. S. King, Minneapolis, Minnesota; the property of the Illinois Industrial University; calved. July 26, 1871; sire, imported Maus; owned by Mr. Gibbs, Compton, Canada, and imported by him; dam, Fanny (bred in Montreal) by Cuthbert Duke; dam by 3d bull imported by Hochelaga Agricultural Society.

NIOBE—(Cow).—Red and white; bred by W. S. King, Minneapolis, Minnesota; the property of the Illinois Industrial University; calved, May 11, 1870; sire, imported Tarbalton, 372; dam, Nannie, 653, by Rob Roy, 325; gr. dam, imported Handsome Nell, 423, by Georgia; gr. gr. dam, Libby; Niobe served by Davie, he by Rob Roy, out of Camelia.

JERSEYS.

BULL.—Bred by Samuel C. Colt, West Hartford, Connecticut; the property of the Illinois Industrial University; calved, August 8, 1871; sire, Jersey Boy, 582; (Herd Register, Vol. 2) dam, Eliza, 794; (Herd Register, Vol. 1).

COW.—Bred by Samuel C. Colt, West Hartford, Connecticut; property of the Illinois Industrial University; calved, June 5, 1870; sire, Rob Roy, 17; (Herd Register, Vol. 1) dam, Daisy, 910; (Herd Register, Vol. 1.)

HEREFORDS.

CHALLENGER—(Bull).—Bred by Fred. Wm. Stone, Moreton Lodge, Guelp, Ontario, Canada; the property of the Illinois Industrial University; calved, December 13, 1870; sire, Sir Charles, 3, 434; dam, Princess 3d by imported Sailor, 2, 200; gr. dam, Princess by imported Patriot, 2, 150; gr. gr. dam, Princess, imported by Carlisle, 923; gr. gr. gr. dam, Peeress by Monarch, 504; gr. gr. gr. gr. dam, Peeress by St. Germans, 227; gr. gr. gr. gr. gr. dam bred by the late Mr. Turner, Hoke Court.

GRACEFUL 6TH—(Cow).—Red, with white face; bred by Fred. Wm. Stone, Moreton Lodge, Guelph, Ontario, Canada; the property of the Illinois Industrial University; calved, April 11, 1870; sire, Sir Charles, 3, 434; dam, Graceful 2d by imported Patriot, 2, 150; gr. dam, Graceful, imported by Severn, 1, 382; gr. gr. dam, Lady by Albert Edward, 859; gr. gr. gr. dam, Zephyr by Walford, 871; gr. gr. gr. gr. dam, Friday 2d by Wonder, 420; gr. gr. gr. gr. gr. dam, ——— by Commerce, 354; gr. gr. gr. gr. gr. gr. dam, Pretty Maid by the Sheriff, 356; gr. gr. gr. gr. gr. gr. gr. dam by Old Sovereign, 404.

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