Dup. to 3875

TRANSACTIONS

OF THE

WISCONSIN

STATE AGRICULTURAL SOCIETY,

WITH TABULAR ABSTRACTS OF THE

REPORTS OF COUNTY AGRICULTURAL SOCIETIES

AND NUMEROUS

PRACTICAL PAPERS AND COMMUNICATIONS.

VOL. X, 1871.

Prepared by J. W. HOYT, *Secretary.*

MADISON, WIS.:
ATWOOD & CULVER, STATE PRINTERS, JOURNAL BLOCK.
1872.

PREFACE.

THIS VOLUME, though for sufficient reasons wanting in such statistical information as gave special value to the preceding, will nevertheless be found to contain a large amount of important matter, including several prize essays on practical subjects designated by the Executive Board.

It was the expectation of the secretary that the geological report of the Hon. John Murrish, state commissioner for the survey of the lead region, would be so much matter over and above the five hundred pages to which the Society's annual volume is limited by statute; but owing to the peculiar terms of the law providing for the republication of said report with the Transactions, and various circumstances connected with its first publication in the legislative journals and in pamphlet form, it became necessary to embrace it within the limits so prescribed. The subject of the report is so important, however, and, withal, bears so direct a relation to the practical industries of the state, that its inclusion will be gratifying to all readers interested in the measures adopted by the legislature for determining the nature and extent of our mineral resources.

As the undersigned had retired from the office of secretary and entered upon other duties ere the papers to be embraced in this volume had all been received, and even some weeks before the printing of the volume could commence, the revision of the manuscript and the reading of the proof-sheets were, by agreement with his successor, entrusted to his late assistant, Mr. F. W. Case, whose competency, carefulness and efficiency were a guaranty of correctness.

The printers have executed their part of the work in that excellent style for which they are so justly distinguished, and which has enabled the Society to give to its recent volumes a neatness of appearance hadly surpassed by any like publication in this country.

J. W. H.

MADISON, August, 1872.

CONTENTS.

CONSTITUTION.

ARTICLE I.

OF THE NAME OF THE SOCIETY.

This society shall be known as the "Wisconsin State Agricultural Society." Its object shall be to promote the advancement of agriculture, horticulture, and the mechanical and household arts.

ARTICLE II.

OF THE MEMBERSHIP.

The society shall consist of life members, who shall pay, on subscribing, twenty dollars, and of honorary and corresponding members, who shall be elected by a two-thirds vote of the members of the executive board, at any regular meeting. The presidents of county agricultural societies shall be members *ex-officio*, entitled to the same privileges as life members, and together shall be known as the general committee of the society.

ARTICLE III.

OF THE OFFICERS.

The officers of this society shall consist of a president, one vice president for each congressional district of the state, a secretary, a treasurer, and seven additional members, who shall hold their respective offices for the term of one year from the first day of January next succeeding the date of their election, and until their successors shall have been elected; and all of whom, together with the ex-president latest in office, and the president and general secretary of the Wisconsin Academy of Sciences, Arts and Letters, shall constitute the executive board.

ARTICLE IV.

OF THE POWERS AND DUTIES OF OFFICERS.

The president and vice presidents shall perform such duties as are common to such officers in like associations, and as may be required by the executive board.

The secretary shall keep the minutes of all meetings, and have immediate charge of the books, papers, library, and collections, and other property of the society. He shall also attend to its correspondence, and prepare and superintend the publication of the annual report of the society, required by law.

The treasurer shall keep the funds of the society and disburse the same on the order of the president, or a vice president, countersigned by the secretary, and shall make a report of all receipts and expenditures at the regular meeting of the society in December.

The executive board shall have power to make suitable by-laws to govern the action of the several members thereof. They shall have general charge of all the property and interests of the society, and make such arrangements for the holding and management of general and special exhibitions as the welfare of the society and the interests of industry shall seem to require.

The general committee shall be charged with the interests of the society in the several counties where they respectively reside, and constitute a medium of communication between the executive board and the public at large.

ARTICLE V.

OF MEETINGS AND ELECTIONS.

The annual meeting of the society for the transaction of general business shall be held in its rooms in Madison, on the first Wednesday of December, at three o'clock P. M., in each year, and ten days notice thereof shall be given by the secretary, in one or more papers printed in the city of Madison.

The election of officers of the society shall be held each year during and at the general exhibition, and the exact time and place of the election shall be notified by the secretary in the official list of premiums and in all the general programmes of the exhibition.

Special meetings of the society will be called by order of the executive board, on giving twenty days' notice in at least three newspapers of general circulation in the state, of the time, place, and object of such meetings.

At any and all meetings of the society, ten members shall constitute a quorum for the transaction of business, though a less number may adjourn from time to time.

ARTICLE VI.

OF AMENDMENTS

This constitution may be amended by a vote of two thirds of the members attending any annual meeting; all amendments having been first submitted in writing at the previous annual meeting, recorded in the minutes of the proceedings, and read by the secretary in the next succeeding meeting for the election of officers.

LIFE MEMBERS.

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Adams, Jas	Janesville.	Bliss, C. M	Iowa.
Adams, Isaac	Cottage Grove.	Blossom, Levi	Milwaukee.
Adams, L. L	Stoner's Prairie.	Bostwick, J. M	Janesville.
Alexander, O	Milwaukee.	Bostwick, Perry	Janesville.
Allen, J. W	Janesville.	Bostwick, R. M	Janesville.
Allen, W. C	Delavan.	Bonnell, James	Milwaukee.
Allen, H. M	Evansville.	Boorse, Henry	Granville.
Allis, Edward P	Milwaukee.	Boyce, A. A	Vienna.
Angel, R. R	Janesville.	Boyd, R. B	Milwaukee.
Angel, W. H	Sun Prairie.	Bowen, J. B	Madison.
Atkins, Albert R	Milwaukee.	Bowman, J. M.	Madison.
Atwood, Chas. D	Madison.	Bradley, C. T	Milwaukee.
Atwood, David	Madison.	Braley, A. B	Madison.
Atwood, Wm. T	San Francisco.	Brazea, Benj	Wauwatosa.
Atwood, R. J	Madison.	Briard, W. A	Madison.
Armour, P. D	Milwaukee.	Briggs, F	Buffalo, N. Y.
Aspinwall, D. M	Farmington.	Brockway, E. P	Ripon.
Ayres, J. W	Kenosha,	Brodhead, E. H	Milwaukee.
		Brown, Jas. J	Madison.
Babbitt, Clinton	Beloit.	Brown, B. F	Fitchburg.
Babbitt, D. H	Janesville.	Brown, T	Madison.
Bacon, J. P	Westport.	Bruce, A. T	Milwaukee.
Bacon, W. D	Waukesha.	Bryan, Jno	Cross Plains.
Bailey, A. P	Sun Prairie.	Bryant, D. D	Madison.
Bailey, M. T	Madison.	Bryant, G. E	Madison.
Barlass, Andrew	Emerald Grove.	Bull, Stephen	Racine.
Barlass, David	Emerald Grove.	Bullard, Jas	Evansville.
Barnes, George	Janesville.	Bump, N. P	Janesville.
Barrows, E. S	Chicago.	Bunker, Geo	Madison.
Barry James	Fitchburg.	Burgess, J. M	Tennessee.
Bates, A. C	Janesville.	Bush, Sam'l	Milwaukee.
Beecroft, W. G	Madison.	Button, Henry H	Milwaukee.
Bement, E	Oregon.	Burnham, Miles	Danville.
Bemis, Jervis	Janesville.	Burnham, A., Jr.	Milwaukee.
Benedict, J. D	Bristol.	Burnham, J. L	Milwaukee.
Benedict, S. G	Providence, R. I.	Byrne, John A	Madison.
Benedict, W. G	Milwaukee.		
Bennett, A. A	Grant Co.	Casar, Wm	Janesville.
Benson, S. W	Bloomfield.	Camp, H. H	Milwaukee.
Billings, Earl	Madison.	Capron, Geo	Madison.
Bird, I. W	Jefferson.	Carlton, W. D	Sun Prairie.
Bird, T. E	Madison.	Carpenter, J. A	Waukesha.
Bishop, John C	Fond du Lac.	Carpenter, J. E	Windsor.
Black, John	Milwaukee.	Carpenter, J. H	Madison.
Blair, Franklin J	Milwaukee.	Carpenter, S. D	Madison.
Blanchard, Willard	Windsor.	Carr, N, B	Madison.

NAMES.	RESIDENCE.	NAMES.	RESIDENCE.
Carter, A. M.	Johnstown.	Davis, N. P.	Pierceville.
Carter, Guy	Janesville.	Davis, S. B.	Milwaukee.
Carver, P. S.	Delavan.	Davis, W.	Center.
Cary, J.	Milwaukee.	Dean, E. B.	Madison.
Case, J. I.	Racine.	Dean, N. W.	Madison.
Chandler, Sam'l.	Milwaukee.	Dean, John S.	Madison.
Chapman, T. A.	Milwaukee.	Delamater, W. A.	Elkhorn
Chapman, C. R.	Leicester.	Delaplaine, G. P.	Madison.
Chase, Enoch	Milwaukee.	De More, A. B.	Milwaukee.
Chase, H.	Milwaukee.	Dewey, Nelson.	Lancaster.
Cheney, Rufus	Whitewater.	Dewolf, E.	Chicago.
Child, Jno	Lima Centre.	Devoe, A. B.	Madison.
Children, E	Lancaster.	Dexter, W. W.	Janesville.
Chipman, A.	Sun Prairie.	Dickerman, I. A.	Verona.
Church, Wm. W.	Milwaukee.	Dickson, J. P.	Janesville.
Clapp, G. W	Fitchburg.	Dodge, J. E.	Potosi.
Clark, C. M.	Whitewater.	Dodge, H. S.	Milwaukee.
Clark, Lewis	Beloit.	Doolittle, W. J.	Janesville.
Clark, Saterlee	Horicon.	Doris, John	Milwaukee.
Cochrane, John.	Waupun.	Dorn, M. M	Madison.
Cogswell, A. W	Brookfield.	Dousman, J. B.	Milwaukee.
Colby, Charles	Janesville.	Dousman, T. C.	Waterville.
Coleman, W. W.	Milwaukee.	Dousman, H. L.	Prairie du Chien.
Colloday, Wm. M.	Stoughton.	Dow, O. P.	Palmyra.
Colton, S. B.	Madison.	Drakely, S.	Madison.
Cornell, James	Beloit.	Drury, E. W.	Fond du Lac.
Cornwell, H. H.	Verona.	Dunlap, S.	Burk.
Corrigan, Jno	Cedarburg.	Dunn, And.	Portage City.
Cottrill, J. P. C.	Milwaukee.	Dunn, Wm.	Madison.
Cottrill, W. H.	Milwaukee.	Dunning, Abel	Madison.
Cottrill, C. M.	Milwaukee.	Durkee, H.	Kenosha.
Cory, J	Footville.	Dutcher, J. A.	Milwaukee.
Crampton, N. B.	Madison.	Dwinnell, J. B.	Lodi.
Crawford, E. B.	Omaha.		
Crawford, J. B	Baraboo.	Eaton, J. O.	Lodi.
Crawl, Jno	Center.	Echlin, J. O.	Janesville.
Crocker, Hans	Milwaukee.	Edgerton, E. W.	Summit.
Crosby, J. B.	Janesville.	Edmunds, F. W.	Madison.
Cross, J. B.	Milwaukee.	Elderkin, Ed.	Elkhorn.
Crossitt, B. F.	Janesville.	Elliott, E.	Lone Rock.
Culver, Caleb E.	Shopiere.	Elliot, Jos. T.	Racine.
Cummings, Wm.	Fitchburg.	Elmore, A. E.	Green Bay.
Curtis, F. C.	Rocky Run.	Ellis, J. A.	Chicago.
Curtis, Seymour.	Fitchburg.	Ellsworth, O.	Milwaukee.
Cutting, J. W	Harmony.	Ellsworth, W. J.	Madison.
		Elmore, R. P.	Milwaukee.
Daggett, M. L.	Madison.	Eldred, Jno. E.	Milwaukee.
Dahlman, Anthony.	Milwaukee.	Emmons, N. J.	Milwaukee.
Dahlman, John.	Milwaukee.	Enos, Elihu.	Waukesha.
Dann, Obed.	Janesville.	Esterly, Geo. W.	Whitewater.
Danks, E. P.	Stoughton.		
Daniells, W. W	Madison.	Fairbanks, E.	S. Johnsbury, Vt
Darling, K. A.	Fond du Lac.	Farwell, L. J.	Chicago.
Darwin, A. G	Brooklyn, N. Y.	Fenn, G. W.	Janesville.
Davidson, Adam.	Verona.	Ferguson, D.	Milwaukee.
Davis, G. L	Milwaukee.	Ferguson, Benj.	Fox Lake.
Davis, Jno.	Milwaukee.	Fernly, Jno.	La Grange.

Name.	Residence.	Name.	Residence.
Field, Martin	Mukwanago.	Greenman, C. H	Milton.
Field, W. W	Boscobel.	Gregory, J. C	Madison.
Fifield, L	Chicago.	Grinnell, J. G	Adams.
Fifield, D. E	Janesville.	Groom, John	Madison.
Fifield, E. G	Janesville.	Grover, E	Madison.
Finch, Lorin	Bradford.	Grubb, W. S	Baraboo.
Firmin, F. H	Madison.	Guernsey, Orrin	Janesville.
Fisher, C. C	Center.	Gurnee, J. D	Madison.
Fisher, Elijah	Newark.		
Fisher, S. W	Center.	Haight, J. M	Sacramento, Cal.
Fisher, Seth	Center.	Haight, Nicholas	Madison.
Fitch, D	Madison.	Hall, Augustus	Janesville.
Fitch, W. F	Madison.	Hallock, Youngs	Middleton.
Fitch, W. G	Milwaukee.	Hall, H. P	Madison.
Fitzgerald, R. P	Milwaukee.	Hanchett, A. M	Hanchetville.
Fletcher, John	Springfield.	Hancock, Brad	Marshall.
Flint, J. G. Jr	Milwaukee.	Hammond, L. M	Janesville.
Folds, Geo. H	Madison.	Hammond, E. S	Fond du Lac.
Foot, E. A	Kansas.	Harrington, N. H	Delavan.
Foote, Sidney	Madison.	Harris, Jas	Janesville.
Fowler, Jacob	Oshkosh.	Harvey, J. W	Madison.
Fowler, James S	Milwaukee.	Hasbrouk, W. H	Eau Claire.
Fox, W. H	Fitchburg.	Hastings, S. D	Madison.
Fratt, N. D	Racine.	Hausman, Jos	Madison.
Frank, A. S	Madison.	Hawes, J. F	Madison.
Freeman, C. F	Milwaukee.	Hawes, W. N	Verona.
Friedman, Ignatius.	Milwaukee.	Hayes, A. J	Milwaukee.
French, Jonathan	Madison.	Helfenstein, J. A	Milwaukee.
Fuller, M. E	Madison.	Hempstead, H. W.	Milwaukee.
Fuller, F. D	Madison.	Hicks, J. H	Oshkosh.
Furlong, Thos. T	Chicago.	Hibbard, W. D	Milwaukee.
Furlong, John	Milwaukee.	Hibbard, Wm. B	Milwaukee.
		Higbee, A. T	Stoughton.
Gammons, Warren.	Middleton.	Hill, H. J	Madison.
Gates, D. W. C	Madison.	Hill, James H	Madison.
Gaylord, Aug	Milwaukee.	Hill, J. W. P	Windsor.
Gernon, George	Madison.	Hill, P. B	Milwaukee.
Gibbs, Chas. R	Whitewater.	Hill, Robt	Milwaukee.
Gilbert, Thomas	Oregon.	Hilmer, A. M	Milwaukee.
Giles, H. H	Madison.	Hiner, W. H	Fond du Lac.
Gilman, Henry	Stoughton.	Hinkley B. R	Summit.
Gillette, R. E	Tomah.	Hobart, L. J	Milwaukee.
Goodenow, H. D	Madison.	Hodge, Robt	Janesville.
Goodrich, Ezra	Milton.	Hodson, C. W	Janesville.
Goodrich, G	Whitesville.	Hœflinger, Carl	Wausau.
Gould, L. D	Madison.	Hogan, Gilbert	Janesville.
Grady, F. M	Fitchburg.	Hollister, R. M	Janesville.
Graham, Alex	Janesville.	Holmes, A. M	Milwaukee.
Grant, S. B	Milwaukee.	Holt, David	Madison.
Grant, Albert	Milwaukee.	Holton, Edward D.	Milwaukee.
Graves, R. A	Ripon.	Hopkins, Bedford B	Milwaukee.
Graves, S. W	Rutland.	Hopkins, James	Madison.
Green, Anthony	Milwaukee.	Hopkins, J. C	Madison.
Green, Geo. G	Milwaukee.	Hoskins, J. W	Milwaukee.
Greene, N. S	Milford.	Hoyt, J. W	Madison.
Green, Samuel	Fitchburg.	Hulbert, E	Oconomowoc.
Greenleaf, E. B	Milwaukee.	Hume, Wm	Oshkosh.

NAMES.	RESIDENCE.
Hutson, Sol........	Janesville.
Hyde, Edwin	Milwaukee.
Ilsley, Chas. F....	Milwaukee.
Imbusch, J. H.....	Milwaukee.
Ingham, A. C.	New York.
Jackman, Hiram...	Janesville.
Jenks, S. R...	Madison.
Jenkins, J. C......	Janesville.
Jerdee, L. P.......	Madison.
Jerdee, M. P..	Madison.
Johnston, Jno., Jr..	Madison.
Johnson, M. B.....	Janesville.
Johnson, John.....	Milwaukee.
Johnston, Hugh L.	Milwaukee.
Johnston, John....	Milwaukee.
Jones, C. H........	Sun Prairie.
Jones, John N.....	Madison.
Juneau, Paul......	Juneau.
Janssen, E. H.....	Mequon.
Kellogg, L. F.	Madison.
Kellogg, L. H.....	Milwaukee.
Keimert, Emil	Milwaukee.
Keyes, E. W......	Madison.
Kent, A. C........	Janesville.
Kershaw, C. J.....	Milwaukee.
Kimball, M. G.....	Madison.
Kimball, John.....	Janesville.
Kingsley, S. P.....	Springfield.
Kingston, J. T.....	Necedah.
Kiser, Wm. C.....	Madison.
Kiser, J. C........	Oregon.
Klauber, Samuel ..	Madison.
Knight, E.........	Sun Prairie.
Kneeland, Moses..	Milwaukee.
Kneeland, James..	Milwaukee.
Knowles, Geo.	Milwaukee.
Knapp, J. G.......	Madison.
Koss, Rudolph	Milwaukee.
Ladd, M. L........	Sugar Creek.
Lamb, F. J........	Madison.
Landaur, Max.....	Milwaukee.
Lapham, I. A......	Milwaukee.
Larkin, B. F..	Madison.
Larkin, C. H..	Madison.
Larkin, Daniel.....	Milwaukee.
Larkin, William...	Madison.
Lawrence, W. A...	Janesville.
Lawton, J. G......	Green Bay.
Learned, J. M.	California.
Leiedersdorf, B....	Milwaukee.
Leitch, W. T......	Madison.
Leitch, W. T., Jr. .	Vienna.
Leslie, John	Madison.
Lester, Waterman	Janesville.
Lewis, Herbert A.	Madison.
Lewis, John L....	Madison.
Lindsey, E. J......	Milwaukee.
Little, Thos. H...	Janesville.
Lloyd, Lewis.....	Cambria.
Lockwood, John..	Milwaukee.
Ludington, H . ..	Milwaukee.
Ludington, James	Milwaukee.
Ludlow, A.......	Monroe.
Lucy, O. K.......	Columbus.
Lyman, L. H.....	Dakota.
Lynch, T. M......	Janesville.
Lynde, W. P.....	Milwaukee.
Main, Alex. H....	Madison.
Mann, I. L.......	Fitchburg.
Mann, J. E.......	Madison.
Mann, Henry.....	Milwaukee.
Macy, J. B.......	Fond du Lac.
Manwaring, Wm.	Black Earth.
Marshall, Samuel.	Milwaukee.
Martin, A. C	Ashton.
Martin, C. L......	Janesville.
Martin, Nathaniel	Monroe.
Martin, S. W.....	Madison.
Mason, George A.	Madison.
Masters, E. D....	Jefferson.
Mathews, A. K...	Milwaukee.
Matteson, Clinton	Rosendale.
Matts, I. H. B....	Verona.
Maxson, O. F.....	Waukegan.
May, A. C........	Milwaukee.
Mayhew, T. J.....	Milwaukee.
Mayhew, J. L.....	Milwaukee.
McCarty, F. D....	Fond du Lac.
McConnell, T. J ..	Madison.
McCormick, J. G	Madison.
McCollough, And.	Emerald Grove.
McDill, A. S.	Westport.
McDonald, A.....	Alloa.
McDougal, Geo. W.	Madison.
McGeoch, P......	Milwaukee.
McIndoe, W. D...	Wausau.
McKenna, Martin.	Madison.
McKenna, David .	Madison.
McLaren, Wm. P.	Milwaukee.
McNiel, David....	Stoughton.
McGregor, Alex ..	Nepeuskin.
McPherson, J. P..	Springdale.
Mears, Wm. A....	Madison.
Merrill, Alf.	Madison.
Merrill, S. S.	Milwaukee.
Miller, John	Madison.
Mills, Simeon....	Madison.
Miltimore, Ira....	Chicago.
Miner, Cyrus.....	Janesville.

NAMES.	RESIDENCE.	NAMES.	RESIDENCE.
Miner, Jno. B	Milwaukee.	Plumer, B. C.	Wausau.
Mitchell, Alex.	Milwaukee.	Pond, Samuel A.	Albany.
Mitchell, J. L	Milwaukee.	Porter, Wm. F	Maine.
Morehouse, L. H.	Milwaukee.	Porter, Wm. H.	Marshall.
Morse, Samuel	Milwaukee.	Post, David T	Milwaukee.
Moseley, J. E.	Madison.	Powers, D. G.	Milwaukee.
Mosher, J. C	Lodi.	Powers, D. J	Chicago.
Moxley, A. R.	Madison.	Powers, Wm. J.	Black Earth.
Mullen, James	Milwaukee.	Pratt, E. E	Chicago.
Murray, Geo	Racine.	Pres't. St. Peter's	
		Val. Farm's Club	Springfield.
Nash, C. D.	Milwaukee.	Pritchard, P, M	Fitchburg.
Nazro, John	Milwaukee.	Proudfit, Andrew.	Madison.
Needham, J. P	Wauwatosa.		
Newcomb, S. B.	Cold Spring.	Rawson, C. A	Madison.
Newton, Epriam	Oregon.	Ray, Charles	Milwaukee.
Newton, I. S	Middleton	Raymond, S. O	Geneva.
Nichols L. T	Janesville.	Riordon, Charles	Oshkosh.
Norris, C. W	Milwaukee.	Reed, Herbert	Arena.
Norton, J. B.	Madison.	Reed, Harrison	Jacksonville, Fl.
Nott, B. F	Oregon.	Ressigue, A. C	Janesville.
		Reynolds, M	Madison.
Ober, R. P	Milwaukee.	Reynolds, John	Madison.
Olney, C. W	La Cygne, Kan.	Reynolds, Thomas	Madison.
Orr, G. H	Verona.	Reynolds, John	Kenosha.
Ott, Geo. V.	Madison.	Rexford, J. D	Janesville.
		Rice, E. M.	Whitewater.
Paddock, Geo	Milwaukee.	Richards, Richard.	Racine.
Page, H. L.	Milwaukee.	Richardson, D.	Middleton.
Page, H. M.	Madison.	Richardson, James	Buffalo, N. Y.
Palmer, H. L.	Milwaukee.	Richardson, R. J.	Janesville.
Palmer, J. Y		Richardson, H	Janesville.
Palmer, O. M.	Oregon.	Richmond Amaz'h	Whitewater.
Park, John W	Vernon.	Riebsam, C. R.	Madison.
Park, Wm. J.	Madison.	Robbins, J.	Vienna.
Parker, C. H	Beloit.	Robbins, J. V	New York.
Parmley, Ira	Center.	Roddis, R.	Milwaukee.
Palmer, Henry	Oregon.	Rodermund, John.	Madison.
Parsons, P. B.	Madison.	Rodgers, Lawrence	Westport.
Partridge, J. S	Whitewater.	Roe, J. P	Franklin.
Patten, L. F.	Janesville.	Rogers, C. H.	Milwaukee.
Patton, Jas. E.	Milwaukee.	Rogers, D. J	Milwaukee.
Payne, Wm.	Janesville.	Rogers, J. S.	Burlington.
Peffer, G. P.	Pewaukee.	Rogers, Anson.	Janesville.
Pember, R. T.	Janesville.	Ross, James.	Madison.
Perkins, P. M	Burlington.	Rowe, Richard W.	Madison.
Perrine, L. W.	Janesville.	Rowe, W. E.	Mazomanie.
Perry, B. F.	Madison.	Ruble, Simon	Beloit.
Pfister Guido.	Milwaukee.	Ruggles J. D.	San Francisco.
Phelps, A. Warren.	Milwaukee.	Russell, Harvey.	Milwaukee.
Pierce, C. L.	Milwaukee.		
Pilgrim, D. T	West Granville.	Sage, E. C	New Lisbon.
Pinney, S. U	Madison.	Salisbury, R. W.	Fitchburg.
Pinckney, B.	Fond du Lac.	Salisbury, D. F.	Fitchburg.
Plankinton, John.	Milwaukee.	Sanderson, Edw.	Milwaukee.
Plumb, J. C.	Milton.	Sanderson, R. B.	Madison.
Plumb, T. D	Madison.	Schute, Charles	Milwaukee.

NAME.	RESIDENCE.
Schutt, U.	Janesville.
Scollan, Frank	Madison.
Scott, S. B.	Milwaukee.
Seville, James	Merrimac.
Sexton, Kellogg	Milwaukee.
Simmons, C. J	Monroe.
Sinclair, Jeff.	Milwaukee.
Sharp, J. W.	Iowa.
Shaw, J. B.	Milwaukee.
Sheldon, A. H.	Janesville.
Shepherd, C.	Milwaukee.
Sheldon, D. G.	Madison.
Sheldon, S. L.	Madison.
Sherman, Adelmorn	La Prairie.
Sherman, Amaziah	La Prairie.
Sherman, Geo.	La Prairie.
Sherman, J. M.	Burnett.
Sherwood, J. C.	Dartford.
Shipman, S. V.	Madison.
Shipman, A. C.	Sun Prairie.
Skelley, Chas.	Janesville.
Skinner, Geo. J.	Madison.
Skinner, E. W.	Turner, D. T.
Slaughter, G. H.	Middleton.
Slaughter, W. B.	Middleton.
Sloan, I. C.	Janesville.
Slocum, G. A.	Chicago.
Smith, Angus	Milwaukee.
Smith, Adam	Burke.
Smith, Geo. B.	Madison.
Smith, J. B.	Milwaukee.
Smith, S. W.	Janesville.
Smith, H. L.	Janesville.
Smith, M. C.	Janesville.
Smith, S. B.	Vernon.
Smith, J. Maurice	Janesville.
Snell, H.	Madison.
Spaulding, Wm.	Janesville.
Spaulding, Jos.	Janesville.
Spencer, Jas. C.	Milwaukee.
Spencer, R. C.	Milwaukee.
Squire, Thos. H.	Waterloo.
Stannard, A. C.	Milton.
Stark, Chas. A.	Milwaukee.
Steele, Chester	Milwaukee.
Stevens, Geo. C.	Milwaukee.
Stevens, J. T.	Madison.
Steensland, H.	Madison.
Stewart, C. K.	Danville.
Stewart, G. H.	Beaver Dam.
Stilson, Eli	Oshkosh.
St. John, J. W.	Janesville.
Stockman, John	Milton.
Stone, G.	Beloit.
Storm, Wm.	Madison.
Stowe, Lafayette	Sun Prairie.
Sullivan, Jas.	Burke.
Sutherland, C.	Syene.
Swain, Wm. W.	Verona.
Tallmadge, John J	Milwaukee.
Tallman, W. H.	Janesville.
Taylor, E.	Mukwanago.
Taylor, W. R.	Cottage Grove.
Tenney, H. A.	Madison.
Tenney, D. K.	Chicago, Ill.
Terry, F. H.	Milwaukee.
Terwilliger, Jas.	Syene.
Thorsen, John	Milwaukee.
Tibbits, Geo. M.	Milwaukee.
Tierney, K.	California.
Thompson, W. H.	Chicago, Ill.
Thompson, Dr. W.	Madison.
Thorp, J. G.	Eau Claire.
Throop, B.	Milwaukee.
Todd, J. G.	Janesville.
Tolford, J. W.	Madison.
Torgerson, Lars.	Madison.
Townley, John	Moundville
Treat, R. B.	Chicago.
True, W. H.	Fitchburg.
Twining, M. S	Magnolia.
Utter, Jas.	Oregon.
Van Cott, Albert B.	Milwaukee.
Van Etta, Jacob	Madison.
Van Kirk, N.	Milwaukee.
VanNorstrand, A H	Green Bay.
Van Slyke, N. B.	Madison.
Vaughan, O. A.	Lodi.
Viall, Andrus	Madison.
Vilas, Chas. H.	Madison.
Vilas, Henry	Madison.
Vilas, L. B.	Madison.
Vilas, L. M.	Madison.
Vilas, Wm. F.	Madison.
Wackerhagen, E.	Racine.
Wait, J. B.	Waitsville.
Warren, J. H.	Albany.
Warren, W. R.	Madison.
Webster, James.	Danville.
Webster, Martin	Fox Lake.
Webb, James A.	Janesville.
Welch, W.	Madison.
Wells, Daniel L.	Milwaukee.
Werner, John	Sauk.
West, Henry	Madison.
West, S. C.	Milwaukee.
West, Henry M.	Milwaukee.
Whaling, J. M.	Milwaukee.
Wheeler, Guy	La Prairie.
Wheeler, W. A.	Madison.

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Wheeler, L. A.....	Milwaukee.	Williams, S. G...	Janesville.
Wheelock, W. G...	Janesville.	Wilson, Wm.....	Westport.
Wheelright, J.....	Middleton.	Wilson, H. O.....	Milwaukee.
White, A.........	Verona.	Wilson, Zebina...	Palmyra.
Whiting, W. F....	Milwaukee.	Wolcott, E. B....	Milwaukee.
Wightman, H.....	Black Earth.	Wooley, J. T.....	Milwaukee.
Wilcox, C. T......	Janesville.	Wootton, Robert..	Madison.
Wilkins, A. W....	Milwaukee.	Worden, Ed......	Madison.
Willey, O. S.......	Madison.	Worthington, B.M.	Madison.
Williams, C. L ...	Madison.	Worthington, D...	Madison.
Williams, C. H....	Baraboo.	Wright, D. H.....	Madison.
Williams, D.......	Darien.	Wright, Geo.....	Mt. Horeb.
Williams, Daniel..	Madison.	Wright, J. S......	Emerald Grove.
Williams, Daniel..	Summit.	Wright, Josiah T.	Janesville.
Williams, G. G....	Whitewater.	Wright, N. A.....	Prairie du Chien
Williams, J. P.....	Janesville.	Wylie, Geo. W...	Elkhorn.
Williams, Randall.	Janesville.		
Williams, S. B....	Madison.	Young, J. E......	Harmony.

TRANSACTIONS.

ANNUAL REPORT.

His Excellency, CADWALLADER C. WASHBURN,

Governor of Wisconsin:

SIR—In compliance with the law, we have the honor herewith to transmit the report of the Wisconsin State Agricultural Society for the year 1871.

INDUSTRIAL CONDITION OF THE STATE.

The condition and progress of our industry, in all its departments, were so fully set forth in our report of 1870 that no attempt will be made to elaborate them in this.

We shall simply make a brief record of the year represented, and occupy the remainder of the report with a statement of what appear to be the present leading wants of the state.

Industrially considered, the year 1871 has but little to distinguish it from the average in Wisconsin, except that the late frosts of spring and the drouth of summer slightly diminished the yield of certain crops; that the early setting in of winter cut short the season for fall plowing and for gathering in the autumnal harvests; and that the destructive fires which prevailed in some sections destroyed not only many human lives, with the fruits of their labor, but likewise over large areas so swept away or deadened the forests with which they were clothed as to affect the industry of those districts for many years to come.

AGRICULTURE.

The acreage of wheat made an increase, according to the statistics of the National Department of Agriculture, of some four per cent. But the yield per acre was considerably less—according to some estimates, one-sixth to one-fifth—than the average. This falling off was due to several causes, including especially rust, drouth and the ravages of insects.

The superior quality and yield of the winter wheat, as compared with the spring varieties, afforded new evidence of the advantage of producing it wherever the conditions are favorable.

But—as we have so often urged in previous reports—no amount of wisdom in the choice of varieties, and no condition of season, however favorable, can insure excellent crops of wheat, annually, so long as all other equally essential conditions are neglected. This, it is gratifying to observe, our farmers are beginning to realize.

Buckwheat fell considerably below the average throughout the country; the deficiency being due, in some cases to drouth in early stages of growth, and in others to frost. It is true, however, that Wisconsin fared better than some of the neighboring states in both of these respects. Indeed it was one of the very few states in which the crop was reported an average.

Rye is so little grown that it hardly requires mention. The yield, where produced, was considered about up to the average.

The oats crop was fair. The Agricultural Department at Washington, reported Wisconsin as one of the eight states producing an average. In some cases the yield is said to have been over 90 bushels per acre.

Barley was also a success; the yield being above, and the quality a little below the average.

The corn crop was excellent—probably eight to ten per cent. above the usual yield, and of superior quality.

As a rule, sorghum fell quite below the ordinary yield in most of the states where cultivated; but in Wisconsin, which was one of the first states to introduce this new plant into American agriculture, and one of the most efficient in giving it a full and fair trial, it maintained itself well. The statistician of the Agricultural Department represents ours as the only state east of the Mississippi river in which there was not a falling off in the amount produced.

Potatoes turned out well in spite of the beetle so destructive in former years.

The sugar beet has had another special trial in Sauk county, with results, which in view of all the circumstances, are encouraging. The crop made a good yield in quantity, and the per cent. of sugar and its quality are such as to strengthen the confidence of those who have had the enterprise in charge. Touching the conditions of entire success—the substitution of machinery having a greater capacity than that now in use—reference is made to the communication from Mr. Wefferling, superintendent of the works at Black Hawk, herewith submitted.

The tobacco crop considerably exceeded the average, which has heretofore been large. The acreage was very much greater than in any previous year and the conditions appear to have been favorable for the production of both a large yield and a very fair quality.

Peas and beans—crops never very largely produced by our farmers—fell below the standard in yield, owing to dry weather at the most critical period of their growth.

Hops have been the means of ruining so many farmers in Wisconsin, that their production has been discontinued by a large proportion of those who had formerly made it a specialty. The acreage in 1871 was probably not more than three-fifths as great as in 1870.

It is gratifying that the production of flax and hemp is gaining in the appreciation of our farmers. These crops are well adapted to our soils and climate, and their growth may be made very profitable. The increase of production over the crop of 1870 is believed to have been between thirty and forty per cent.

The hay crop of 1871 exceeded that of 1870 by about one-tenth, both in quantity and condition. Timothy and clover are gaining ground every year; so that the time is not remote when no sensible farmer will think of relying solely on the wild hay of prairie and marsh.

The pasturage of autumn suffered very greatly from the drouth in many portions of the state; which fact, in connection with the unusually early opening of winter, necessitated an uncommon draft upon the season's stock of hay, and considerably affected the production of butter during the fall months.

Dairying has suffered a still further back-set from the yet lower prices than in 1870; so that many who engaged with enthusiasm in the production of milk, as well as a large proportion of those who engaged in the establishment of new cheese- and butter factories, have been disheartened, if not led to the extremity of sacrificing a portion of their investments and quitting the whole business in disgust.

Stock-breeding and stock-growing appear to have kept a steady pace forward during the past year; the most marked features of this general business being a healthy reaction in the department of wool-growing, and an increased interest in the production of pork.

The fruit crops of 1871 were generally good. Apples were not only of good quality, but the product was scarcely less than forty-five per cent. above the average crop. Pears also yielded largely, and grapes were twenty-five per cent. more abundant than usual, notwithstanding the crops are almost invariably excellent. The weather of early summer was a little too dry for a great crop of strawberries, but other small fruits did well.

Cranberry culture is making progress. Many new marshes have been planted, and there is much enquiry among farmers in all quarters whose lands are well adapted to the culture of this valuable fruit. An interesting paper on this subject will be found in its appropriate place in this volume.

THE LUMBER INTEREST

Had a very satisfactory season. The winter of 1870–1871 was an unusually favorable one for getting out logs; and although the prices were at first quite low, they afterwards rose to a paying figure, and finally, as a result of the Chicago and Wisconsin fires, which created an instantaneous and an immense demand, advanced to very remunerative rates.

If the statistics occasionally found quoted on good authority in the papers of the state are at all correct, the annual product of 1871 very largely exceeded that of any previous year Pains have been taken to procure complete statistics of this great and growing business; but up to the date of this writing we are unable to give anything like a full statement.

MINING

Has made but little more progress than heretofore. That important development of iron mining which is certain to come in the early future is waiting for the construction of railways and a general increase of facilities for its economical prosecution. Happily, some of these requisite public improvements are already in progress.

The resurvey of the lead region by Mr. John Murrish, commissioner, has done something to quicken the interest in lead-mining, since the conclusions reached by him are favorable to the opinion that large deposits of mineral will be found in the lower magnesian limestone.

There is a growing conviction in the public, and especially in the minds of those who have been concerned in observations upon the geological formations of Wisconsin, that our state is possessed of a mineral wealth of which we have heretofore had but little idea. As required by law, the report of Mr. Murrish will be embraced in this volume.

MANUFACTURES.

But little has occurred in this branch of our industry during the past year deserving of special notice in this report.

Here and there a factory has been built, and some of those already in operation have been enlarged to meet a growing demand. The prophecy that Wisconsin is surely destined to become a great manufacturing state, is in process of fulfilment.

Without particularizing to any considerable extent, we deem it proper to call attention to the inauguration of an almost entirely new branch of manufacturing industry since the date of our last report. Reference is made to two or three small establishments in Grant county for the preparation of various ochres, and the oxide of iron for use as paints. Judging from the numerous samples deposited in the State Agricultural Rooms by Mr. Murrish, by whom they were discovered, and from the account given by him of the great extent of the formation from which they were taken, we are led to believe that this enterprise, begun on a very small scale in that region, is destined to grow into an important branch of industry.

It is also worthy of remark in this place, that the cheese-factory business, which manifested uneasiness on account of the diminished prices of the product in 1870, has been even less profitable during the past year. Nevertheless, encouraged by the opinion that these discouragements resulted from temporary causes only, several new factories have been established; the list of factories at present, so far as we have been able to determine, being as follows:

CHEESE FACTORY STATISTICS FOR THE YEAR 1871

County.	Firm.	Location.	Number of Cows.	Length of Season.	Pounds of Milk.	Pounds of Cheese.	Rate.	Aver'g. Price.
				Mos.				Cts.
Columbia	L. S. Stewart	Columbus	205		490,000	50,000	9.8	
Dodge	D. Boynton	Chester	300	5½		60,000		
Dodge	M. S. Barrett	Burnett	200	5		40,000		
Dodge	J. B. Cochrane	Trenton	450	6	999 000	100,000	9.99	12½
Dodge	C. C. M. Hodge	Leroy	123	4½		34,252		12½
Dodge	Quick & Nieser	Juneau	160	5½				
Fond du Lac	M. F. B. Ellsworth	Rosendale	150	5½	869,599	87,170	9.8	12
Fond du Lac	Chester Hazen	Ladoga	625	6½	2,390,428	239,892	9.96	
Fond du Lac	Chester Hazen	Brandon	200	5	614,715	51,043	10.9	
Fond du Lac	E. S. Jenkins	Rosendale	450	5	845,492	84,307	10.02	10¾
Fond du Lac	D. D. Treleven	Fond du Lac	92		262,229	26,741	9.9	
Fond du Lac	J. S. Spafford	Fond du Lac	90					
Fond du Lac	G. H. Downey	Waupun	140		275,775	27,744	9.94	
Fond du Lac	*G. D. Curtis	Rosendale	28		95,000	10,000	9.5	11½
Green	*Joel Smith	Brooklyn	20		49,580	†4,950	10.	11
Green Lake	L. Harrington	Berlin				29,198		
Jefferson	Cold Spring Company	Cold Spring	475	8	1,604,085	167,616	9.57	
Jefferson	Olin, Gates & Co	Oakland	250	6½	705,286	71,480	9.25	
Jefferson	D. Holmes	Ft. Atkinson	75	4½	256,637	24,632	10.01	10
Jefferson	A. D. Coburn	Palmyra	225			60,000		
Jefferson	E. P. Ingols	Milford	160		609,150	61,780	9.86	10¾
Jefferson	*H. C. Drake	Lake Mills	36		125,164	‡13,375	9.36	12½
Jefferson	W. G. Fox	Jefferson						
Jefferson	S. Faville	Lake Mills			750,000	75,000	10.	
Jefferson	Faville & Burnham	Waterloo			150,000	15,600	9.61	12½
Kenosha	*John Tuttle	Salem	11		21,972			

* Private Dairy. † 620 pounds of Butter. ‡ 600 pounds of Butter.

Cheese Factory Statistics for the year 1871—continued.

County.	Firm.	Location.	Number of Cows.	Length of Season.	Pounds of Milk.	Pounds of Cheese.	Rate.	Aver'g. Price.
Richland	H. L. Eaton	Lone Rock	170	6½	580,905	59,347	9.78	11¾
Richland	A. D. W. Beckwith	Lone Rock	140	7	463,324	47,278	9.80	......
Richland	*G. J. Carswell	Lone Rock	28	......	130,000	13,000	10.00	11½
Rock	J. Bingley	Milton Junction	110	5½	380,000	38,000	10.00	......
Rock	E. Devereaux	Union	......	......	172,500	18,750	9.2	12
Rock	—— Emery	Union	......	......	......	24,000	......	......
Rock	C. H. Wilder	Evansville	......	......	......	77,834	......	......
Sauk	N. W. Morley	Baraboo	75	4½	191,146	20,011	9.55	......
Sauk	*J. VanIngan	Baraboo	......	......	58,798	5,793	10.15	14
Sheboygan	*A. D. DeLand	......	70	......	229,000	24,000	9.5	11
Sheboygan	A. C. Stoddard	Greenbush	67	4⅔	222,780	17,776	10.25	13½
Sheboygan	D. Verity	Sheboygan Falls	90	5½	200,000	24,000	......	......
Sheboygan	Hiram Smith	......	250					
Sheboygan	H. Conover	......	156					
Sheboygan	J. Holden	......	100	......	......	480,000	......	......
Sheboygan	A. G. Dye	......	200					
Sheboygan	J. N. Strong	......	80					
Trempealeau	M. D. Comstock	......	63	3½	85,000	8,415	10.1	12½
Walworth	P. M. Coles	Darien	......	......	416,000	40,000	10.4	9
Walworth	A. P. Davis	Darien	......	......	331,803	32,325	10.33	12½
Walworth	F. H. Coburn & Son	Whitewater	230	7½	770,453	79,662	9.67	......
Walworth	D. J. Bert & Son	Sharon	450	......	968,000	100,000	9.68	11½
Waukesha	Hinkley & Co	Summit	200	......	......	78,000	......	......
Waukesha	Mann & Douseman	Waterville	170	......	......	67,000	......	......
Winnebago	E. D. Knapp	Oshkosh	225	4¾	349,212	38,375	9.1	13
Winnebago	E. F. Dunham	Oshkosh	64	......	96,530	9,653	10.00	12

* Private Dairy.

Woolen factories have slowly multiplied, and the business is in a healthy condition. The following is a pretty complete list of those now in operation:

LIST OF WOOLEN MILLS IN WISCONSIN.

Hutchinson, Fay & Bullard	Appleton.
James Crampton	Attica.
J. Kneeley & Co.	Bangor.
Bacon, Humphrey & Co.	Baraboo.
Island Woolen Mills	Baraboo.
Chandler, Congdon & Co.	Beaver Dam.
McFetridge, Burchard & Co.,	Beaver Dam.
Beloit Woolen Mills	Beloit.
Berlin Woolen Mills	Berlin.
E. H. Sackett	Black Earth.
Perkins Bros. & Co	Burlington.
D. Roberts	Cambria.
Geo. Dow & Sons	Cambridge.
Hilgen & Wittenberg	Cedarburg.
A. Patzer	Cedar Creek.
J. M. Lambert	Easton.
Fulton Woolen Mills	Fulton.
Geo. W. Carpenter & Sons	Fond du Lac.
Jas. Proctor	Genesee.
Geneva Woolen Mills	Geneva.
Fuller, Clark & Fuller	Harrisville.
Payne, Hastings & Co	Janesville.
F. A. Wheeler & Sons	Janesville.
Jefferson Woolen Mills	Jefferson.
F. Blascheck	La Crosse.
Lancaster Woolen Mills	Lancaster.
Whitney & Stinson	Lawrence.
Henry Hugerford	Lemonweir.
Madison Woolen Mills	Madison.
G. Rudolph	Manitowoc.
McCune & Co	Mayville.
Chapman & Hewett	Menasha.
Oldham & Jones	Mifflin.
Esch Bros	Milwaukee.
Monticello Woolen Mills	Monticello.
L. A. Perkins	Montello.
Wells & Scobie	Neshkora.
N. W. Bass	Platteville.
Nye & Bass	Platteville,
D. J. Pettijohn	Platteville.
—— Jones	Plymouth.
Blake & Co	Racine.
Hills & Clark	Sheboygan Falls.
Bricknee & Heald	Sheboygan Falls.
T. B. Tyler & Co	Sparta.
I. Younglow	Spring Lake.
C. Lawton & Son	Towerville.
D. Jones & Co.	Watertown.
Paris & Ellsworth	Waukau.
Dayton, Dewey & Co	Waupaca.
Waukesha County Manufacturing Co	Waukesha.

Number of mills in the state	54
Number of sets manufacturing cards	63
Number of sets custom or roll cards	43

Nnmber of pounds of wool manufactured into cloth, yarn, etc..	1,500,000
Number of pounds made into rolls for custom work	120,000
Total number of pounds used..................................	1,620,000
Total number of pounds—clip for 1871—estimated at..........	4,620,000

The capacity of the manufacturing cards now in operation, if run the whole time, would be 2,320,000 pounds per annum; but about two-thirds of all the mills in the state were shut down from one to three months of the season. Many factories have added largely to their machinery and made great improvements in both quality, quantity and, style of the goods manufactured, and are now supplying a large portion of the woolen goods used in the state.

The extensive business done by the Milwaukee Iron Company has been considerably enlarged, and is having a most prosperous career. This energetic and powerful company have rendered a very important service to the state by demonstrating the feasibility of working up our iron ores on our own soil with common advantage to the producer, the operative and the capitalist.

COMMERCE

Has made important gains during the year in the way of a very considerable increase of facilities for transportation and handling of the products of the northwest and of all classes of merchandise delivered at our commercial ports for distribution.

THE INDUSTRIAL ORGANIZATIONS OF THE STATE

Continue to prosper. The state, district, and county agricultural societies have held successful exhibitions and report a growing interest among the people in the objects for which they were created. A full report of the acts of the State Agricultural society will be found under the head of "Proceedings." Synopses of the reports of the district and various other independent organizations will also be embraced in this volume.

The condition of the county agricultural Societies will appear from the following tabular statement:

ABSTRACT OF RETURNS OF COUNTY AND DISTRICT AGRICULTURAL SOCIETIES FOR 1871.

Counties.	Representative Officers.			Place and Date of Fairs.		Finances.			
	Presidents.	Secretaries.	Treasurers.	Place.	Time.	Receipts.	Expenses.	Premiums	Am't in Treasury.
Adams	V. E. Smith	Dan'l Scofield	John Hill	Friendship	Sep. 19–20	$201 00	$180 75	$133 80	$71 45
Brown	W. G. Boswell	J. M. Smith	F. Hayomento	Green Bay	Sep. 21–22	290 50	1,673 10	195 00	184 84
Columbia	A. G. Cook	L. H. Doyle	J. Q. Adams	Columbus	Sep. 19–21	1,867 89	1,248 87	849 00	408 02
Crawford	J. Atherton	I. B. Brunson	Lawrence Case	Pra. du Chien	Sep. 20–21	1,676 25	1,704 05	844 50	....
Dane	Wm. R. Taylor	G. C. Russell	Geo. A. Mason	Madison	Sep. 19–21	4,787 83	2,765 40	1,829 92	37 08
Dodge	M. P. Clarkson	E. B. Bolens	O. B. Wilcox	Juneau	Sep. 13–15	572 50	592 05	415 23	19 55
Door	....	H. Harris	R. M. Wright	Sturgeon Bay	Sep. 22–23	287 89	240 40	171 50	46 99
Eau Claire	D. C. Richardson	Harris Searl	Chs. Buckman	Augusta	Sep. 12–13	380 28	366 49	146 20	22 79
Fond du Lac	E. S. Hammond	D. C. Lamb	A. B. Taylor	Fond du Lac	Sep. 12–14	2,643 74	2,521 11	879 00	122 63
Grant	J. B. Cullis	F. A. Burr	W. W. Robe	Lancaster	Sep. 13–15	1,240 55	1,075 42	661 00	297 27
Green	T. H. Eaton	W. W. Wright	Thos. Emerson	Monroe	Sep. 21–23	1,023 00	1,023 00	599 42	....
Green Lake	Sam. W. Mather	L. C. Potter	S. P. Rogers	Berlin	Sep. 13–15	824 80	939 08	772 50	....
Iowa	S. W. Reese	J. T. Pryor, Jr	Sam'l Hoskins	Dodgeville	Sep. 20–22	1,899 68	1,714 87	709 00	184 81
Jackson	Wm. T. Price	F. H. Allen	O. O'Hearn	Blk. Riv. Falls	Sep. 20–21	868 15	912 90	287 15	106 30
Jefferson	Q. C. Olin	D. E. Baker	Jas. Barr	Jefferson	Sep. 19–21	1,396 25	1,659 16	676 66	50 33
Juneau	H. C. Macumber	F. S. Veeder	M. Temple	Mauston	Sep. 21–23	773 07	657 69	398 65	115 38
Kenosha	W. V. Cull	H. H. Tarbell	....	Kenosha	Sep. 19–21	1,310 06	1,230 10	562 33	79 96
La Crosse	A. P. Gray	A. J. Phillips	F. W. Stiles	Salem	....	954 80	957 76	491 50	57 82
La Fayette	F. Campbell	H. L. Brown	S. S. Allen	Darlington	Sep. 14–16	931 80	965 95	....	....
Lodi Union	J. Narracong	Isaac Van Ness	J. B. Dwinnell	Lodi	Sep. 13–15	682 10	728 17	344 00	44 06
Manitowoc	John Hall	E. B. Treat	Jas. Tangher	Manitowoc	Oct. 14–15	425 42	430 20	340 50	....
Marathon	L. Kickbusch	C. H. Muller	Jacob Kolter	Wausau	Sep. 14–15	651 25	783 84	241 25	22 42
Marquette	H. H. Taylor	G. W. Robinson	G. W. Ray	Oxford	Sep. 20–21	210 00	229 38	159 50	17 68
Monroe	J. A. Clark	D. McBride	T. B. Tyler	Sparta	Sep. 14–16	440 00	502 77	224 50	37 28
Outagamie	W. H. Lamphear	J. E. Harriman	E. C. Goff	Appleton	Sep. 26–28	717 05	954 90	334 50	12 48

Abstract of Returns of County and District Agricultural Societies for 1871—continued.

COUNTIES.	REPRESENTATIVE OFFICERS.			PLACE ATD DATE OF FAIRS.		FINANCES.			
	Presidents.	Secretaries.	Treasurers.	Place.	Time.	Receipts.	Expenses.	Premiums	Am't in Treasury.
Ozaukee	A. M. Alling	Wm. Vogenitz	B. O. Z. Kussow	Cedarburg	Sep. 20–21	$195 46	$258 07	$123 25	......
Pierce	J. M. Bailey	I. H. Southwick	M. W. Barb	Prescott	Sep. 21–22	423 00	383 65	275 00	$127 40
Portage	Henry Cate	J. H. Felch	Wm. Calkins	Plover	Oct. 10–11	247 75	166 35	130 60	81 40
Racine	N. D. Fratt	A. L. Lawton	J. Lueck	Burlington	Sep. 6– 8	3,526 62	2,450 59	1,440 00	1,076 03
Richland	J. B. McGrew	Wm. H. Joslin	C. H Smith	Richl'd C'tre	Sep. 21–23	576 45	579 71	194 25	3 26
Rock	Seth Fisher	R. J. Richardson	C. Miner	Janesville	Sep. 12–15	3,706 85	3,687 43	1,935 65	95 60
St. Croix	Sam. Williams	T. D. Hall	A. D. Richards'n	Hudson	Oct. 13–14	440 20	480 86	318 00	......
Sauk	H. H. Potter	J. J. Gattiker	Henry Cowles	Baraboo	Sep. 20–22	1,825 70	1,805 70	450 00	20 00
Sheboygan	W. W. Huson	J. C. Thomas	M.D. Hotchkiss	Sheboyg. F'lls	Sep. 13–15	1,543 50	1,536 50	427 25	7 00
Trempealeau	D. Bunn	A. R. Wyman	D. Arnold	Trempealeau	Sep. 20–21	540 20	457 30	106 00	89 20
Vernon	J. C. Davis	G. W. Nuzum	Ralph Hall	Viroqua	Sep. 26–29	789 07	962 64	275 90	225 56
Walworth	P. G. Harrington	S. G. West	Hollis Latham	Elkhorn	Oct. 3– 6	3,248 71	3,248 71	1,233 00	......
Washington	F. W. Notting	Albert Semler	Franz Lorenz	West Bend	Oct. 5– 7	1,079 56	1,094 49	390 50	......
Waukesha	J. C. Starkw'ther	F. H. Putney	....	Waukesha	Sep. 13–16	1,075 50	1,170 58	593 00	11 00
Winnebago	R. J. Judd	Jas. Brainerd	Jas. H. Jones	Oshkosh	Sep. 6– 8	774 39	757 71	375 00	16 68

THE AGRICULTURAL DEPARTMENT OF THE STATE UNIVERSITY

Is progressing as well, perhaps, as should be expected under the circumstances of inadequate means and a small working force. The farm is steadily undergoing improvement under the fostering care of the board of regents, and the professor of agriculture is conducting various important experiments thereon, in addition to his labors in the lecture room. So much of his report to the board of regents as should be republished for the information of the readers of this society's Transactions will be included in this volume.

THE ACADEMY OF SCIENCES, ARTS AND LETTERS

Has had another prosperous year. Its meetings have been well attended and have brought out the results of various important investigations, which it is presumed will be published. Aiming at the progress of industry through scientific discovery and a hearty co-operation with the industrial organizations of the state in securing the application of science to the practical arts, it should have friendly recognition everywhere and among all classes of the people.

INDUSTRIAL NEEDS OF THE STATE.

As was intimated at the outset, it is not our purpose, within the necessarily narrow limits of this report, to enter upon a full discussion of even such of our industrial faults and deficiencies as are most important, but simply to so mark them in bold outline as to arrest the attention of those who must be held mainly responsible for their correction.

First of all, we are in great need of a

LESS GREED OF LAND.

Nearly all Americans descended from English ancestry have inherited a strong desire for large farms. Whether it be owing to the fact that the estates of England have always been vast in extent with a marked tendency to become yet vaster, and so the natural desire for large possessions has been strengthened by habit and education; or whether, having sprung from the dependent landless classes of English people—there are but these two classes in Great Britain—successive generations of craving what in the old world could not be had, but is so easily acquired here, have intensified that desire, we need not stop to discuss. The fact that, in this mania for much land, regardless of our condition or capabilities, we prove our lineage is beyond question. In fact there seems to be no voluntary limit in this direction. We have seen many "large farmers," but we have never seen one whose ambition for land was wholly satisfied. Nor have we often seen an American farmer whose lands were cultivated up to the full measure of economy.

The Germans, Belgians, French and other continental people who have come among us show a different habit and a different ambition. Indeed, the systems of farming (if anything we have can be called a system) practiced by the American and the continental farmer are, in most respects diametrically opposite. And the difference rests on this fundamental difference in their desire for much land.

In Germany there are some estates embracing many thousands of acres. But these belong to the nobles, who either cultivate them by means of large capital under skillful direction, or keep large portions of them in forests for the pleasures of hunting and for future supplies of timber and fuel. The same is true in France. A very large portion of the arable lands, however, is minutely divided, so that each occupant may be the owner of the land he tills.

Thus in Belgium much the larger number of farms fall below five acres in area, while in France the number of farms having less than ten acres is over three million; the average size for the whole empire being fifteen acres.

If now we enquire into the practical results of this extreme subdivision, we shall be astonished at the dispasity between even French agriculture—which has neither enjoyed nor deserved the credit of being the best in the world—and our own.

Let us see. The population of the two countries is about equal. But the areas are very unequal; that of France being a little less than four times as great as that of Wisconsin. Nevertheless in most of the staple crops produced by the two countries, France leads the whole United States— or did in 1860, the last date when any fair comparison could be made— as will appear by the following figures:

PRODUCT.	United States.	France.
Wheat, bushels, over	173,104,924	300,000,000
Rye, bushels	20,000,000	70,000,000
Buckwheat, bushels	12,000,000	32,000,000
Barley, bushels	12,000,000	60,000,000
Oats, bushels	170,000,000	230,000,000

If we feel inclined, as an offset to these reproachful figures to set up a claim on the score of cotton, Indian corn and tobacco, we must not forget how great are the specialties which France makes of the sugar-beet, wine, wool and silk.

This disparity will appear still greater if it be borne in mind that in France a much larger proportion of the people than with us are engaged in manufactures, and that the total of her exports, just previous to the late destructive war, was nearly twice as great as our own.

Comparing portions of this country with other portions, more particularly the West with New England, the difference, although less marked, is still decidedly in favor of the smaller farms. For much as we incline to ridicule the idea of farming on the stony hill-sides of the old Bay State, we are compelled to admit that the averages of that state, in the case of most crops grown by her and by us, are considerably above ours.

The facts prove, therefore, what anyone might determine *a priori*, that small farms sustain a definite relation to

BETTER CULTURE—

A sufficient reason of itself for denouncing the policy of that farmer who, instead of using his means and efforts to make the most that can be economically made out of a few acres, is ever looking with covetous eye upon all neighboring lands.

The ambition of the continental farmer is to get the largest possible returns from the smallest amount of land. And this is a sensible ambition; for as the land represents his capital, and is often obtained at great sacrifice of himself and family, it is to him desirable that he should realize as largely as possible upon the original investment. Accordingly he spares no pains to put his little farm in the best possible condition. If drainage be needed, he contrives some way to accomplish it. If the subsoil should need to be brought up to the surface, and thus made to yield its hidden sources of fertility and wealth, he resorts either to subsoil plowing or falls back on the use of the primitive spade. Somehow the thing is done. If it be apparent that a foreign fertilizer is essential to a full crop, he manages to procure it. But there are some things he never fails to do, nor thinks of omitting any more than he would think of leaving off his daily meals.

Firstly, he recognizes some such principle as that of rotation—that it is not well to occupy a given patch of land with precisely the same kind of a crop from one generation to another; that changes, and particular changes, are necessary as a means of keeping the soil *in heart* and in the best physical condition.

Secondly, he so far appreciates the law of exhaustion that he spares no pains to restore to the soil, by a constant and most thorough manuring, the food elements removed from time to time in the harvested crop. Nothing that can produce a kernel of wheat or another spear of grass is ignored. Even the highways and by-ways are swept for the droppings that may chance to be there.

Thirdly, he fails not to give to the soil the most thorough mechanical preparation of which he is capable.

Fourthly, he is unsparing in his cultivation of the growing crop. Even his field crops are hoed as carefully as are his garden vegetables. What nutriment there is in the soil is thus saved for the cherished plant. Nothing is wasted on noxious weeds.

Thus it is that France, with an area less than that of the largest of our States, produces more annually than is produced by our entire country. Nor is French agriculture fully up to the mark of perfection, or anywhere near it. Indeed, until within a few years, she was reckoned among the more backward of the countries of Middle and Western Europe. Even yet, but few of us Americans have any just idea of how we suffer by a comparison with her, and with Belgium, Holland, Germany and Switzerland in all these important matters.

The reason of the difference has already been hinted at, and may be fully comprehended if we give any heed to the careful and economical system practiced by them, and to the slovenly, headlong, utterly reckless practice of the majority of American farmers.

In view of the cheapness of wild lands and of the irrepressible desire of every American that he should at least seem to be rich, and that his children should be really so, it is hardly strange that they who have chosen agriculture as their profession should seek to possess themselves of large areas, regardless of their ability to give them proper cultivation. But it is a little strange that more of them should not realize the economy of attempting to cultivate only so much of their immense farms as they can cultivate well; the remainder being left to produce timber and to preserve its native fertility for the growing needs of a rapidly increasing population.

If one fully intends to adopt the theory and practice of the robber, he may possibly gain something by creaming a large farm and then selling it out and taking another, to be left in the same or a worse condition, in turn. But are our American farmers all land-skinners? Do not some of them intend to build for themselves and their posterity permanent and satisfactory homes?

Another need of our industry is a better recognition of the importance of

A DIVERSIFIED AGRICULTURE.

Our experience in wheat-growing should have taught us this long ago. For have we not reduced our average from a very high to a very low figure during the period of this first generation?

Our farmers should have learned by this time that there is no such thing as permanent success without systematic rotation and manuring. But systematic fertilization is impossible without a liberal supply of live stock. The conclusion is inevitable, therefore, that grain-growing must go hand in hand with grass-growing and stock-raising.

Here and there one is found who practices upon this manifest principle as if it were cardinal; and such farmers are invariably successful. Besides keeping up the fertility of their lands, they are safe from the ruin which may come to him who stakes all upon a single crop. Neither drouth, nor flood, nor insect foes, nor yet commercial changes can utterly overwhelm him; and inasmuch as it is hardly possible that all these calamities should overtake him at once, he is always "master of the situation."

These principles are so simple and trite that one at first feels like apologizing to his readers for restating them; but then there are the sad misfortunes of the Sauk county hop-growers, and the still more common experience of the wheat maniacs, in proof of how little previous teachings and the reiterations of a multitude of writers and speakers have been heeded.

Again, there is too little

REGARD FOR SPECIAL CONDITIONS.

Farmers are rotinists. They are prompt to denounce the blind adherence to fashion which so widely prevails in the social world; and yet no people or class of people on earth manifest so little independence or so blindly and implicitly follow the prevailing custom—which, unhappily in their case is the very worst fashion they could possibly adopt.

What we would urge is this: that they should discard the iron-bedstead rule of doing this or that because everybody else does it, and undertake to think for themselves. That before deciding whether they will grow this crop or that, whether they will give their strength mainly to grain growing or stock-raising, and if to stock-raising whether it shall be to sheep-raising, cattle-breeding, or pork-raising—that before they settle any of these questions, they look the ground over in the light of reason and experience, and then adapt their course to the circumstances by which they must necessarily be affected.

That a man living a thousand miles from any sufficient market, and with no means of transportation but wagons drawn by ox-teams, should devote his energies and means to the raising of potatoes or turnips; that a farmer having elevated lands and dry pastures, only fit for sheep-feeding should devote himself wholly to the breeding and rearing of short-horn cattle; or that a man located within twenty minutes of New York or Philadelphia, and upon lands admirably adapted to the production of vegetables and small fruits, should sow every square yard of it to wheat and rye; this would strike any thinking and intelligent man as the height of absurdity. And yet blunders equally senseless are made by not a few of our farmers in Wisconsin, and are persevered in from year to year.

The earth is scarcely more versatile in its productiveness and suitableness to certain ends than the mind of man in its adaptability to the various pursuits of life. And yet few parents are so stupid that the question never arises in their minds as to the special aptitudes of their children, when the time comes for giving them some sort of preparation for the occupation they are to follow.

Few lands are so limited in the range of vegetation but that a variety of crops and stock may be profitably grown upon them. But there are limitations nevertheless, and they cannot safely be ignored. Why is it that so few of our farmers study them?

Our disregard of conditions is further manifested by the readiness and uniformity with which we all rush into a novel enterprise, or turn our whole strength upon a single branch of business which, as we have already insisted, can only be made permanently successful by giving due attention to the claims of each element and seeking to harmonize them all.

Here, as in everything else, selfishness and a blind greed are bad guides to follow. They may flourish for a season, but there is a law that in the end they shall defeat themselves; and that law is inexorable. It is illustrated when we see a second or third merchant of a particular class establish himself in a village where one, and but one, could do a thriving business. We see it when a second cheese factory is established in a community barely able to give the first one a liberal support. We see it illustrated when the farmers of a community or state all rush pell-mell into this branch of farming or that, and then rush out of it in the same headlong, senseless manner.

One would suppose that when an intelligent farmer saw all his neighbors and everybody's else neighbors turning their exclusive attention to pork-raising, that it would be a good time for *him* to raise corn, meanwhile omitting nothing essential to steady and uniform success. But observation proves that such men are rare, and the result is that very scon everybody has more hogs than his own crops will supply, and corn has gone up quite beyond reach for profitable feeding. If the great majority do not then become disgusted with the low price of pork, sell off, or give away, their breeders, and all go into corn, because *that pays*, they will constitute one interesting exception to the general rule.

The writer once knew a farmer in Ohio who started out under the guidance of this rule: always to do just what his neighbors pretty generally did *not* do. He was not far from being a philosopher. The neighbors are still plodding and grumbling. The philosopher has added farm to farm, owns his thousands in bank stock, and finds no difficulty in keeping his temper. Another farmer of our acquaintance has flourished nearly as well in the practice of doing what his neighbors did, but doing it *first*. He was the leader of fashion in agriculture, and was always ready to discard the model he had given them about the time the majority had adopted it.

But if any one should distrust his own judgment—and the appearance is that most farmers have reason to—he may safely fall back on the general rule first above suggested—the rule of adopting a safe and judicious policy for the average of times and seasons, and of persevering in it with slight modifications, notwithstanding temporary discouragements.

During the late low prices of wool, when so many sheep-men became disgusted and either slaughtered their flocks or sold them out of the state at a sacrifice, we noted that one large grower persevered, and now, when the dejected wool-growing interest is looking up a little, he is still in *in statu quo* and ready to take advantage of the rise, while others are buying back or looking up new flocks at a second sacrifice.

This discussion leads us to touch briefly, and yet emphatically, upon the great need there is among us of a more just

APPRECIATION OF STOCK-RAISING,

As being not only essential, as heretofore urged, to the continued fertility of the soil, but likewise especially profitable in and of itself.

No matter what the fluctuations in the prices of the various domestic animals and their products, they are always in demand, and usually at prices much more remunerative than those of wheat and the other cereals. And then there is something in the convenience and economy of having a market on one's own premises for such crops as are chiefly grown for the consumption of animals.

Nor should it be overlooked that the producer of horses, beef, pork and mutton has an advantage in that he is not obliged to sell at a present sacrifice or hold over at a dead loss of interest on the amount thus locked up, as in the case of wheat, oats or corn, cribbed and garnered until the return of better prices. For the horse, the calf or bullock, the sheep, and the hog, besides being always ready, or easily made ready, for the market, can be carried over a few months or even a year or so without other sacrifice than one of convenience, since they are all the time increasing in weight and value. There is no *dead* loss at all—unless they die outright, of which there is little need, if they are properly cared for.

It is an occasion for congratulation that these views are even slowly gaining ground in Wisconsin. As cattle and hogs multiply the acreage of the root and corn crops will correspondingly increase. As sheep multiply thousands of our now useless hill-sides will whiten with productive flocks. But as yet we have only begun to realize the advantages of this great branch of our husbandry.

And one of the first conditions of better success than has yet been attained is

A BETTER KNOWLEDGE OF THE PRINCIPLES OF STOCK BREEDING AND STOCK RAISING.

Too many of our farmers are content with knowing that a horse is a horse, a bull a bull. They know nothing of "points," if, indeed, they do not believe that all this talk about principles is moonshine. If they would increase their herd they resort to the scrub male of the commons in preference to a thoroughbred, because of the difference in price of service. And as for buying an animal of unquestioned purity of blood, that thought never entered their heads. The number of this class is happily growing less and less every year, under the influence of the agricultural societies and journals of the country. No word should be spared that would help reduce it to zero.

But even in this day of societies, and journals, and agricultural colleges, there is comparatively little knowledge of the science of breeding and fearing of domestic animals. It does not dispose of the obligation to study into this science to say that concerning some of the so called "principles" there is still much doubt. That is true; but it is also true that many cardinal and highly important questions have been settled and are now recognized by scientific men everywhere.

We know:

That soundness of the generative organs and vigorous constitutional health added to faultless form and development are essential to the highest fertility of any race or breed of animals;

That the qualities of the parent tend to perpetuate themselves in the offspring, and that the perpetuation is more certain in proportion as the characteristic quality is more marked;

That the reappearance in the offspring of a quality or feature characteristic of the parent is the more invariable and certain in proportion as such characteristic quality has been fixed in the ancestry by a long series of repetitions at last resulting in a determinate breed;

That this power to transmit or reproduce qualities is especially strong in certain races and individuals—which fact if known will render them highly serviceable in case the characteristics are desirable, or equally to be avoided if undesirable;

That all breeds have a tendency to reproduce the characteristics of even their remote ancestors, however inferior;

That this tendency to *breed back* is more marked in some individuals than others—a trait to be discovered as early as possible and to be eliminated so far as may be by discarding such individuals as breeders;

That morbid taints and organic defects are so liable to transmission, that perfect and healthy offspring can never be reasonably hoped for from less than perfect and healthy parents;

That, while *breeding in and in* is sometimes essential to great excellence and the formation of a distinct and permanent breed, the constitutional weakness, disease and final sterility to which it tends, must be avoided, whenever danger threatens, by the infusion of fresh blood from another branch of the same family as far removed as is practicable;

That important modifications looking to improvement may be made in any given breed by such selections of male and female as will reinforce those characteristics deemed desirable, and weaken and extinguish such as are undesirable;

That modifications may also be affected by subjecting the animals to new conditions of climate, soil, feed, training, etc.;

That the impression made upon the female by the getter of her first young is especially marked, so that she does not rid herself of it entirely for several succeeding pregnancies;

That the impressibility of the female during gestation is so great as to render it unsafe for her to associate with inferior races, or breeds;

That the offspring of quite young parents are apt to be wanting in the highest constitutional vigor and force of endurance;

That the moral qualities of the offspring, especially amiability and docility, are more or less dependent on the quiet and comfortable condition of the female during pregnancy; and

That parturition may be facilitated by a kind of feeding calculated to keep the system in a free and healthy condition during the period of gestation.

It is also worthy of our notice that there are some reasons for supposing that the male parent, more than the female, determines the character of the locomotive and external organs (some authorities add nerve and vigor); while the size and internal organs are more especially influenced by the mother. But neither this nor any one of the theories about the voluntary determination of sex can be classed among the established principles of breeding.

Every farmer should also understand that there are

PRINCIPLES OF STOCK RAISING

As well as stock-breeding—that it is possible to procure better results than otherwise by observing the physiological laws involved in the protection, feeding and fattening of animals. If he were possessed of a full and complete science of physiology it were all the better; but he should hardly be pardoned for not knowing:

That gentle treatment and a full and nourishing diet are especially important while an animal is yet young, since losses suffered then are not easily made up afterwards;

That shelter from severe cold is a positive saving of food, which besides supplying the wastes of the body and building up new tissues, is also the source of animal heat—is the *fuel* by which the creature is warmed;

That opportunity for a retreat from the intense noon-day heat of summer is likewise important, since the animal is thus protected from the too stimulating or over mastering influence of the sun's direct rays.

That different kinds of animal food are adapted to different ends, some more directly affecting the growth of muscle, others producing fat, others increasing the flow of milk, and so on;

That regularity and moderation in feeding and watering are essential to health;

That perfect health and bodily vigor cannot be maintained without moderate daily exercise;

That quiet, comfort, whether in sleeping or feeding, conduces very greatly to health and is especially necessary to such animals as are fattening or producing milk;

That the temper of an animal is scarcely less susceptible than that of a child to the influence of kind and generous treatment.

Another important industrial need of Wisconsin is

A MORE RATIONAL PRACTICE IN FRUIT-GROWING.

Towards this our State Horticultural Society and the agricultural societies have made important contributions.

It is less common than it used to be to see a new apple-orchard planted on low, rich and moist land. The sad experience of the many who at first tried that, under the supposition that the better the soil the better the fruit, and the more of it, has not been without good result to those who have come after them. It is also much more common in these latter days to find our farmers seeking information from our own experienced fruit-growers as to the hardiest varieties. A few destructive winters have enforced the reason for intelligent caution in a matter of so much moment.

But, notwithstanding these gains during the past twenty years, there is still a vast amount of ignorance concerning this whole subject of fruit-growing—concerning what to plant, where to plant, when to plant, how to plant and cultivate.

As no section of our heaven-favored land in which the successful production of the staple fruits of the temperate latitudes is impossible can hope to be a permanently acceptable place of abode for our people, it is a question of general and state interest as well as private.

For these reasons the state has wisely considered it a matter of true policy to foster such agencies as have been instituted for the promotion of this most interesting and highly important branch of our industry. Certainly no legislative encouragement could be more properly given.

Measures looking to

THE PRESERVATION AND PRODUCTION OF FOREST TREES

Are of very great moment, and urgently demand the attention of the state.

Nature gave to Wisconsin an endowment in the form of timber, the immense value of which has not been appreciated, nor will be, it is feared, until our magnificent forests have fallen before the ruthless axe of the lumberman, and instead of a well-tempered and kindly climate, fertile fields and rapidly advancing improvements, we present the sad spectacle of a people struggling half vainly under scorching suns and withering blasts, and against the odds of a scarcity of the most essential materials to carry forward the civilization so nobly begun.

We seem blind to what, as a state, we owe to the exceptional richness of this inheritance. The voice of experience, the warnings of history, and the teachings of science are alike unheeded.

It is undeniable, in the first place, that forests, or even trees sparsely distributed over the surface of a countiy, materially and beneficially affect its climate.

In a general way, they increase the fall of rain and thus insure one of the most essential conditions of fertility, as well as uniformity in the volume of streams for watering the lands through which they flow, for supplying motive powers, and affording better and more reliable facilities for navigation.

By retaining, for gradual percolation through the soil, the water and snow otherwise soon carried off, they are the cause of springs, which in turn become sources of perennial streams and even of lakes, whose influence upon climate are palpably great. For the same reason they are preventive of disastrous floods.

By this same retention of water and snow for the slower process of evaporation, they tend to keep up a uniform supply of moisture to the surrounding country long after it would otherwise be dry and hot.

By affording barriers to strong currents of air they protect a country against the disagreeable and evil effects of drying summer winds and arctic blasts.

By tempering the suddenness of transitions from heat to cold in autumn, and from cold to heat in the spring season, they promote uniformity of temperature and the security of both animal and vegetable life.

By promoting a desirable equilibrium in the electric ocean which pervades both earth and air, they tend to prevent those violent and destructive storms which are common on vast plains and prairies.

As it concerns the economical value of the *products* of the forest, we need only refer to some of their leading uses to satisfy any reflective mind of how much the happiness, prosperity and progress of a community depend on their abundant supply.

Being outside the limits of the coal formations with which our neighboring states on the east, south and southwest have been favored, our dependence for fuel must be either on coal at a great cost for transportion, or on wood of our own growth.

Fuel with us can never be cheap except wood be supplied at a low price.

Houses cannot be built by the poorer class of people unless timber and lumber of every needed sort can be had cheap.

Dwellings and shops cannot be built *for rent* by the poorer classes at prices they can afford to pay unless the material can be had at low prices.

The cheapness of forest products will also determine:

The number, commodiousness and elegance of all public buildings, including school houses and churches;

The expense of constructing railways, docks, warehouses, mills; and hence,

The cost of transportion, travel and manufacture;

The profits on whatever the farmer produces for the market;

The cost of all goods and articles purchased by the whole people; and even

The tendency of the people to that freedom of intercommunication so essential to community of knowledge and homogenity of sentiment.

This question of forests, therefore, is one that touches, in the most vital manner, every economical and social interest of our people.

If to all other considerations we add the æsthetic and moral reasons which are found in the surpassing beauty of a landscape bedotted with groves of sturdy oaks, of graceful elms, or of stately and solemn pines, and in the nestling places they afford for rural homes,—most delightful and hallowed of all human abodes,—there would seem to be every conceivable motive on the part of both people and government for guarding this great common interest with an intelligent and jealous care.

The deplorable fact is, however, that, while our forests are being swept from the state as with the besom of destruction, almost nothing has been done either to prescribe conditions and limitations—a thing the state has a perfect right to do in the sale of lands belonging to it, or held in trust—or to stimulate and encourage the planting of trees in those portions of the state under general cultivation and not sufficiently supplied.

In 1867 a commission was created with the duty of reporting "on the disastrous effects of the destruction of forest trees going on so rapidly in the state of Wisconsin." This commission made a full and convincing report, and there the matter rested.

The importance of the subject is beyond all question. The state cannot afford much longer to postpone action.

ENCOURAGEMENT OF MANUFACTURES.

The natural advantages for many branches of manufacture are so marked in Wisconsin that mills and factories are springing up with but little effort and no special encouragement on the part of the state. Nevertheless, it is manifest that a still more rapid growth could be induced by the adoption of some policy calculated to engage eastern and foreign capital in certain branches requiring heavy outlays in the beginning and considerable time for first returns.

If in such cases there was but a temporary exemption of machinery from taxation, that amount of encouragement would often decide the question of investment in our favor. And since, in every instance of this kind, only such property would be exempted as otherwise would never come into the state at all, that exemption would impose no additional burden upon any other interest.

Such exemptions of machinery from taxation are practised by some other states, and with great apparent advantage.

Being in general strongly opposed to everything like class legislation, we would be slow to even suggest any measure that would fall in that category unless it should appear that the reasons for it were very much stronger than any that could be urged against it. The above suggestion is made with the knowledge of some important cases in which capitalists accustomed to a liberal exemption law in other states have been deterred by our own tax on machinery from putting large sums of money into manufacturing enterprises here.

Under a liberal public policy, Wisconsin may early become the leading manufacturing state of the west.

A JUDICIOUS LIBERALITY IN THE PROMOTION OF INTERNAL IMPROVEMENTS

Is essential to the industrial and social development of any state or country. Railroads, good country roads, shipping facilities, telegraphs—these are the agencies that stimulate industry, quicken the pulse of commerce, diffuse intelligence and bind a people together in relations of sympathy and friendly co-operation.

If the railroad history of Wisconsin presents a few chapters that we would gladly expunge, for the reason that they are a record of public corruption and private ruin, it nevertheless makes a summing up of fiscal achievements to which we may refer with becoming pride and satisfaction. Few, if any, states can show larger results in this department of public enterprise; and probably none can point to a greater number of important railroad enterprises now in progress. Every measure of legislation looking to the encouragement of such improvements, without jeopardizing the security and future prosperity of the counties and lesser communities, should have the hearty support of every citizen.

It should also be the policy of the state to do everything properly within its power to insure the construction and improvement of wagon roads. Roads of this kind are a prime necessity of the people. They retard the progress of individual and public improvement if bad, and greatly accelerate it if good.

The country roads of Wisconsin are neither the best nor yet the worst; but we risk nothing in saying that they are far inferior to what they ought to be, especially in view of the favorable conditions afforded by a generally good soil and an undulating surface, easy of drainage.

What legislation may do for roads is illustrated by their different character in those communities where the cash proceeds of a county or local tax are applied for their construction and improvement by competent and efficient commissioners, and in those whose policy and practice it is to let every man work out his tax pretty much his own way or shirk his duty altogether.

A uniform system, formed with a view to the needs of the people, and the economy of skillful supervision, is capable of yielding very important results.

What has been repeatedly and urgently said in these reports concerning the great advantage to our industry that would grow out of the proposed improvement of the Wisconsin and Fox rivers, is no less true now than it was then. No honorable means necessary to bring about that result should be omitted.

In view of the importance of more extensive and cheaper facilities for telegraphic communication, we have warmly welcomed your Excellency's recommendations to the present legislature concerning co-operative steps towards a national telegraphic system in this country, similar to those now in such sucessful operation in Great Britain and some of the other more advanced countries of Europe.

The facilities now enjoyed are of great value to every branch of industry; but they are as nothing compared with what they might be made under a uniform system established and maintained, not in the interest of a selfish and irresponsible monopoly, but in the interest of the whole people.

A LIBERAL COMMERCIAL POLICY.

The commercial economy of a state may be to some extent guided and very considerably quickened and strengthened by the government; and to this end there should exist the utmost sympathy and harmony between the commercial class and the whole body of the people. Anything like antagonism is injurious to both. The people should know and feel that their own individual success, as well as the prosperity of the commonwealth, is directly affected by the status of commerce; and commercial communities should realize that they can only prosper in proportion as the productive industries are healthy, prosperous and favorably disposed towards the most natural commercial centers.

It is a painful fact in the history of Wisconsin that this manifest principle has not invariably found recognition in the past. If they who have erred in this respect are not already conscious of their blunders, it is hardly possible that any further reference thereto in this place would insure their correction.

But be the faults of individuals and communities what they may, the state should keep its eye steadily fixed on the growth and future greatness of the commonwealth. In commerce let the motto of our people be, "The commerce of *Wisconsin.*"

INVESTIGATION OF HIDDEN RESOURCES.

No enterprising state will rest satisfied with barely what is most palpable in the way of natural resources. Of these it will of course first avail itself, though mindful the while of such as may be brought to light with little or much effort.

The small expenditure which leads to the discovery of a mountain of iron, a deposit of lead, a vein of silver, a bed of kaolin, or a quarry of valuable building stone pays a larger interest than any other moderate material investment the state could make.

If some of our attempts at a systematic and complete geological exploration of Wisconsin have partially failed this fact constitutes no sufficient reason why all future like attempts should also prove failures. Failure is certainly not inherent in and inevitable to a policy the intelligent practice of which by so many states and nations has led to such important results. The fault has been in the methods we have adopted, not in the resources to be investigated, nor yet in the general policy of conducting such investigations.

It is gratifying that there are evidences of a return to reason on the part of the state in all matters of this sort, and that certain cautious steps towards an investigation into the hidden sources of our natural wealth have already been taken. Proper caution is well, but let there be no further interruptions to the work at last resumed until it is completed.

INVESTIGATIONS INTO THE CAUSES OF INDUSTRIAL LOSS

Are likewise deserving of aid from the state, in so far as they affect our own state exclusively, for the reason of economy; in so far as such causes are general in their influence, affecting other communities as well as our own, because it is the duty of every state to make contributions to the general welfare and the common progress of mankind.

Under this head are properly included enquiries into the causes of those diseases of animals and plants which injuriously affect the public interests, and the means of arresting and eradicating them: all important violations of the principles of political economy; and finally into the root and remedy of all social evils which retard the progress of communities.

Here is opened an immense field. But its extent is not more than commensurate with its importance. The pleuro-pneumonia, the murrain, the foot-rot, the hog-cholera, neither of them appears very formidable at the first glance; but it would require many figures to foot up the losses they have each of them entailed upon the industry of this country. The wheat midge and the weevil are very little things, but the ruin they have sometimes wrought in a single year could only be estimated by millions of dollars. So of the locust, the grass-hopper, the potato beetle, the coccus, the aphis, and a long list of destroying insects that annually prey upon the hard earned fruits of our labor. But insignificant as they are individually so long as they prove themselves more than a match for the husbandman and the orchardist, they are not unworthy the attention of the state; which, if it cannot decide to constitute commissions for each separate department of investigation that might be named, can at least extend its fostering care to all such agencies as exist for the very purpose of extending our knowledge in these and kindred matters.

THE BETTER EDUCATION OF THE INDUSTRIAL CLASSES.

Everything heretofore said in the discussion of our industrial needs leads to this general conclusion, that the industrial classes of the people must be better educated. The farmer must not always grope in darkness, ignorant of even the elementary principles involved in the production of his crops, the breeding and rearing of his domestic animals, the shaping his plans to meet the exigencies of the times. The miner must not always rest his hopes of success on inferences drawn from traditional notions and theories. The mechanic must not be left to plan and construct in accordance with usage, though it be in the most flagrant violation of principles long known and established. They sadly need the teachings of science. Society every moment suffers the penalty of their ignorance. Opportunities for instruction must be both abundant and cheap—so abundant and so free that poverty will be no hindrance. More than this, when the facilities are made ready, society must adopt the principle of going into the by-ways and hedges and compelling them to come in.

The state will not prove its wisdom by holding its hand of help closed against the agencies that already exist for this noble purpose, nor in refusing its encouragement to new ones promising efficiency. Certainly it cannot consistently neglect the only school it has in all its borders for special instruction in those practical arts whose prosperity lies at the very foundation of the public welfare.

The university college of science and the arts has been reared on a foundation furnished by the general government, supplemented by a gift of $40,000 in bonds by Dane county. The congressional gift, though not in all respects an equal one as compared with like gifts to some of the older states, was munificent and should have inspired in the state a corresponding disposition to do its full share in the noble work of providing scientific instruction for the industrial classes of our people.

This, however, it seems not to have done. The gift of 240,000 acres of land was reluctantly accepted, and has since been managed, not in the interest of education, as it was the sacred duty of the state to manage it, but in the supposed interest of local communities and private speculators.* Such improvements as have been made have come out of the proceeds of the county bonds, and there is, as yet, no such instructional force in the department as is necessary, or as would have been there to-day had the state done its share in the work of endowment.

If the people are inclined to complain that more has not been accomplished by Wisconsin's college of agriculture and the mechanic arts let them send their complaints to the legislature, at whose door lies the sin of niggardly dealing, if not of absolute fraud.

WORTHY IDEALS.

It is a grand thing to have the molding of an empire while yet the elements are plastic—to take the best thoughts and sentiments of all times and make of them institutions that will endure through after generations.

It is an opportunity with which the people of this new continent have been favored as have no other people in all history. For here there was no need of the always difficult and most tedious work of pre-demolition. Amplitude of area, abundance of the best possible material, the experiences of all the past, and principles well refined in the furnace of trial,—these were ours. We could build as we would.

It is a work which each new state, as it takes its place at the front in the march of empire, may undertake with increased advantage, because enriched by a knowledge of all that has been done or tried before.

It has been, and is, our grand privilege as the people of Wisconsin. Rich in our endowment of lands, mines, forests, waters, scenery and climate; in our geographical position among the states of the Union; in our inheritance of the best qualities of many races; and in the beginning that has been made of independent homes, free institutions and a marvelous industrial development, we shall be held to a fearful responsibility if we mold not this our empire after the highest and noblest ideals.

On behalf of the Executive Board, I have the honor to be, Sir, with great respect,

Your obedient servant,

J. W. HOYT, *Secretary.*

STATE AGRICULTURAL ROOMS, January, 1872.

PROCEEDINGS.

EXECUTIVE MEETINGS.

STATE AGRICULTURAL ROOMS,
MADISON, February 7, 1871.

The Executive Board of the Wisconsin State Agricultural Society met, pursuant to requirement of the by-laws, in the State Agricultural Rooms, on the evening of February 7, 1871, at 7 1-2 o'clock.

Present.—Messrs. B. R. Hinkley (president), Wm. R. Taylor, Eli Stilson, Saterlee Clark, C. L. Martin, J. O. Eaton, N. S. Greene, J. H. Warren, N. D. Fratt, C. H. Williams, H. Ludington, John L. Mitchell, and J. W. Hoyt.

President Hinkley in the chair.

On motion, it was determined that the first order of business should be the preparation of regulations and a list of premiums for the next annual exhibition.

Voted, on motion of Mr. Warren, that the general regulations of 1870, under the head of "supervision," be adopted as they now stand.

"Rules of entry" next taken up. Rule 9—"competition will be open to the world in all departments and classes"—gave rise, as usual, to an animated discussion, although the weight of opinion was manifestly on the affirmative side. Certain classes of stock and manufactured articles more especially were regarded by one or two members as entitled to protection. On the other hand, it was urged that the object of the exhibition being to improve the quality of our productions, whether in one department or another, it was unwise to exclude articles or animals from without the state on the ground that, coming from sections of the country older in industrial experience than ours, and therefore likely to be superior to those produced by ourselves. If any other state, or any other country than the United States, could show better horses, cattle, sheep or swine, we wanted them to do it. Not only so, we wanted our farmers to buy them when they were brought, and so steadily improve their own stock by the infusion of better blood.

Touching the matter of competition in the department of manufactures, Mr. Hoyt presented the informal protest of manufacturers of carriages and some other articles, against compelling them, in order to show at all, to compete with eastern manufacturers. But in doing so he took occasion to show that such protests were without proper ground; affirming, in the first place, that our carriage manufacturers, at least those of them who complained of this rule, had, of all men, the least occasion for fearing competition—that he had seen no better carriages, and no handsomer ones, in either style or finish, any where at the east, or even at the London or Paris exhibitions, than were made right here in Wisconsin. If, in the article of boots and shoes, they were accustomed to turn out a more *finished* stock of common work, their work was inferior to ours in serviceableness, and there was no sufficient reason why our manufacturers could not also compete with them in style if they chose to try.

Finally, it was unanimously voted that the time for limitations of this sort had passed—that Wisconsin was now of age and needed no longer the advantage of odds against her neighbors. And so the rule was allowed to stand.

Mr. Mitchell was of the opinion that the subject of entries should not be passed until some change had been made as to the kind of entry card used in the horse and cattle departments. He was opposed to the name of the exhibitor being known to the judges. Horses and cattle were stock in which breeders had large interests at stake; besides which, there was nothing else ever placed upon exhibition in regard to which there was naturally so much feeling, and hence so great danger of personal considerations entering into the estimates of judges. The committee should not be made acquainted with exhibitors, nor should any one but the superintendent be allowed within the ring during their examination. In conclusion, he offered the following, for incorporation into the "rules of entry," to wit:

"Under the new rules governing the exhibition of *horses* and *cattle*, the entry will be the same as heretofore, but the entry *card* will not bear the name of the owner; the animal being known by its *number*."

Which, after some discussion and explanations, was unanimously adopted.

The "rules of inspection," after the most careful consideration, were amended by the adoption of the following special rules relating to the horse and cattle department:

RULES APPLYING TO THE HORSE AND CATTLE DEPARTMENTS EXCLUSIVELY.

1. Superintendents of the horse and cattle departments are ex-officio chairmen of their respective committees, but shall not be entitled to a vote.

2. All votes shall be by ballot. The animal receiving a majority of the votes cast shall be entitled to the premium.

3. Each premium shall be voted for separately,

4. In case of a tie vote another committee-man shall be called in, and his vote shall be confined to the animals receiving the greatest number of votes, and shall be final.

5. *Members of awarding committees shall not, in any case, consult until after the award is made.*

The terms of admission were amended by slightly increasing the rates of single admission for carriages.

On motion, the committee adjourned to meet again at 9 o'clock the following morning.

WEDNESDAY, February 8, 1871—9 o'clock A. M.

The board met pursuant to adjournment.

Present—same members as before, except Mr. Clark, detained for a short time by duties in the Senate.

President Hinkley in the chair.

On motion the board proceeded to consider the subject of premiums to be offered for competition at the next fair.

A motion was then made that no prizes be offered for essays, on the ground that but little ever came of such offers—in fact that nobody in Wisconsin appeared to feel sufficient pride in literary work of this sort, and that the annual prize list was therefore a farce.

Mr. Hoyt strongly opposed this motion. He acknowledged with reluctance and mortification, that there was ground for a plausible argument on the other side, since the only prize awarded by the society for many years was the one accorded so unanimously to the paper on "Wheat Growing in Wisconsin," prepared by Vice-president Eli Stilson, and published in the volume of Transactions for 1869—published, too, he was sorry to observe, when too late to make the correction, without the proper announcement of its having received such an award. But the ground, after all, was more specious than real. For while on the one hand our farmers were very differently situated from the farmers of New England, and could hardly be expected to enlist so readily in this kind of literary labor, there were nevertheless some among us who might be induced to do so; and the wholesome example of these few would gradually lead to like efforts on the part of others. He would therefore strongly urge not only the continuance of prizes for essays, but he would increase their number and amount, so as to give a wider range of subjects, and to at least half-way reward men for the labor essential to their preparation.

The motion having been put and lost, the following list of prizes was agreed upon:

Best approved essay on the Preparation and Management of a Farm for mixed Husbandry in Wisconsin, based upon experience of the author, $25.

Best approved essay on the Preparation and Management of a Grain Farm, $25.

Best approved essay on the Preparation and Management of a Stock Farm, $25.

Best approved essay on the Preparation and Management of a Dairy Farm, $25.

Best approved essay on the Practical Management of Sandy Land, $25.

Best approved essay on the Cultivation of the Grasses and the Curing of Hay, $25.

Best approved essay on the Cultivation of Indian Corn, Silver Medal.

Best approved essay on Root Crops, their Cultivation, Preservation and Use, $25.

Best approved essay on the Rotation of Crops, reference being had to special adaptation to different soils, $25.
Best approved essay on the most economical use of Straw on the Farm, $25.
Best approved essay on the Breeding and Fattening of Swine, Silver Medal.
Best approved essay on the Planting and Management of an Apple Orchard, including choice of varieties, adapted to the climate of Wisconsin, etc., $25.
Best approved essay on the Cultivation of the Plum, Silver Medal.
Best approved essay on the Cultivation of the Pear, Silver Medal.
Best approved essay on the Cultivation of the Cranberry, Silver Medal.
Best approved essay on the Planting and Management of a Vineyard, adapted to Wisconsin, Silver Medal.
Best approved essay on the Cultivation of the small Fruits, especially Strawberries, Raspberries, Currants, and Gooseberries, Silver Medal.
Best approved essay on the Laying Out and Managing a General, or "Market" Garden, with practical directions for Marketing the Crop, $25.

The question next arose as to whether prizes, sufficiently large to constitute an inducement, when added to the natural desire to excel, should not be offered once more on field crops.

Remarks in favor of the suggestion were made by the president and by Messrs. Stilson, Taylor, Field, Warren and other members of the board; after which, on motion, it was resolved to offer two premiums of $200 each on the best three successive crops of wheat and corn respectively; the conditions being as follows:

Best 5 acres of Wheat, yield not less than 30 bushels per acre, for years 1871, 1872, 1873, $200.
Best 5 acres of Corn, yield not less than 75 bushels per acre, for years 1871, 1872, 1873, $200.

Competitors to make their entries, and send in their statements for each year before the December meeting of the board. These statements to be verified and to embrace the following particulars: The character of the soil, and the manner of preparing it, the character and quantity of manure, etc., the variety planted or sown, time and manner of harvesting, the measure of the *entire* crop and the weight per bushel, and full particulars of the expense from first to last, and the statement to be accompanied by samples for the inspection of the committee. Awards to be made at the meeting of the board in December, 1873.

The board next took up the matter of premiums in Division A—domestic animals.

After considerable discussion of the propriety of amending the list of 1870, so as to give farther encouragement to the breeding of horses, particularly in the classes of roadsters and draft horses, it was voted, that the premiums on the younger animals, from three years old down, in all the first four classes should be increased by at least twenty-five to fifty per cent.

The annual consideration of the propriety of continuing the trials of speed of trotting and running horses was taken up, but without practical result; the premiums being allowed to stand the same as in 1870.

The statement that such trials were deemed objectionable by some was met by the counter-statement, that, as managed by this society, they were not open to the common objection of "immoral influence;" that, as a means of testing the quality of blood, thus affording incidental encouragement to breeders of thorough-breds and other superior horses, they were legitimate and important; and that, as a means of attracting and entertaining the public, and so fulfilling the two-fold office of bringing many who would not otherwise attend our fairs under the influence of instructive examples, and of securing to the society the funds required for the encouragement of industry in all its departments, they were indispensable.

At this stage in the proceedings the board were waited upon by a committee from the State Horticultural Society, expressing the desire of that body to continue in friendly co-operation with this society in the holding of the annual exhibition of fruits and flowers, and proposing to be responsible for the immediate management of this department and for the offer and payment of premiums therein, provided the Board of Agriculture would appropriate to their society a liberal sum for this purpose. The committee further represented the wishes of the horticultural society by requesting that, in case any increase should be made by the board in the aggregate of the premiums offered by them, there should be a corresponding increase in the amount heretofore appropriated to the horticultural department.

On motion of the secretary, the proposition of the committee was received and laid on the table for subsequent consideration.

Adjourned to meet again at 2 o'clock P. M.

WEDNESDAY, Feb. 8—2 o'clock, P. M.

The board met as proposed at 2 o'clock.

Present—all the members in attendance during the first session.

Consideration of premium list resumed.

In the cattle department there were several propositions to amend the list of 1870; one to increase the prizes offered on Devons, Ayrshires, and Alderneys, which gave rise to a somewhat lively discussion.

On the one side it was maintained that the breed best adapted to Wisconsin, all things considered, was the Durham, and that it should therefore be more especially encouraged; that the Devons, though superior as *working* cattle, were not so valuable for beef or milk, and hence could not be considered so valuable for our use.

On the other hand, it was urged that the beef-producing qualities should not of themselves overrule every other consideration; that the Durham had but little if any advantage over the Devon as a *milker;* while in other respects the latter breed was superior to the former; and finally, that so long as there seemed to be an honest difference of opinion—a fact sufficiently evidenced by the exclusive attention given to the breeding of Devons by some of the most enterprising and successful stock men of the state—it was not the true policy for the State Agricultural Society to make any difference.

In support of this general statement of policy and duty on the part of the society, it was urged by the secretary, that, while there was at present a manifest tendency towards an increase of the dairy business in Wisconsin, and the society had given its encouragement directly to this interest; and while, moreover, it was generally conceded by those best informed on this subject, that the Ayrshire excelled all other breeds in the quantity of milk, as did the Alderneys in quality, no proper encouragement had hitherto been given to either of these breeds.

The result of the discussion was (1) an increase in the number of premiums offered in each of the classes--a new premium being offered for both bulls and cows four years old and over, instead of beginning with three year olds, as in 1870, two sets of premiums being offered on calves of each sex, namely, one on calves six months and under twelve, and one on calves under six months—(2) a general increase of the premiums on the younger animals, in all the classes; and (3) a reduction of the premiums on Devons, Ayrshires and Alderneys of three years old and over to one-half the amount offered last year.

The premiums on milch cows were increased by fifty to one hundred per cent.

The sweepstakes premiums on herds were increased to $100 for the first and $50 for the second, and sweepstake prizes, first and second, were also agreed on for bull of any age, cow or heifer of any age, and five calves, male and female, under one year old.

In the sheep department the premiums were allowed to stand substantially the same as last year, except that the class of long wool sheep was divided into "Long Wool—Leicesters, and Long Wool—not Leicesters."

The discussion of premiums for the classes of swine was made more than usually interesting by a proposition from Messrs. Plankinton & Armour, Layton & Co., James F. Wooley, L. Farlin, Van Kirk & Geoch, pork-packers of Milwaukee, offering the society the handsome sum of $500 to be awarded, by a committee of its appointment, in the following premiums:

Best boar of any age, $100.
Best sow of any age, $100.
Best six pigs under 6 months, $100.
Best fatted hog for packing purposes, $50.
Best boar or sow of any age or breed, with five pigs of same breed, not over 7 months old, (exclusive of animals awarded any of the premiums above named,) $100.
Second best, $50.

On motion of Mr. Ludington, through whom it was made, this proposition was accepted with thanks and many expressions, on the part of individual members, of high appreciation of the spirit of liberality which prompted it.

In the poultry department many premiums not heretofore offered were added to the list.

In the agricultural department no material changes were made, except by the addition to the society's list of the following special premiums on wheat, generously offered by the Milwaukee Chamber of Commerce:

Best bushel winter wheat, $25.
Best bushel spring wheat, $25.

The premiums on household products, including sealed and preserved fruits and pickles, were considerably multiplied.

The department of fruits and flowers having been reached, Mr. Hoyt expressed the desire that there should be a continuation of the good feeling and active co-operation which had so long existed between the agricultural and horticultural societies, and moved the acceptance of the proposition made through their committee, with the concession of such increase in the amount of premiums authorized as to the board should seem proper; such acceptance being conditioned, however, upon the offering by the said horticultural society of cash premiums aggregating an amount equal to the amount appropriated to it for such use.

Which motion was seconded by Mr. Stilson, and adopted unanimously.

On motion of Mr. Stilson, seconded by both Messrs. Field and Taylor, the amount of the horticultural appropriation was fixed at $800.

In the department of machinery and implements no changes were made, further than that the liberal offer, by Messrs. Pierce & Whaling, iron merchants of Milwaukee, of the following special premiums on plows was accepted:

Best steel crossing plow, $50.
Second best, $25.
Limited to the states of Iowa, Minnesota, Michigan and Wisconsin.

The question was raised whether the board should not revive the former policy of offering general premiums in this department the same as in others. But the simultaneons declaration by several members of the almost universal satisfaction given by the present method, promptly settled all doubts on this point. The exhibitors in this department are so almost invariably manufacturers for the market that the opportunity to advertise their machines and implement through the medium of the state fair, without danger of being damaged by an injudicious report of a committee, was esteemed by them as of more value than the premium, should they each be so fortunate, now and then, as to get one.

In the department of manufactures, a number of changes were made, none of which, however, were of sufficient importance to render their publication in these Transactions important. In the class of carriages, etc., the generosity and enterprise of Messrs. Pierce and Whaling enabled the society to offer the following special premiums on farm wagons:

Best farm wagon, $50.
Second best, $25.
Limited to the States of Iowa, Minnesota, Michigan and Wisconsin.

This second offer of the above-named gentlemen making an aggregate on plows and wagons of $150, laid the society under new obligations, which were duly acknowledged.

In the department of fine arts, the premiums were largely increased in number and importance, and the list was made still more attractive to the youthful artist by the following handsome offer of Mrs. Alexander Mitchell, to whose great liberality in granting the loan of many valuable works of art, and in favoring the superintendent with her counsel and co-operation in many ways, the gratifying success of this department in 1870 was so largely due:

Best Original Drawing (from nature) by person under 20 years, Silver Medal.
Judges—To be supplied.

When the board entered upon the old battle ground of Division D, which, since the abolishment of that other farce, the "plowing match," had been almost wholly given up to ladies' riding, base ball, and other displays and performances of like character, the spirit of revolution was manifest in more than one countenance.

"These things afforded innocent amusement for the people and they helped to swell the society's receipts. Why discard them?"

"How do you know," replied the other party, "that they are innocent. They are not only foreign to the work of an industrial organization, but they are in bad taste, especially the ladies' riding, as a public exhibition, and lower the dignity of a great state agricultural society; and whatever is in bad taste and tends to degrade the society is not an innocent entertainment for us. Again, how do you know that it so immensely 'swells the society's receipts?' When has the society tried doing without all this humbuggery. How do you know but that the people are tired of it and would be glad to see in Wisconsin more of a straight-out, thorough-going, legitimate and dignified exhibition, in every respect worthy of an intelligent people and of a society which now claims honorable rank among the most successful in the United States?"

Thus the argument ran; and when the vote to abolish the ladies' riding and all sporting games, and to transform Division D for the time into a department of natural history for the showing of the natural products of the state, every member said "aye."

On motion, the board adjourned to meet at 7 1-2 o'clock in the evening.

WEDNESDAY, February 8, 7½ o'clock P. M.

The board re-assembled at the appointed hour.

Present—same members as before.

President Hinkley in the chair.

The secretary desired to make a communication to the board, the subject of which was personal to himself. At the meeting held in February, 1870, he had tendered to the board an informal resignation of the office of secretary, both on the ground of the inadequacy of his salary, and because he had received calls to other fields of labor which were equally congenial to his tastes and would yield him double the income he was at present receiving. The board, on that occasion, manifested so great a reluctance to his severing his connection with the society to whose work he had been so long devoted, and were so ready to extend to him the privilege of adding to the income he derived from the society by making and fulfilling other engagements either within or outside of Wisconsin, that, in pursuance of a motion submitted by Ex-governor Dewey and unanimously adopted, which officially confirmed to him this privilege, he withdrew his resignation and consented to remain in the discharge of his duties at least another year. That year had passed. With it there came the double burden of regular duties here and extra duties belonging to the management of the Chicago Historical Society. He had endeavored to perform the duties of both positions faithfully, and had received the approval of both organizations. But this performance of double duty, at places more than a hundred miles apart, had brought a double strain upon his physical health, as well as double revenue, and he ought not to continue it indefinitely—especially as still other public duties, including the management of the Wisconsin Academy of Sciences, etc., claimed his attention here at home.

In view of all these considerations he had, with some natural reluctance, made the decision again to ask the board to release him from the duties of secretary of the society.

From this proposition of the secretary there appeared very general dissent, which was expressed by several of the members in terms as gratifying to him as they were creditable to the generous impulses of those who employed them.

Whereupon, Mr. Eaton offered the following resolution, prefaced with remarks, deprecating the retirement of the secretary:

"*Resolved*, That the salary of the secretary of this society is hereby increased to three thousand dollars, said increase to date from January 1st of the present year, and the said amount to cover all such assistance as he may procure, except during the week of the fair."

In order that there might be the utmost freedom in the discussion of this resolution and of his resignation, the secretary temporarily retired from the board. Upon his return, he was informed that the resolution had been unanimously adopted, and that it was the hope of the board that this action would induce him to remain yet longer in the service of the society. In a few remarks, the secretary expressed his high appreciation of the many kind expressions of interest and good will on the part of members of the board, as well as for their generous resolution to increase his compensation, and concluded by declaring his willingness to accede to their request.

Mr. Stilson offered the following resolution:

"*Resolved,* That the thanks of this society and of the state are due to our secretary, Dr. J. W. Hoyt, for the large and valuable collection of mineral, agricultural and various products of nature and the arts, which, with great labor at home, and in foreign travels, and with the expenditure of considerable sums of money from his own personal funds, he has gathered and placed in these rooms for the public use.

"*Resolved, further,* That, on reflection, we regret the action of the society at the late December meeting, in relinquishing its interest in said collections in favor of the Wisconsin Academy of Sciences, Arts and Letters, and that we request Dr. Hoyt to defer any official communication to the academy of the said action of the society until it first be determined whether the society may not, in some manner mutually satisfactory, itself acquire a full and permanent interest in the proprietorship of said collections.

"*Resolved,* That the president is hereby requested to appoint a committee of three members of this board to confer with Dr. Hoyt on this whole subject, and ascertain upon what conditions the said interest and proprietorship may be so acquired."

Which, on motion of Mr. Eaton, was adopted.

The president, in pursuance of the resolution, appointed Messrs. Eli Stilson, W. W. Field and W. R. Taylor to act as said committee.

Mr. Eaton offered the following resolution:

"*Resolved,* That the state fair for 1872 be held in the city of Milwaukee: *provided,* that the citizens of said place shall make such improvements and additions to the fair grounds heretofore occupied, as the executive board of the society may require; said improvements and additions to be made previous to the fair of 1871."

Which, after some discussion, was unanimously adopted.

On motion, the board adjourned to meet at 9 o'clock the following morning.

THURSDAY, February 8—9 o'clock A. M.

The board met pursuant to adjournment.

The president, on taking the chair, called attention to the great importance of the duties next in order—the selection of officers and judges for the fair—and urged that all members apply themselves to the work closely, since it was the desire of some that there should be a final adjournment of the board in time to allow of their leaving for home by the noon train.

A motion was made and carried to proceed first to the appointment of general officers and superintendents.

The secretary and treasurer were held to be controllers of the office of entry and of the ticket office, respectively, *ex officio*.

Mr. Hoyt nominated vice-president Wm. R. Taylor, who had so long and so efficiently served the society in that important position, as chief marshal, with authority to choose his own assistants; which nomination was seconded, and unanimously carried.

Mr. Taylor thanked the gentlemen who had kindly favored him for that position, and the board for endorsing their recommendation, but asked to be excused on the ground that the duties were exceedingly laborious, and, if discharged, as he would wish to discharge them, self sacrificing to a degree not easily understood by those upon whom they had never been devolved. He would very much prefer that some other person should be chosen in his stead.

The board refused to excuse him, however, and he at length consented to serve.

Other nominations were made in succession for the several positions to be filled and the list was finally completed as follows:

Marshal—Wm. R. Taylor, vice-president.
Superintendent of Gates—N. D. Fratt, member of the board.
Superintendent of Horse Department—N. S. Greene, member of the board.
Superintendent of Cattle Department—C. H. Williams, vice-president.
Superintendent of Sheep Department—Eli Stilson, vice-president.
Superintendent of Swine and Poultry Department—J. H. Warren, member of the board.
Superintendent of Agricultural Department—W. W. Field, member of the board.

Superintendent of Fruit and Flower Department—To be supplied by State Horticultural Society.
Superintendent of Machinery Department—Rufus Cheney, vice-president.
Superintendent Department of Manufactures—Saterlee Clark, vice-president.
Superintendent Department of Fine Arts—J. O. Eaton, member of the board.
Superintendent of Natural History Department—I. A. Lapham, member *ex-officio* of the board.
Ticket Accountant—D. H. McArthur.

On raising the question, whether the policy of the board, as to the appointment of judges for the several classes of the exhibition, which had been adopted at the meeting of 1870, should be continued, there seemed to be a pretty general concurrence in the opinion that the selection of fewer judges, pledged to attend and devote themselves to the work of the society, had yielded quite as satisfactory results as the former method of appointing a full set for every class; and accordingly, it was again tried by common consent.

The board then proceeded to a canvas of all portions of the state, with the view, first, of finding competent persons who would be likely to serve on the committees, and secondly, of giving them as fair and equal a distribution as possible in the various sections of the state; continuing in this work until such selections had been made as seemed most judicious for each of the several groups of classes.

The accounts of the several members for expenses in attending this meeting, having been audited, on motion, the board adjourned *sine die.*

PLANKINTON HOUSE,
MILWAUKEE, Monday, September 25, 1871.

The executive board of the Wisconsin State Agricultural Society met in the elegant office generously prepared for them by Mr. J. P. C. Cottrill, propietor of the Plankinton House, at seven o'clock P. M.

Present—Messrs. B. R. Hinkley, president; H. Ludington, Wm. R. Taylor, Rufus Cheney, Eli Stilson, Saterlee Clark, N. S. Greene, N. D. Fratt, C. H. Williams, J. O. Eaton, C. L. Martin, J. H. Warren, John L. Mitchell, W. W. Field and J. W. Hoyt.

President Hinkley in the chair.

The president made a general statement of what had been done in the way of improving the grounds; of the liberal part performed by the citizens of Milwaukee; of certain embarassments growing out of the double use of the hall of fine arts and the probable want of room for the accommodation of all who would wish to exhibit therein; of the enlargement of each of the halls proper by an addition of fifty feet; the large increase in the number of stalls for horses and cattle, already full of stock, and of the unprecedented demand for pens for swine and coops for poultry.

The secretary stated that the entry books warranted the opinion that the demands for space would necessitate, either additional constructions or a more compact arrangement of articles than had ever been necessary heretofore, and that large numbers of swine and a considerable number of cattle were confidently expected—in short, that the exhibition of 1871 promised to be much the largest ever held by the society, and that superintendents should plan accordingly.

Several questions of either local or temporary interest were raised and settled.

The board then adjourned, to meet each succeeding evening during the continuance of the fair, except Thursday—the evening devoted to the election of officers of the society for 1872.

OFFICE OF THE SOCIETY, PLANKINTON HOUSE,
MILWAUKEE, Sept. 26 and 27, 1871.

The executive board met, in their office at the Plankinton House, on each of the dates above named, at 7 1-2 o'clock, for the consideration of all questions that might arise concerning the fair. But, as the business transacted was entirely temporary in its nature and bearing, it is not deemed important to place a report of it on the permanent record of the society.

OFFICE OF THE SOCIETY, PLANKINTON HOUSE.
MILWAUKEE, Sept., 29, 1871.

The board met at 7 o'clock P. M., and resolved itself into an auditing board for the settlement of claims and the payment of premiums.; continuing in session until 10 o'clock.

Adjourned to meet the following (Saturday) morning at 8 o'clock.

OFFICE OF THE SOCIETY, PLANKINTON HOUSE,
MILWAUKEE, Sept., 30, 1871.

The board met at the appointed hour and continued in the work of paying bills and premiums, with an intermission between 1 and 2 o'clock P. M., until 3 1-2 o'clock P. M., when an adjournment was taken until October 13th; the treasurer having occasion to be absent from the state until about that date.

OFFICE OF H. LUDINGTON, TREASURER OF THE SOCIETY,
MILWAUKEE, October 13, 1871.

Pursuant to adjournment, B. R. Hinkley, president, Harrison Ludington, treasurer, met at the office of the treasurer in Milwaukee, to resume the payment of local accounts and premiums. The secretary having found it necessary to visit Colorado soon after the conclusion of the fair, and having found it impracticable tc reach home in time for this meeting, was represented by his assistant, Mr. F. W. Case, acting in the capacity of chief clerk.

The session continued throughout the day, when an adjournment was taken to October 26th.

OFFICE OF H. LUDINGTON, TREASURER OF THE SOCIETY,
MILWAUKEE, October 26, 1871.

Messrs. B. R. Hinkley, president, Harrison Ludington, treasurer, and J. W. Hoyt, secretary, met pursuant to adjournment, in the office of the treasurer at Milwaukee, on the morning of the 26th of October, and resumed the work of paying local bills and premiums; notice of their purpose to do so having been given through the press of the city.

The secretary came prepared to deliver diplomas and medals to citizens of Milwaukee and vicinity, who were entitled to them, and many were so delivered.

At 4 o'clock P. M., applications having ceased, the board adjourned *sine die*.

DECEMBER MEETING.

STATE AGRICULTURAL ROOMS,
MADISON, December 5, 1871.

The executive board met pursuant to requirement of the by-laws, on December 5th, (being the day next preceding the date of the annual meeting of the society,) at 7 1-2 o'clock P. M.

President B. R. Hinkley in the chair.

The attendance being small and additional members being expected on the night trains, an adjournment was taken until 9 o'clock the next day.

WEDNESDAY, Dec. 6, 1871.

The board met pursuant to adjournment.

Present—Messrs. B. R. Hinkley, president, Harrison Ludington, Wm. R. Taylor, J. O. Eaton, Saterlee Clark, W. W. Field, and J. W. Hoyt.

President Hinkley in the chair.

Mr. Hoyt produced the order books, bills, vouchers, etc., together with his personal account with the society as secretary; and Mr. Ludington, treasurer, presented a full report of the orders paid by him during the year; all of which, on motion, the board, as a committee of the whole, proceeded to examine and compare.

The following is the personal account of the secretary so presented:

WISCONSIN STATE AGRICULTURAL SOCIETY IN ACC'T WITH J. W. HOYT, SEC'Y.

Received from the Society during 1871.

Received on am't advanced on Bruen property ($2,529) and on loan, etc., ($775.58) as per audit of board (*see* Trans. 1870, p. 118)	$3,000 00	....
Received for use in advertising	500 00	....
Received on general account	3,433 25	....
Received in over-allowance to F. W. Case and Geo. W. Stoner, clerks	44 00	....
Total of receipts	———	$6,987 25

Accounted for by Secretary.

Amount advanced by secretary on Bruen property (*see* Trans. 1870, p. 118)	$2,529 00	....
Amount due on loan (*see* Trans. 1870, p. 118)	775 58	....
Amount expended in advertising	313 00	....
Amount of travelling expenses	50 00	....
Amount of salary, for 1871	3,000 00	....
Balance of advertis'g and other society moneys in hand, and cheque for which is herewith presented	319 67	....
Total of amount due and expended	———	$6,987 25

The annual report of the treasurer [for a full account see minutes of annual meeting of the society] showed the amount of receipts during the year to have been $27,747.48; the amount of expenditures (ncluding payment of indebtedness to J. W. Hoyt for money loaned by him to the society and advanced on the Bruen property,) $21,793.48; and the balance on hand to be $5,954.00.

All of which accounts of the secretary and treasurer were found correct and approved by a unanimous vote of the board.

Mention was made by the president and other members of the board of the valuable assistance received from Mr. Beck, chief of police of Milwaukee, at the late fair; and a motion was made, seconded and unanimously carried, tendering to him the thanks of the board, together with the grand silver medal of the society, and fifty dollars, as an expression of their appreciation of the valuable and efficient services rendered the society by him on that occasion.

On motion, the board then adjourned *sine die*.

SOCIETY MEETINGS.

MEETING FOR THE ELECTION OF OFFICERS.

CITY HALL, MILWAUKEE, September 28, 1871.

Pursuant to requirement of the constitution, and to notice published in accordance therewith, a large number of the life members of the Wisconsin State Agricultural Society convened at the city hall in Milwaukee for the purpose of electing officers of the society for the year 1872.

President B. R. Hinkley in the chair.

President called the meeting to order, and stating that the object of the meeting was to elect officers for the ensuing year, asked what was the pleasure of the society.

Mr. T. C. Dousman, of Waukesha, moved that a committee of seven—one from each congressional district and one from the state at large—be appointed by the president to nominate officers for the year.

Motion seconded and adopted.

President appointed T. C. Dousman, H. L. Palmer, Anson Rogers, C. Hœflinger, J. H. Warren, Eli Stilson and Benjamin Ferguson.

During the absence of the committee Secretary Hoyt gave a report of the financial condition of the society for the preceding year.

Mr. S. B. Davis, of Milwaukee, called for a report of the present condition of the treasury, and moved that the treasurer be instructed to present his report.

Secretary Hoyt stated that it would be impossible to give the items in detail without reference to the books of both secretary and treasurer, which were not at hand.

Treasurer Ludington said that the annual meeting in December was the time appointed for him to make his report; that he could not report at this meeting, except in general terms. He stated that he had at his office orders showing the amount and objects for which the money was drawn, and that his books were open at any time to the inspection of members.

The President remarked that it was not in order to call for the report of the treasurer at this meeting, as it was not the time regularly appointed.

Hon. Sat. Clark moved that hereafter the treasurer be instructed to present a report of the condition of the treasury at the annual meeting for the election of officers.

Seconded by Mr. Davis.

Treasurer Ludington moved, as a substitute, that hereafter the Treasurer's report as presented at the annual meeting, be printed, and that a copy be sent to each life member.

Substitute accepted and motion, as amended, carried.

The committee on nominations reported, for

President.—B. R. Hinkley of Waukesha.

Vice Presidents.—First Congressional District, Rufus Cheney of Walworth; Second Congressional District, W. R. Taylor of Dane; Third Congressional District, C. H. Williams of Sauk; Fourth Congressional District, Benjamin Ferguson of Dodge; Fifth Congressional District, Eli Stilson, of Winnebago; Sixth Congressional District, John T. Kingston Juneau.

Secretary.—Sat. Clark of Horicon.

Treasurer.—Harrison Ludington of Milwaukee.

Mr. Clark enquired why his name was presented as candidate for secretary.

Mr. E. W. Keyes remarked that many other members were quite as much surprised at the report as was Mr. Clark, and asked whether he declined the nomination.

A motion was made by E. Elderkin to refer the report back to the committee, with instructions to substitute the name of J. W. Hoyt for that of Mr. Clark.

Mr. Keyes moved that the report be laid upon the table, and that the meeting proceed to the election of officers by ballot, as the constitution required. Whereupon some discussion arose as to what the requirements of the constitution were in this regard; which question was settled by the secretary's showing from the constitution itself, as revised, that the *ballot* was not indispensable.

Dr. C. L. Martin seconded the motion of Mr. Keyes, and sustained the proposition by complimentary reference to the great service rendered to the society by Dr. Hoyt during the darkest period in its history, and to the high and honorable position to which it had been brought chiefly through his ability and his devotion to its interests.

Further remarks of like character were made by Mr. J. O. Eaton and others.

Mr. Dousman, chairman of the committee on nominations, stated that he knew of no objection to Dr. Hoyt, that the reason, and the *only* reason named in the committee why the nomination of any other person should be considered, was that the compensation demanded by him, and which had been accorded to him by the board, was greater than the society ought to pay its secretary.

Mr. Hoyt thereupon stated as facts, first, that although he assumed the duties of secretary when the salary was but one thousand dollars, and for the greater portion of the eleven years of his service had received a very small and totally inadequate compensation, he had never demanded or even asked for an increase—that he had "demanded" *nothing.* He accepted the position in the first place at the earnest request of prominent members, and as the unanimous choice of those present and voting, and with one exception he had been unanimously designated for the office at each subsequent election. He had never sought the place or desired it. On the contrary, he had twice, within the past two years, expressed a desire to be relieved, and only remained at the solicitation of the executive board. The salary had been advanced to three thousand dollars without solicitation or suggestion on his part, and had been accepted with reluctance—notwithstanding his great interest in, and attachment for the society—in view of the inducements which had been offered him to make other engagements, much more satisfactory in a pecuniary point of view.

Mr. E. D. Holton followed with words of the most cordial commendation of the secretary, not only on the ground of the energy and ability, he had always shown in the management of the society's practical affairs, but likewise because of the enviable reputation he had won for it by his valuable contributions to the agricultural literature of the country. The society could hardly afford to dispense with that order of talent. He therefore moved, with due respect for Mr. Clark, that his name be stricken from the list of names reported by the committee, and that the name of J. W. Hoyt be substituted therefor.

Which motion was seconded by Mr. Keyes, and carried.

Mr. Ferguson moved that his own name as candidate for vice-president be erased, and that the name of Mr. Clark, the present incumbent for the fourth congressional district be substituted.

Motion seconded by E. W. Skinner, and carried.

On motion, the report of the committee as thus amended was then adopted without dissent.

The president declared the several nominees duly elected to the offices for which they had been named respectively, and

On motion the society adjourned *sine die.*

ANNUAL MEETING OF THE SOCIETY.

STATE AGRICULTURAL ROOMS,
MADISON, December 6, 1871—3 o'clock P. M.

The society met pursuant to constitutional provision and due notification through the press.

Quorum present.

The president, B. R. Hinkley, on assuming the chair, announced that the object of the meeting was the annual settlement with the treasurer, by an examination of his accounts and a comparison of them with the records and vouchers in the office of the secretary.

The treasurer's report was then submitted, bearing the approval of the executive board, by whom it had been carefully examined in detail.

REPORT OF THE TREASURER.

To the Executive Board of the Wisconsin State Agricultural Society:

The financial transactions of the Wisconsin State Agricultural Society, for the year 1871, have been as follows:

1870.	RECEIPTS.		
Dec. 7.	To cash received from D. Atwood, former treasurer...		$9,717 77
1871.			
Sept. 26.	To cash from pork packers of Milwaukee, for special premiums..........	$500	....
	Cash from Milwaukee Chamber of Commerce, for special premiums..........	50	....
			550 00
	Amount received for 14 life memberships.........		280 00
	Entry fees at fair..........		897 00
	Ground rent collected at fair..........		1,950 21
	Gate fees..........		13,942 66
	Grain sold at fair..........		90 17
Dec. 6.	To advertising and other funds unexpended, returned by secretary..........		319 67
			$27,747 48

EXPENDITURES.

By cash paid on orders this day (Dec. 6,) returned and cancelled, said orders covering the following general disbursements:—

For premiums	$7,109 29
Office expenses, including postage, expressage and freight	243 22
Expenses of members attending meetings of the board	386 25
Printing and advertising	1,186 26
Superintendence at the fair	1,448 40
Clerical service	480 91
Labor, police and watch at the fair	1,785 50
Forage used at the fair	947 12
Omnibus hire and livery at the fair	120 00
Refreshments for officers, judges, guests and help	666 10
Music at fair	175 00
Expenses of machinery for power hall	326 14
Incidental expenses of the fair	149 58
Miscellaneous expenses, including orders 1, 12, 62, 68, 75, 381 and 394½	190 05
Salary of secretary, and $138.67 for incidental purposes and afwards returned	3,138 67
Payments and interest on lands purchased	2,665 50
Amount due the secretary on loan of 1869, and indebtedness of 1870	775 58
	$21,793 48
Balance on hand	$5,954 00

All of which, together with the vouchers for the several sums paid, is respectfully submitted.

HARRISON LUDINGTON, *Treasurer.*

MADISON, Dec. 6, 1871.

The secretary moved that a committee of three life members, not including any members of the executive board, be appointed to examine the report of the treasurer, and report thereon as early as practicable.

The motion was carried, and the president appointed Messrs. S. D. Hastings, David Atwood and A. H. Main to perform the duties of said committee.

Mr. Field moved an adjournment until 7 1-2 o'clock p. m., at which time he hoped the committee would be prepared to report.

The secretary asked the temporary withdrawal of the motion that he might make a statement in regard to an amendment to the constitution, proposed by Mr. Saterlee Clark, vice president, at the annual meeting in 1870, and now on file in the secretary's office.

The amendment, of which notice had been given by Mr. Clark in effect required that the "seven additional members" of the executive board (additional to the general officers, including the president, vice presidents, secretary and treasurer), should also be distributed in like manner as the vice presidents are now distributed, by congressional districts. Said amendment would be warmly supported by Mr. Stilson and some other members, if they were present, as he knew by letters received, which strongly urged its adoption. Unfortunately, however, Article VI. of the constitution requires that all propositions to amend that instrument shall "be read by the secretary in the next succeeding meeting for the election of officers." At the late meeting for the election of officers, the reading of Mr. Clark's proposed amendment was omitted by oversight, and could not therefore be constitutionally acted upon at this meeting. He regretted this omission.

Mr. Field having renewed his motion, the board then adjourned to meet again at 7 1-2 o'clock.

WEDNESDAY, December 6, 1871—7½ o'clock, P. M.

The society met pursuant to adjournment to receive the report of the committee appointed to examine the treasurer's report.

Quorum present.

President Hinkley in the chair.

On behalf of the committee, Mr. Hastings presented the following report:

[Copy.]

To the Wisconsin State Agricultural Society:

The undersigned, the committee to whom was referred the report of your treasurer, would respectfully report that they have made as full an examination of the report and accompanying papers as the limited time at their command would allow, and they find that the treasurer has vouchers for all the money he claims to have paid out, and we find corresponding stubs on the order-book for all the orders paid by the treasurer.

We have no doubt but the accounts of the treasurer have been carefully kept, and that he has accounted for all the money that has been placed in his hands.

(Signed) SAM'L D. HASTINGS,
DAVID ATWOOD,
A. H. MAIN,
Committee.

MADISON, Dec. 6, 1871.

On motion, the report of the committee was received and unanimously approved.

Secretary submitted a full account of all warrants drawn by him on the treasurer during the year 1871, with the name, object, and amount of each order.

Which, on motion, was ordered to be printed with the treasurer's report.

On motion, the society then adjourned *sine die.*

The following is the warrant account of the secretary referred to above:

WARRANT ACCOUNT OF THE SECRETARY;

Giving the name of the person for whom, and the object and amount for which each order, issued by the secretary for the year 1871, *has been drawn.*

No. Ord.	To whom and for what issued.	Amount.
300	(Old series), E. W. Keyes, P. M., postage stamps	$10 00
1	D. Atwood, counterfeit money received at fair, 1870	38 75
2	W. W. Field, expenses at December meeting	11 60
3	Eli Stilson, expenses at December meeting	15 45
4	N. S. Greene, expenses at December meeting	11 00
5	B. R. Hinkley, expenses at December meeting, and money paid out as per bill rendered	85 70
6	Sat. Clark, expenses at December meeting	15 00
7	Rufus Cheney, expenses at December meeting	13 00
8	C. Loftus Martin, expenses at December meeting	9 30
9	J. G. Thorp, expenses at December meeting	25 00
10	Wm. R. Taylor, expenses at December meeting	6 00
11	L. B. Vilas, expenses at December meeting	6 00
12	J. C. Gregory, drawing mortgage and stamps for same	10 00
13	J. H. Stocker, medal cases	18 25
14	Chas. Andrews, hotel expenses of secretary at fair, 1870	29 50
15	F. W. Case, clerical services, (1870)	99 16
16	A. D. Seaman & Co., use of furniture, (1870)	8 20
17	Bloedel & Mueller, medals	308 50
18	J. W. Hoyt, to apply on salary, 1870	43 25
19	W. F. Storey, advertising, (1870)	24 00
20	J. W. Hoyt, payment of principal and interest on land, and money loaned	3,000 00
21	J. W. Hoyt, to apply on salary	20 00
22	J. W. Hoyt, to apply on salary	281 50
23	J. W. Hoyt, to apply on salary	98 50
24	E. W. Keyes, postage stamps	4 00
25	W. S. Wescott, premium, (1869)	10 00
26	Wm. R. Taylor, superintendence and money advanced at fair, (1869)	51 40
27	L. M. Bevier, labor at fair, (1870)	17 50

Secretary's Warrant Account—continued.

No. Ord.	To whom and for what issued.	Amount.
28	Giles, Bro. & Co., silver ware for prizes	$35 00
29	Fredrickson & Sorenson, rollers for diplomas	3 00
30	J. W. Hoyt, balance of indebtedness of 1869, and salary, (1871)	500 00
31	C. E. Bross, agent, express charges	4 80
32	E. W. Keyes, P. M., box rent and postage	5 72
33	B. M. Worthington, filling out diplomas, (1870)	4 00
34	B. R. Hinkley, livery at fair, (1870)	10 00
35	Geo. R. Cook, engraving medals, (1870)	33 85
36	W. J. Park & Co., stationery	12 38
37	W. Ramsey & Co., scissors for office	1 75
38	E. W. Keyes, P. M., postage stamps	10 00
39	C. E. Bross, express charges	1 75
40	V. Beck, hauling shafting, etc	3 00
41	R. Cheney, expenses at February meeting	15 00
42	L. B. Potter, premium, (1870)	15 00
43	T. L. Fink, premium, (1870)	3 00
44	Stephen Warren, premium, (1870)	20 00
45	C. Cook, premium, (1870)	22 00
46	N. S. Greene, expenses at February meeting	15 00
47	J. O. Eaton, expenses at February meeting	17 00
48	C. Loftus Martin, superintendence at fair, (1870)	25 00
49	B. R. Hinkley, expenses at February meeting	15 00
50	N. D. Fratt ....do..........do	16 00
51	C. Loftus Martin .....do..........do	15 00
52	Eli Stilson..........do..........do	15 00
53	J. H. Warren..........do..........do	21 20
54	Wm. R. Taylor..........do..........do	12 00
55	H. Ludington ....do..........do	16 00
56	J. L. Mitchell ....do..........do	16 00
57	W. W. Field..........do..........do	15 00
58	E. W. Keyes, P. M., postage stamps	10 00
58½	J. W. Hoyt, salary (balance of first quarter)	250 00
59	J. W. Hoyt, salary	750 00
60	C. E. Bross, express charges	2 95
61	E. W. Keyes, box rent	2 50
62	D. Clark, repairing office chair	6 60
63	E. W. Keyes, postage stamps	20 00
64	J. B. Parkinson & Co., printing	4 00
65	C. E. Bross, express charges	1 60
66	George A. Bruen, interest on amount due on land	136 50
67	C. E. Bross, express charges	3 55
68	J. H. Klippart, electrotypes for transactions	18 25
69	E. W. Keyes, postage stamps	30 00
70	Wm. Pyncheon, drayage and freight	4 10
71	E. W. Keyes, postage stamps	20 00
72	J. W. Hoyt, salary	759 00
73	E. W. Keyes, postage stamps	10 00
74	Moseley & Bro., stationery for office	5 60
75	F. W. Case, transactions to complete set	9 20
76	C. E. Bross, express charges	1 70
77	E. W. Keyes, postage stamps	15 09
78	J. W. Hoyt, advertising fund (in part returned to Treas.)	500 00
79	E. W. Keyes, postage stamps	8 00
80	Cramer, Aikens & Cramer, advertising	15 00

Secretary's Warrant Account—continued.

No. Ord.	To whom and for what issued.	Amount.
81	P. V. Deuster, advertising	$5 00
82	C. E. Bross, express charges and dispatches	4 95
83	E. W. Keyes, postage stamps	9 00
83½	S. Ruble premiums	70 00
84	J. J. Pellett, premiums	13 00
85	G. H. Daubner, premiums	30 00
86	A. W. Barber, premiums	1 00
87	F. S. Capron, premiums	45 00
88	N. S. Austin, premiums	15 00
89	N. Stearns, premiums	5 00
90	D. W. Rowlands, premiums	25 00
91	J. Bush, premiums	8 00
92	Wm. J. Smith, premiums	30 00
93	D. H. Donnan, premiums	40 00
94	T. B. Rowlands, premiums	15 00
95	W. Leroy, premiums	20 00
96	George Lawrence, premiums	38 00
97	J. C. Owen, premiums	20 00
98	Thomas Davis, premiums	27 00
99	H. W. Hewitt, clerk	20 00
100	G. N. Lyman, premiums	30 00
101	Wm. Reid, premiums	18 00
102	J. N. Smith, premium	70 00
103	A. Clark, premium	30 00
104	J. L. Owen, premium	55 00
105	E. Porter, premium	100 00
106	J. L. Owen, premium	60 00
107	E. P. Brockway, premium	465 00
108	J. Taylor, premium	155 00
109	C. H. Hall, clerical service	15 00
110	Matt. O'Neil, premium	90 00
111	McFetridge, Burchard & Co., premium	10 00
112	Geo. Wolf, premium	12 50
113	W. Kitzrow, premium	38 00
114	Henry Luhring, premium	10 00
115	Mrs. M. Stackhouse, premium	2 00
116	J. F. Burchard, premium	5 00
117	J. C. Corrigan, premium	125 00
118	W. D. McIndoe, premium	30 00
119	Severance & Williams, music at fair	175 00
120	H. G. Roberts, premium	8 00
121	Mrs. W. P. Lynde, premium	2 00
122	J. M. Hall, premium	15 00
123	John Jeffers, premium	50 00
124	(No order issued.)	
125	T. C. Smith, premium	45 00
126	Isaac Baldwin, premium	2 00
127	N. D. Fratt, for gate keepers	379 00
128	N. S. Greene, and assistant, superintendence at fair	68 00
129	Gilbert Adams, premium	27 00
130	C. H. Williams, superintendence at fair	36 00
131	H. R. Clark, assistant, superintendence at fair	24 00
132	(No order issued.)	
133	Fred. Moody, assistant, superintendence at fair	24 00
134	Sat. Clark, superintendence at fair	60 00
135	J. H. Warren, superintendence at fair	42 00

Secretary's Warrant Account—continued.

No. Ord.	To whom and for what issued.	Amount.
136	H. Hassler, shavings for halls	$12 00
137	John Hiles, shavings for halls	12 00
138	W. W. Field, superintendence at fair	54 00
139	R. Anderson, assistant, superintendence at fair	32 00
140	J. W. Dunlop, premium	16 00
141	H. W. Dunlop, clerical service	35 00
142	J. S. Wilcox, premium	2 00
143	R. & D. H. Cheney, superintendence at fair	84 00
144	N. D. Fratt, superintendence at fair	43 00
145	E. Fairbanks, premium	15 00
146	A. Marquis, assistant, superintendence at fair	15 00
147	J. O. Eaton, superintendence at fair	54 00
148	J. Van Etta, premium	27 00
149	C. C. & R. H. Parks, premium	400 00
150	R. H. Hewitt, assistant, superintendence at fair	16 00
151	J. Pollard, premium	38 00
152	W. T. Smith, premium	41 00
153	Wm. Simpson, premium	40 00
154	Mrs. W. O. Stillman, premium	4 00
155	P. B. Stewart, premium	3 00
156	G. C. Chaffee, premium	35 00
157	Thomas Davis, premium	5 00
158	Wm. Rhodes, premium	40 00
159	L. Eastman, premium	30 00
160	W. E. McClure, premium	10 00
161	W. R. Taylor, for assistant marshals, police, laborers, patrol, watchmen, night and day at fair, (26 men)	446 25
162	Geo. S. Haskell, premium	17 00
163	J. W. McCready, premium	15 00
164	H. H. Barnes, premium	112 50
165	Ed. Wheatley, premium	115 00
166	D. P. Myers, premium	2 00
167	E. M. DePuy, premium	13 00
168	A. B. Douglass, premium	180 00
169	A. Rainhard, premium	2 00
170	C. M. Phillips, premium	5 00
171	E. & J. Smith, premium	85 00
172	E. Elderkin, clerical service	35 00
173	F. Hartwell, clerk	25 75
174	D. H. McArthur, ticket accountant	36 00
175	J. Cochrane, water for track	40 00
176	Holmes & Mabbett, oats	139 27
177	John Corey, watchman	10 00
178	Alcott & Van Vracken, premium	8 00
179	Lee & Judson, premium	13 00
180	G. J. Kellogg, premium	39 50
181	B. R. Hinkley, for assistant superintendents and watchmen	281 50
182	A. Middlemass, premiums	2 00
183	Rodway, Smith & Co., premium	10 00
184	O. S. Willey and assistant, superintendence at fair	78 00
185	H. L. Stoltz, premium	5 00
186	W. T. Hay, Watchman	3 00
187	L. H. Hodges, premium	30 00
188	J. C. Plumb, premiums	5 00

Secretary's Warrant Account—continued.

No. Ord.	To whom and for what issued.	Amount.
189	Whitnell & Ellis, premium	$29 00
190	Byers & Campbell, premium	170 00
191	A. M. Stacey, premium	5 00
192	A. M. Stacey, premium	10 00
193	H. F. Orvis, premium	15 00
194	W. G. Benedict, premium	4 00
195	C. C. Dewey, premium	7 00
196	Reuben Strong, premium	3 00
197	Stephen Warren, premium	20 00
198	G. H. Lamberton, premium	23 00
199	Luther Rawson, premium	144 00
200	N. Bower, livery for president	4 00
201	J. C. Starkweather, premium	36 00
202	Welchselberg & Hyde, livery by Eaton	10 00
203	Wm. Gallun, premium	5 00
204	Trostell & Gallun, premium	5 00
205	J. Wing, premium	20 00
206	H. Lumb, premium	10 00
207	George Jeffrey, premium	10 00
208	B. R. Hinkley, services and money paid out during season	672 00
209	Wechselberg & Hyde, livery, by W. W. Field	7 00
210	Mrs. O.C. Meyers, premium	6 00
211	Luther Rawson, premium	15 00
212	J. C. Meacham, premium	10 00
213	J. H. Paul, premium	90 00
214	Copeland, Ryder & Co., premium	10 00
215	J. Stoddard, premium	85 00
216	Lydia Davis, premium	4 00
217	A. L. Boynton, horse for assistant marshal	16 00
218	A. Schneider, wood	9 50
219	George W. Stoner, clerical services	45 00
220	A. L. Boynton, premium	54 00
221	G. W. Ogden & Co., premium	15 00
222	Miss Abbie Ogden, premium	4 00
223	Mrs. James McAlpine, premium	8 00
224	Mrs. C. Travis, premium	3 00
225	Mrs. M. J. Fowler, premium	2 00
226	Mrs. C. P. Root, premium	7 00
227	Ed. Carr, premium	20 00
228	James Eager, premium	3 00
229	David Wells, premium	20 00
230	Bredfeld Bros., drayage	6 00
231	S. E. Weller, drayage	2 00
232	C. T. Bradley, premiums	285 00
233	T. H. Curtis, premium	2 00
234	L. S. Curtis, premium	9 00
235	W. O. Lydston, premium	5 00
236	Sherin Bros., premium	10 00
237	E. Simpson, premiums	70 00
238	W. Hunt, premium	10 00
239	A. D. Seaman & Co., premium	2 00
240	H. Wardle, clerk	25 00
241	Wechselberg, Brown & Co., premium	20 00
242	J. L. Pierce, premium	4 00
243	J. W. Hoyt, hotel bill during fair	22 90
244	Peter Wakem, premiums	245 00

Secretary's Warrant Account—continued.

No. Ord.	To whom and for what issued.	Amount.
245	J. W. Hoyt, salary	$750 00
246	H. L. Durand, premiums	128 00
247	Peter Wakem, premium	5 00
248	F. W. Case, clerical service	100 00
249	C. E. Bross, express charges and despatches	10 15
250	James Dean, clerical service	10 00
251	E. D. Darwin, agent, freight	1 43
252	A. G. Tuttle, premium	53 50
253	R. M. & W. Andrus, premium	30 00
254	Mrs. D. McVean, premium	18 00
255	E. Elliott, premium	5 00
256	E. W. Keyes, P. M., postage stamps	7 00
257	Mrs. E. D. Lyon, rosettes	9 50
258	C. H. Hall, clerical service	35 00
259	M. J. Cantwell, printing	28 75
260	S. H. Seamans, premium	66 00
261	Miss C. E. Stevens, premium	6 50
262	C. C. & R. H. Parks, premium	25 00
263	E. J. Elton, premium	3 00
264	Percival Sheard, premium	10 00
265	Mrs. J. Joy, premium	6 00
266	C. H. Greenman, premium	20 00
267	Charles Elson, carpenter work	182 75
268	N. J. Swain, grain	35 00
269	Nuzum, Dopperstein & Schmidt, premiums	5 00
270	C. F. Fisher, hay and straw	349 12
271	E. J. Grover, hay and straw	423 73
272	M. L. Butterfield, premiums	50 00
273	C. M. Wolf, ribbons	18 10
274	J. M. Wheeler, superintendence at fair	12 00
275	E. J. Grover, premium	3 00
276	G. A. Ludington & Co. premium	35 00
277	H. Ludington, premium	10 00
278	H. Gregg, premium	2 00
279	Charles Cook, premium	30 00
280	Miss J. L. Heth, premium	18 00
281	G. W. Williams, premiums	5 00
282	Mrs. Rachael Lapham	2 00
283	Cramer, Aiken & Cramer, printing	82 15
284	Milwaukee Publishing Company, printing posters, etc.	184 00
285	Lansing Bonnell, use of stoves, etc	7 50
286	J. E. Tesch & Co., brushes and combs	3 85
287	Filer, Stowell & Co., use of engines and fixtures	316 64
288	P. V. Deuster, advertising	1 50
289	D. Ferguson, premium	28 00
290	H. F. Jennings, premium	20 00
291	Winchester & Partridge, premium	10 00
292	New England Lithograph Co., diplomas	52 50
293	August Ehnert, premium	10 00
294	D. M. Aspinwall, premium	15 00
295	John Root, premium	5 00
296	J. S. Wilcox, premium	6 00
297	Mrs. H. Russell, premium	2 00
298	J. W. Park, premium	53 00
299	E. B. Thomas, premium	122 00
300	Mrs. P. Yale, premium	5 00

Secretary's Warrant Account—continued.

No. Ord.	To whom and for what issued.	Amount.
301	S. B. Smith, premium	$14 00
302	A. Humbert, premium	30 00
303	L. Rawson, premium	4 00
304	W. E. Grover, premium	2 00
305	C. H. Jacobs, premium	7 50
306	D. Morgan, premium	2 00
307	W. O. Stillman, livery	23 00
308	J. H. Jones, premiums	10 00
309	Mrs. R. M. Jameson, premiums	6 00
310	E. L. Keyes, superintendence at fair	16 00
311	E. Mellon, services at fair	16 00
312	George Murray, premiums	186 00
313	James Cooper, premiums	4 00
314	L. Mock, premium	10 00
315	Strickland & Co., stationery at fair	5 60
316	Miss Susie Conner, premium	4 00
317	W. C. White, premium	10 00
318	Miss A. J. Gildersleeve, premium	4 00
319	D. D. Bryant, premium	3 00
320	H. W. McCafferty, premium, (1870)	18 00
321	David McLay, premium	50 00
322	David Barlass, premium	10 00
323	Austin Wheeler, premium	2 50
324	G. P. Peffer and daughters, premiums	50 50
3 5	John Johnston, premium	4 50
326	A. F. Pratt, premiums	15 00
327	E. W. Keyes, P. M., box rent and postage	9 15
328	T. W. Rice, premiums	10 00
329	E. W. Keyes, P. M., postage stamps	6 00
330	L. B Potter, premium	15 00
331	H. Gregg, premium	10 00
332	Mrs. A. M. Lenz, care of ladies' hall	10 00
333	Mrs. D. Farnham, premium	2 00
334	Chester Hazen, premium	10 00
335	N. Richtmeyer, premium	5 00
336	Mrs. C. Koening, premium	2 00
337	Stickney & Baumbach, premium	15 00
338	A. Von Baumbach, premium	3 00
339	Mrs. D. West, premium	3 00
340	J. I. Case, premium	57 00
341	Mrs. M. D. Lewis, premium	2 00
342	P. V. Deuster, advertising	6 50
343	Daniel Gilson, premium	4 50
344	J. T Cutter, premium	15 00
345	S. A. Tenney, premiums	77 50
346	H. Ludington, dinner tickets	613 70
347	H. M. Elliott, detective police	25 00
348	Henry Thomas, police	3 00
349	H. L. Pomeroy, omnibus hire	50 00
350	Milwaukee News Co., printing and advertising	322 36
351	Wm. Weller & Co., premiums	10 00
352	A. D. Seaman & Co., use of furniture	18 00
353	S. Hickey, premium	5 00
354	L. J. Hobart, premium	20 00
355	W. E. Goodman, use of pumps	5 50
356	E. B. Bennett, police	20 00

Secretary's Warrant Account—continued.

No. Ord.	To whom and for what issued.	Amount.
357	H. Swallow, premium	$3 50
358	A. A. Boyce, premiums	10 50
359	S. A. Fox, premium	15 00
360	H. Bourse, premiums	8 00
361	L. Woodworth, premium	5 00
362	Mrs. D. P. Webster, premium	9 00
363	F. S. Lawrence, premiums	12 50
364	W. H. Jennings, premiums	5 00
365	R. Richards, premiums	40 00
366	P. Putnam, premium	2 00
367	W. J. Park & Co., stationery and fair books	51 33
368	German Printing Co., advertising	13 00
369	R. B. Allen, premiums	10 00
370	Mason Brothers, stationery	6 49
371	Eli Stilson, superintendence at fair	42 00
372	A. T. Riddell, premium	6 00
373	Geo. W. Stoner, filling out diplomas	4 00
374	David Loomer, premiums	10 00
375	Merrill & Eccles, premiums	10 00
376	Merrill & Eccles, premiums	10 00
377	J. H. Ham & Co., premium	5 00
378	E. W. Keyes, P. M., postage stamps	10 00
379	C. E. Bross, Agt., express charges	3 35
380	B. B. Olds, premiums	13 50
381	X. A. Willard, contribution to transactions	100 25
382	Fowler & Pennell, premiums	2 00
383	E. Schuyler, premiums	4 00
384	Joseph Pilgrim, premiums	5 00
385	James Magson, premiums	15 00
386	Miss Carrie Bliss, premiums	3 00
387	Matthews and Bros., premiums	10 00
388	E. S. Wadsworth, premiums	106 00
389	J. C. Howard, premiums	3 00
390	Geo. R Cook, engraving medals	24 80
391	E. W. Keyes, P. M., postage stamps	6 00
392	Geo. Bruen, interest on land	136 50
393	A. H. Main, sundries at fair	9 00
394	H. Ludington, ticket sellers	344 00
394½	H. Ludington, counterfeit money taken at fair	7 00
	Sum total of orders issued by the Secretary	$21,998 38
	Amount of orders 315, 336, 354, 364, 389, 390, 391 and 392 not presented to the Treasurer at the date of his report	204 90
	Amount of orders paid by the Treasurer	$21,793 48

EXHIBITION OF 1871.

The eighteenth annual exhibition of the society was held on the grounds at Milwaukee occupied in 1870.

In fulfillment of their pledges, the citizens of that place, acting through Mayor Ludington, also treasurer of the society, had ordered and executed many improvements, including the grading and smoothing of carriage roads to and upon the grounds; the better preparation of the track for trials of speed; the building of a large number of neat and uniform stalls for horses; the enlargement of accommodations for cattle; the multiplication of swine pens and chicken coops more than a hundred fold; the enlargement of each of the exhibition halls by adding fifty feet to their length, and the laying of floors therein; the addition of a large and spacious shed for hand machinery to the rear of the power hall; the building of a new and substantial 8-feet board fence on the best part of two sides of the grounds; the construction of a fence entirely around the half-mile track; the digging of new wells, etc., etc.

The Milwaukee and Saint Paul Railway Company had promoted the convenient delivery of stock, heavy machinery and passengers, by the construction of extended and substantial platforms adjoining the gates of admission and the entry and ticket offices on the north side, and by the building of chutes through which animals of every class could be delivered from the cars *directly upon the grounds.* The same enterprising and accommodating company had also built two offices within the grounds and contiguous to the offices of the secretary and treasurer—one for the accommodation of the division superintendent and the ticket agent, the other for the freight agent. The presence of these agents upon the grounds where they could be applied to any moment by parties having business with the railway company or desiring to purchase tickets, was very important, and was a concession highly appreciated by the society. They also incurred the expense of establishing a telegraph office for their own exclusive use in the interest of exhibitors and visitors during the fair.

The Western Union Telegraph Company had also generously contributed to the convenience of the society and of the public by establishing an office for general business in the office of the president at the center of the grounds.

When, therefore, the day came for the reception of goods and animals, the society was in excellent condition to accommodate both exhibitors and people; the number of which promised to be without precedent.

Unhappily for the full realization of these hopes, the week of the fair opened with dull and heavy weather, which not more by the cold, dust and wind, which prevailed throughout the fair, than by the threatening aspect of the sky, had a very discouraging effect upon thousands of persons all over the state, who had intended to be present, but who were led to postpone their coming from day to day, until, finally, it was too late.

This view of the case will be found to have been general, by the following editorial in the Milwaukee *Sentinel* of Monday, September 25:

The lowering sky to-day, with whisperings of rain in the breeze, have caused much anxiety in the minds of the public, who are all desirous of having the most propitious weather for this week of the state fair. No unkindly attitude, however, has yet been assumed by the elements, and if it should rain to-night it would be a great benefit in respect to laying the dust, which at present is the most unpleasant thing on the fair grounds, and on the road between there and the city.

For to-day's purposes, no finer weather could have been desired. There has been a great deal going on to-day in the preparatory operations on the grounds, and in entering animals and articles of every description, and to such a gratifying extent has the work been accomplished, that if the weather continues favorable to-morrow, as all hope it will, the exhibition cannot fail of being the most extensive and excellent, and the most largely attended of all the fairs that have been held by the State Agricultural Society since its organization, in 1853. This is evident from the immense number of entries that are being made to-day, both on the grounds, and at the city office in the Plankinton House. All the forenoon an almost continuous procession of wagons, containing articles for exhibition, have been driving in upon the grounds.

The trains arriving to-day, have brought to town a much greater number of passengers than usual, though it is not until to-morrow that the crowds are expected, as the fair does not formally open until then, at two o'clock in the afternoon.

The Milwaukee and St. Paul Railway Company have increased their accommodations on all divisions to meet the extra demand. Even small villages are asking to have one or more passenger cars left each day for their own use, promising to fill them. The probability is that our streets will present a populous appearance by to-morrow.

The special trains to and from the Cold Spring grounds, have been run with regularity all day; they have, of course, carried no crowd of visitors, but principally parties entering articles, and their employes, and workmen for the agricultural society.

In addition to the means of transit to and from the fair grounds, provided by the Milwaukee and St. Paul Railway Company, by these special trains, (for which see their extra time table,) the horse railroad makes connection with omnibusses at its terminus on Galena street. Omnibusses will also be running to-morrow and thereafter, from Spring street, west from the bridge.

The following, which was the day of the formal opening did but little to brighten the hopes of those who, being responsible for the success of the exhibition, naturally enough study the signs of the times as closely as the circumstances of intense occupation will allow.

From daily papers of Milwaukee, issued on the morning of Tuesday, the 26th, the following brief extracts are made:

[From the Milwaukee News.]

The morning of Monday, September 25, A. D. 1871, woke cold and dismal. Heavy gray masses of clouds hung threateningly over the city and suburbs, and caused many to fear for the success of the Wisconsin state fair, which began on that day. The incoming trains from the north brought the intelligence of a misty rain at Berlin, with a wind blowing in the direction of Milwaukee, so as to bid fair to bring what the disagreeable atmosphere threatened—a dull, soggy rain-storm. * * * * The number of entries are so great as to give the most flattering prospects for a successful fair. So great has been the rush that Superintendent Elson has found it necessary to employ thirty laborers since Sunday morning, for the purpose of making new accommodations, in addition to the great improvements already prepared for this fair. Horses and cattle are already entered in sufficient numbers to fill the large quantity of comfortable stables. "Hogs are trumps," said the superintendent, fifty additional pens being required to accommodate the squealing porcines. * * * In the afternoon (of Monday) a drizzling rain set in that looked exceedingly ominous, but it was only of the satisfactory duration, that laid the choking, white, fine dust. The work of the exhibitors was not delayed at all, and its effects will add much to the pleasure of the exhibition to-day. There has been some delay, but towards the end of the day matters were so rushed along, that a very satisfactory exhibition will be arranged for to-day, but by to-morrow one of the largest and most complete fairs ever held in the state of Wisconsin, will be thrown open to the public.

[From the Milwaukee Sentinel.]

An impression which seems to have prevailed in the minds of almost every one in respect to the state fair, has found a realization in much the largest exhibition ever held in Wisconsin. Previous indications of this fact were strengthened by the arrival of trains on the several roads leading into this city Monday. The coaches were thronged with passengers, and the freight-cars brought heavy loads of cattle, horses, machinery and agricultural products. City teams were also engaged throughout the day in carting articles to the grounds. The effect was to make it unusually lively on this first day of the fair. * * *

Early yesterday morning the clouds were lowering, and gave some indications of rain, but as the sun got fairly up it became manifest that the clouds would have it only partially their own way. Occasionally the sunlight would fall cheerfully over the city, and those interested in the fair felt, with good reason, encouraged with the prospect of fine weather. A brisk northwesterly breeze imparted a chilly feeling to the air, which continued throughout the day, and made it quite uncomfortable.

By Tuesday noon, when the entries were closed, every hall was filled, and every stall and pen. It was indeed a fine exhibition—in some departments magnificent—and all in all by far the largest and best ever held in Wisconsin.

Nevertheless, the visitors were still dubious, and came in tardily. The weather was slightly more favorable than on Monday, but the sky was cloudy, the air cold and raw.

The formal opening occurred at the appointed time; President Hinkley delivered the customary address at two o'clock, near the executive office. [Address published under the head of "Addresses."] And at its conclusion the secretary called the roll of the judges and commenced the delivery of the class-books to those present.

As usual, but few of the judges appointed—*and who had formally accepted the appointment*—were present; so that much time, indeed the remainder of Tuesday and part of Wednesday, were occupied by the officers in supplying their places. As fast as the committees were filled, however, they commenced work, and thus some had concluded their tasks before others had been formed and assigned to their respective duties.

Wednesday was a successful day notwithstanding the discomforts of the weather, as will be seen by the following editorial notices clipped from the *News* and *Sentinel* of Thursday morning:

[From the Sentinel.]

Much anxiety was felt on Tuesday night lest the clouds which through the day previous had partially obscured the sky should gather and make the prospects for Wednesday so forbidding as materially to affect the attendance. But fortunately such apprehensions proved groundless, and, although the day was not one of all sunshine, it was, nevertheless, quite pleasant, despite the disadvantages of a somewhat chilly atmosphere. And so the third day of the exhibition was rather agreeable than otherwise.

At a very early hour yesterday evidences were not wanting that the attendance at the fair would be very large. Carriages, busses, and express wagons, fitted up for the occasion, passed backward and forward between the city and grounds, loaded with passengers on the outward trip, and even the first train out from the Union Depot was heavily loaded, and each successive one carried a swarm of living freight. Passenger trains on the various roads arrived with full coaches and sent a flood of visitors to the exhibition.

[From the News.]

The second day of the fair was a most successful one. Great crowds of people poured out from the city all day long to the fair grounds. The out going trains added to their regular passenger coaches long lines of flat cars, upon which were erected wooden seats for the accommodation of the vast numbers that swarmed on the trains at their departure for the grounds during the day, and their return to the city late in the day. Crowds everywhere yesterday were to be seen. Much discomfort was necessarily to be endured in going to and fro, but once on the grounds the vast space there gave play to the multitude, and except in the exhibitory halls or at the centres of public curiosity, one could move about without being jostled seriously.

The number attendant upon the grounds yesterday during the entire day has been estimated, by good judges, to be at least 25,000 people. Every quarter of this state, and many foreign states were well represented.

Although the number visiting the grounds has been very large, the utmost good order and feeling has prevailed.

The weather has been a trifle cold, but as no rain has fallen the exhibition has not had any serious drawbacks. The presence of so many people and vehicles has powdered the driving tracks so that their vicinity is thick with a driving white cloud of fine dust, very disagreeable to the throat and lungs. Like the Valley of Humiliation it is very depressing to pass through, but then when you are through on the other side, you forget it, until you are called upon again to suffer.

Thursday was a pleasanter day than either of the preceding. The clouds broke away during the forenoon, and the sun appeared with cheering effect. Visitors came in large numbers; the attendance in the middle of the day being estimated at between fifteen and twenty thousand.

Several distinguished guests appeared upon the grounds, among them ex-Governor Frederick, of New Hampshire, formerly treasurer of the U. S. Agricultural Society, and one of the soundest practical men of the country. The governor and his friends were on a visit to the Soldiers' Home at Milwaukee, of which he is one of the directors, and was unable to remain and address the people of Wisconsin, as he had often been invited to in previous years; but they nevertheless made the round of the stock departments, and at the conclusion, the governor did say this much to the few listeners gathered about his carriage, namely, that "this was one of the finest exhibitions of cattle and swine that he had seen anywhere, either in this country or in Europe."

In the evening of Thursday, the annual election of officers was held, of which an account will be found under the appropriate heading.

Friday, being the last day of the exhibition, is never so largely attended as either Wednesday or Thursday. The weather was favorable and the programme interesting. Nevertheless the attendance was light. The sunshine was three days behind time.

At eleven o'clock, the annual addresses were delivered, from a platform in front of Power Hall, by Governor Lucius Fairchild, Ex-Senator James R. Doolittle, Hon. E. D. Holton, and Hon. Samuel Fallows, Superintendent of Public Instruction. They were brief, instructive and entertaining, and were well received. [See reports of the speeches under the general heading "annual addresses."]

Special accounts of each of the several departments of the exhibition will be found in the "reports of superintendents;" the results of the competition in the several classes, under the head of "reports of committees on awards and premiums."

The receipts of the fair amounted to some $18,000, which added to the balance on hand at the beginning of the year would swell the total receipts to $27,747.48.

While, therefore, the result was several thousand dollars less than it was hoped would be realized and but for the bad weather undoubtedly would have been realized, it was not so bad as it might have been—especially as the society was enabled to pay all the premiums awarded, and all other claims of every sort, including over $3,000 on real estate, etc., and yet have a comfortable balance on hand, at the end of the fiscal year, of $5,954.00.

OPENING ADDRESS.

Delivered on the Fair Grounds, September 26, 1871.

BY B. R. HINKLEY, PRESIDENT.

Fellow Citizens:—Notwithstanding some slight discouragements, hardly worthy of mention, the general circumstances under which we have met here to-day, are such as to demand the most hearty thanksgiving.

Peace, at last restored to our country, prevails throughout our vast domain, while in the old world, wars and rumors of wars are sadly disturbing the peace of the nations.

Health, too, reigns universal within all our borders, though pestilence stalks abroad in other lands.

Moreover, while a numerous people of the ancient east are wasted by famine, with us the year has been crowned with plenty; so that all over our land the husbandman and they who depend on the fruits of his labor are gathered during these autumn days, to rejoice in common over the triumphs of our national industry.

As an independent community, Wisconsin has been among the most highly favored of the whole sisterhood of states. Her agriculture is advancing with rapid strides. Her manufactures have even outstripped her agriculture. Her commerce has kept even pace with her productive industry. Her internal improvements are paving the way for a rapid advancement in every department of industry; and in her social condition she already compares favorably with communities that were more than a century old ere she had reached the years of her majority.

As a society, we may also rejoice. The successes of last year, which were unprecedented, have been surpassed by the achievements of this. Our exhibition halls, with their capacity increased, in the aggregate, more than fifty per cent. are crowded, as you will see, with a display of the products of the field, the dairy, garden and household, the mechanics' workshop and the artist's studio, that would do credit to any of the older states. Our enlarged accommodations for horses, cattle, sheep, swine and poultry are taxed to their utmost, and the good people of the state are preparing to show their appreciation of the better provision we have made for their convenience and comfort by coming in multitudes that no man can number, to congratulate each other and the society on the extraordinary success of this its latest effort during a long career of unfailing and ever-increasing prosperity.

For how much of this ground of our rejoicing we are indebted to the liberality and enterprise of the good people of Milwaukee, and of those great corporations, the railway companies, will appear from a glance at the greatly improved grounds, and by a test of the superior facilities afforded both people and products for reaching this chosen place of our annual gathering. How much the city and county of Milwaukee, and the state at large are benefitted, in turn, by these efforts of the society does not publicly appear, though it is no less certain and easily demonstrable. For if things do not happen in this world, but occur in accordance with fixed laws; if the movements of the heavenly bodies, wonderful phenomena of the geological, vegetable and animal worlds; the rise, development and downfall of nations; the growth and prosperity of states and lesser communities, and the substantial and permanent success of individual man; if all these are in harmony with the great theory of cause and effect; if the political institutions, the financial and commercial systems of a state or nation, and the daily business of the individual citizen can not be safely and successfully carried on without forethought and wise callation, neither can the industry of a great people hope to yield the largest and best results without systematic and judicious direction, either from the government, or from some proper organization planned and managed in the public interest. In this state, the Wisconsin State Agricultural Society has undertaken to fulfill that office. It was organized with the co-operation of public-spirited citizens, and has for many years been, as we believe, faithfully administered with that end in view.

We know that the means which it employs—the exhibitions it holds, the correspondence it carries on, and the valuable and popular volume of reports annually distributed—are calculated to promote the advancement of all branches of industry in our state; and we must be pardoned if we insist that the persistent efforts it has put forth during this period of infancy on the part of Wisconsin, have had an important influence in securing the results of which the people are so justly proud to-day.

In the past it has not unfrequently been a ground of discouragement to those who have been responsible for the growth and prosperity of the society, that many of our citizens whose practical connections with industrial pursuits, and even dependence upon them for the wealth and position acquired, have manifested little or no interest in its objects and labors. But it is gratifying to observe that, with the day of small things, that day of indifference has passed.

This magnificent collection of blooded stock, and superior products of our agricultural, horticultural and manufacturing industries, and this gathering of the people from every quarter of the state are proofs that the society is rapidly gaining, what it has fairly earned, and should always have had, the cordial sympathy and support of the public.

The officers of the society, though their ability were ten-fold greater than it is, and their efforts Herculean and unremitting, could not, of themselves, insure so much as the success of a single exhibition like this. They must have the moral support, and the practical support of the best citizens, and of the great body of citizens. For this we have striven, and this we are glad to know, is becoming ours more and more every year.

For the present, therefore, I will only further, on behalf of the society I have the honor to represent, offer our hearty thanks to all who have contributed to this satisfactory condition of things, especially to those who have helped to make this our greatest and most complete exhibition of the industry of Wisconsin, and urge upon all, whether officers, judges, or exhibitors, who have duties to perform, to use their very best endeavors to complete what has been so auspiciously begun.

It but remains for me to declare the eighteenth general exhibition of the Wisconsin State Agricultural Society open to the inspection of the public. May all who attend it derive both pleasure and profit from the lessons it has to teach.

ANNUAL ADDRESSES.

Delivered on the Fair Grounds, September 29, 1871.

BY GOVERNOR LUCIUS FAIRCHILD, HON. J. R. DOOLITTLE, HON. E. D. HOLTON AND HON. SAMUEL FALLOWS.

[It is a matter of regret to the secretary, as it will be to all others who heard the annual addresses, that the publication of them must be confined to such brief and imperfect reports as are found in the Milwaukee papers. This is especially true of the speeches made by Senator Doolittle and Mr. Holton, both of which were highly instructive and eloquent, and yet which, being altogether extemporaneous, and but meagrely reported, could not appear in the society's Transactions unless afterwards written out by the authors themselves—a service which neither of those gentlemen has found it convenient to do. Of Gen. Fallows excellent address, we have through his personal sacrifice, a fuller report. Such reports as we have are found in the Milwaukee *Sentinel* of September 30th.]

SPEECHES OF GOVERNOR FAIRCHILD AND SENATOR DOOLITTLE.

Just before noon, the band preceded a carriage, which left the office of the president, in which were some of the gentlemen who had been announced to address these assembled on the grounds, and made its way to the stand provided for the speakers. Soon after arriving there, President Hinkley introduced to the crowd Gov. Fairchild, who arose and briefly excused himself on account of illness.

Senator Doolittle being introduced said he was somewhat taken by suprise himself. He came to listen to a speech from Gov. Fairchild, and he should therefore detain his hearers but a short time. He would direct their attention to a few points. And first of all he believed in Fairs. They are a great blessing as well as an amusement to the American people. As a nation we are deficient in holidays. While other countries have them, we really have but two—one the 4th of July, and the other after the golden sheaves of the husbandman are gathered. The American people need relaxation from the incessant toil which characterizes them. Other nations have it. It was the speaker's good fortune to be present at the World's Fair, where the men and the women of the world were gathered, and it was a pleasant and restful thing to see the panoramic view of the world's pleasure and the world's industry there presented. He spoke of the great fairs in the east, which continued for months, where the Asiatics and the Russians meet and mingle. Of course such fairs could not be held here, but it is eminently proper that Americans should gather on such occasions as this that we may learn of each other.

Another thing occurred to him as he passed over the fair grounds and saw the machinery which has been invented to facilitate the labors incident to the cultivation of the soil, and it was this; how almost impossible it would have been to have tilled the fields and gathered the harvests when our sons and brothers and fathers were engaged in putting down the late rebellion, but for the aid of this machinery. What could we have done without it? Expressing the satisfaction it gave him to witness the evident pleasure and prosperity of the people of Wisconsin, as evidenced by this fair, the gentleman took his seat.

SPEECH OF HON. E. D. HOLTON.

Hon. E. D. Holton next came forward and said the officers of the State Agricultural Society were not in fault for the lack of orators to address the people. They would have had Beecher, but he was away fishing; they wanted Carpenter, but he was compelled to attend to Boston; they would have spoken to Grant, but that he is so busy in taking care of his future political interests; they wanted Gladstone, but the Queen was sick and he is unable to come; and so they settled down on Mitchell and me, and Mitchell isn't here.

I do sincerely congratulate you on this gathering, so pleasant and so full of profit. I concur in what the honorable senator says in respect to fairs. They should, by good rights, have an elevating tendency. We do not come here as mere sensualists, but because this intermingling contributes somewhat to our higher natures. The world may be challenged to witness such a growth in thirty years as our own fair state of Wisconsin exhibits, as manifested by the scenes within this fair-ground enclosure. In my journeyings in Europe I saw in the stables of the best breeders no cattle equal to those to be seen here to-day. Our fairs are not like those of the east, nor are our people like theirs. In going through the state, you will find homes like palaces, and barns like those in the Juniata Valley. This is the beauty of our civilization, that we develop intellectually as well as materially. Have you not marked the wonderful thing that Mr. Capron, who used to exhibit his stock in our fairs, has been sent for by 30,000,000 of people who stretch out their hands to be taught in farming matters by one of your own number? That will do for hifalutin.

The speaker gave his hearers some good advice about instability of labor, and counseled subdivided farming. He gave the boys some good advice about following the profession of farming, and advised them to avoid the city.

Upon taking his seat, he was succeeded by General Samuel Fallows, who had not entirely recovered from a somewhat severe indisposition. He addressed the audience in substance, as follows:

SPEECH OF GENERAL SAMUEL FALLOWS.

Mr. President—Ladies and Gentlemen:

I suppose I am thus unexpectedly called upon to speak at this time because it is deemed necessary to have "a word of exhortation" at the close of the speeches of the distinguished gentlemen who have preceded me. I shall endeavor then as best I can to "improve" the occasion.

I am not now a practical agriculturist, like my friend Mr. Holton, but I was brought up on a farm, and know something of the duties—and dignity, too, of the farmer's vocation.

Consciously and unconsciously, by our gathering here to-day, we are doing homage to a pursuit which lies at the very foundation of the stability and progress of the American people—the pursuit of agriculture. All other professions and pursuits are based upon it. "The earth is the mother of us all." The king himself is served of the field.

The stability of the nation depends upon the owners of the soil. In the palmiest days of Rome, when learning, and virtue, and commerce, and conquest were at their height, the plebians tilled the soil they called their own. Small farms of ten or twenty acres were the rule. Rome, like Egypt, became the granary of the world. But when the patricians absorbed the homesteads of the people, annexing estate to estate, until a very few controlled the landed property of the empire, then the latter became reduced to the level of serfs. Roman virtue was a thing of the past; its power was swept from the face of the earth.

Woe be to America if the day shall come (*it must never come!*) when the people by *any* process whatever, shall become deprived of their absolute ownership in the soil on which they live; when a few, as in England and Ireland to-day, shall own our whole domain. Farewell, then, to republican institutions.

A people owning the soil will not plunge madly into rebellion. They are the great conservative element of the nation. We show, all of us, from all walks in life, from city and hamlet and farm, our recognition of the value and supremacy of the labor idea by coming together on this occasion. We have vindicated and secured, in the triumph of our national arms, the majesty and perpetuity of this idea. At the mouth of more than ten thousand cannon, and at the point of a million flashing bayonets, we have driven from our shores the foulest of all American foes—the idea that it was dishonorable in any to work for a living. Let us trust *that* battle has been fought and won, once and forever.

Mr. Holton has referred to the ignorant people who come together in some of the fairs of the old world. Not ignorant masses come to these fairs held in our midst. I say it advisedly, not boastingly, but with the strictest regard to truth, that, as a people, we are the most enlightened on the face of the earth. We have yoked intelligence to labor. We have redeemed toil from degeneration. The toilers of the land are the rulers of our society; for hand and brain are indissolubly wedded together. And through this, America stands forth as one of the greatest of the world's social regenerative forces. If you want the monuments of this dual toil, look around you—here they are in the princely products of thrift and skill and industry which everywhere greet our eyes.

Yet more needs to be done. I am not satisfied. We talk about "the balance of power," sometimes, but nearly *all* power is in the hands of the farmers of our country, whether religious, social or political. Eight-tenths of our population are tillers of the soil. What intelligence do they need for the responsibilities resting upon them! They ought not to leave to others a knowledge of the great questions and problems which relate to the very structure and on going of the American state. They ought to be competent to deal with them in their varied and intricate forms.

I say our farmers ought to be thus intelligent, as well as the lawyer, the physician, the teacher, or any in the so-called learned professions. I do not forget the fact stated by one of our most distinguished national educators, in my hearing, that "fully three-fourths of all our statesmen, legislators, lawyers, divines, merchants, literary Bohemians, editors, etc., were the sons of farmers." Let me ask where else could they all come from? And I, with many others, can testify that the daughters of these farmers make the best of sweethearts and wives.

But we must keep the farmer's ranks full of intelligent men and women, while supplying the great demand in all other directions. Hence I will exhort at this point, particularly, after Mr. Holton's sermon to the young men before me, and drive, if I can, the nail still deeper into the wood, and most earnestly urge the youth of these American farmers' sons, to walk in the footsteps of their fathers. It *is* a mistake very, very often, to come to the city for employment.

Abbott Lawrence, the great Boston merchant, once stated that "ninety-five out of every hundred business men, even in staid and sober Boston, failed in business." Where is the bankrupt farmer, if he is a farmer?

We asked some time since of the students of our State University, of which Col. Hinkley, your secretary, was one of the regents—[It was suggested to the speaker that Col. Hinkley was president. "I beg pardon," was the response. I ought to have known better. He was *once* secretary, I believe," turning to the president. The latter, smiling, shook his head. "Then," said the speaker, "he must have jumped at once into the onerous position he so ably fills."]

I was saying we asked these students, two hundred in number, what profession they were going to choose in life. How many do you suppose responded they were going to be farmers? Remember that three-fourths were sons of farmers. Only *five*.

A change is taking place. The agricultural department is drawing students who intend to enrich themselves with university culture and then return to digging still more the most ancient and honorable of employments.

Congress has shown great wisdom in making such liberal appropriations of land for the training of intelligent husbandmen. Make *them* intelligent and you educate the nation.

I must conclude. You will allow me a word of criticism which I have made elsewhere before. I confess to a weakness for a fast horse. I believe in motion and locomotion. But we must not, in the expressive, if not very classical, language of

Josh Billings, who, with Horace Greeley tells, "What I know about farming," suffer these great gatherings to degenerate into "agricultural hoss trots." If the greatest interest is to gather about horses running against each other, the end of these fairs will not be attained. Much as I love a good horse, I do not believe the chief end of man to be to raise a horse with a minimum of body and a maximum of legs, and then run him forever.

We must discourage all we can the spirit of gambling that may be raised in consequence. I want to see the breed of draught horses improved. We need them more than racers. I would prefer to give five hundred or a thousand dollars as premiums for plowing the best half acre of land, etc. Let us return to first principles.

Gentlemen, the progress of the nation is bound up in the progress of the science and art of agriculture. May the spirit of this progress ever actuate you.

REPORTS OF SUPERINTENDENTS.

REPORT OF THE HORSE DEPARTMENT.

BY N. S. GREENE, SUPERINTENDENT.

The show of horses at the last state fair far exceeded that of any former exhibition, both in numbers and in the quality cf the animals. So great was the increase, that notwithstanding the extensive additions made the past year to the stalls, a much larger number of animals were entered than could be accommodated. This, with the improved quality of the stock exhibited, shows conclusively an increased interest among breeders in raising this universal favorite servant of man.

The various classes were all well represented, but particular mention should be made of the exhibition of thorough-breds, roadsters and draft horses. Many of the animals in each of these classes would compare favorably with the best of their kind in the country.

The trials of speed were creditable and exciting, and seemed to create more interest than any other feature of the exhibition. However numerous the objections that are urged against races at our state fairs, all must admit that they contribute largely, both to the numbers that attend, and to the interest felt in these exhibitions.

A much larger number of entries were made in competition for the sweepstakes premiums than heretofore, and all of the animals presented were of superior quality. The continually increasing interest felt in this class of premiums, denotes a commendable strife among the breeders of good stock, and we trust will continue to stimulate them to still greater improvements in this direction.

The plan adopted for selecting judges, and the manner of the performance of their duties at the last fair, gave universal satisfaction to exhibitors. The obvious fairness of making the awards, rendering it next to impossible to show favoritism, must commend itself to all.

REPORT OF THE CATTLE DEPARTMENT.

BY C. H. WILLIAMS, SUPERINTENDENT.

The show of cattle at our annual exhibition held at Milwaukee, September, 1871, exceeded in numbers the very fine one of the previous year, and in some classes excelled in quality any former exhibition.

This fine show would seem to indicate, that the breeders of improved cattle are still engaged in the laudable competition for pre-eminence in their business, and that each exhibitor had confidence in his progress and success sufficient to induce him to come forward with his stock in competition with others in the same business.

It is to be hoped, these comparisons and competitions, made public by our annual exhibitions, will make its impress on the mind of the general farmer, such that they will be stimulated into efforts to bring about that very desirable result, the improvement of the "native" cattle of the state.

The number of cattle shown at the last exhibition being in excess of the stalls provided, the society, in anticipation of a still larger show, doubled their former number, but notwithstanding this enlargement of accommodations, the cattle on exhibition more than filled the stalls provided, causing a doubling up, in some cases, not convenient or pleasant to the owners of choice stock. This state of things will sometimes occur, for the officers of the society can not know how extensively the growers of stock will exhibit.

The stately and popular short horns, the handsome red Devons and the gentle Alderneys and Ayrshires were on exhibition in about their usual proportions as to numbers—the short horns largely in excess of any other class—with a very creditable show of the hornless Galloways, which entered the field, in this state, for the first time.

The milch cows and grade cattle were in greater numbers than at the last exhibition, and in better condition. The show of working oxen and neat cattle was very much better than at any former exhibition—the animals exhibited were a decided improvement over the native cattle, and indicated the results which might be reached by all farmers, if they would take advantage of the opportunities for improvement within their reach.

REPORT OF SWINE AND POULTRY DEPARTMENT.

BY J. H. WARREN, SUPERINTENDENT.

The rapidly growing interest felt in these profitable kinds of agricultural stock, together with the extended range of premiums offered by the society, and the very liberal special premiums (which it is hoped will be continued) offered in the swine department by Messrs. Plankinton & Armour, Layton & Co., Jos. T. Woolley, L. Farlan, VanKirk & McGeoch, pork packers of Milwaukee, brought out, not only from our own, but from other states, a very large and fine exhibition in these departments.

In the swine department, especially, the number and variety of breeds was most unprecedented; there being over one hundred pens filled with about twice that number of as fine animals as were ever exhibited.

In point of numbers, the Berkshires, Poland-Chinas and Chester-Whites were most numerous, while the Lancashires, Cheshires and Essexes were well represented by some very fine animals.

It is believed, nor can it be doubted, that the exhibition of such a number and variety of swine of so fine a quality, will do much to stimulate the farmers of our state to improve the breed and quality of their swine; for in no class of animals is there so wide a range between the good and the poor, the profitable and the unprofitable.

We would recommend that the liberal and varied premiums offered by the society be continued; and it is hoped that the pork packers of Milwaukee may feel disposed to continue their aid in promoting improvement in the breeding of swine. Certainly no one, except the breeder, has so much interest in the matter as they have. The better the quality of the hogs brought to them, the better can they compete with packers of other states.

The exhibition of poultry was unusually large and varied, and attracted much attention. The breeding of this class of domestic animals is deserving of encouragement, and is receiving increased attention from our farmers as a most profitable branch of agriculture. There is no class of stock that will make more ready, or better returns for the amount of money invested; while the attention it requires can be given by the female and juvenile members of the household, giving pleasant and profitable employment to them.

We would recommend that it be made a separate department, with a superintendent, and that the liberal and varied premiums be continued.

To Mr. John Dearsley, of Wauwatosa, to whom we entrusted the entire supervision of this department, the society is under obligations for his labors and unremitting efforts, under difficulties from want of room and pens, to make attractive and interesting the exhibitions in this department.

REPORT OF AGRICULTURAL DEPARTMENT.

BY W. W. FIELD, SUPERINTENDENT.

I am happy to report a large and fine exhibition of farm products and garden vegetables in this department. An increased interest was here manifested over any previous year since my connection with the society. To some extent, this may be attributed to increased premiums offered by the society, and to the liberal special premiums given by the Milwaukee Chamber of Commerce for the best samples of winter and spring wheat; but it is largely due to the growing interest among producers of the state in this department of industry.

Exhibitions of field and garden products by E. B. Thomas of Dodge's Corner, Gen. J. C. Starkweather of Oconomowoc, Geo. S. Haskell of Rockford, Ill., who also displayed a fine collection of garden seeds; by Thomas Davis of Oshkosh, and G. H. Lamberton of Lamberton; these, and several cases of field products from the University experimental farm, at Madison, were especially worthy of commendation.

In my report of 1870 I urged upon the manufacturers of cheese the importance of exhibiting samples of their products, as the show at that time was meager, and I am glad now to be able to report that those suggestions were this year concurred in, much to the satisfaction of the society. The display was large and creditable.

The exhibition of butter was also large, and of such excellent quality that the judges found it extremely difficult to decide which sample was entitled to the premium. It was all strictly prime.

The display of honey and sugar was fair, and samples shown were of the first quality. Our seasons are not usually so favorable for the manufacture of maple sugar as in some of the eastern states, the free flow of the sap being for a much shorter period. The quality is however unsurpassed. The manufacture of this delicious product should be encouraged, but not to the neglect of other important work, as preparing for seeding, etc., which needs careful attention at that season of the year. One sample of loaf and two of pulverized beet sugar were exhibited from the Sauk County Beet Sugar Manufacturing Company, of Black Hawk, Sauk County. It was of excellent quality, and I make special mention of it with pleasure. If this sugar can be extensively manufactured with profit, as I am assured in can be, it will prove a great source of wealth to the state.

The exhibit of bread and cake was better than in 1870; the latter being displayed in great abundance and showing skill and taste in its manufacture. The largest display, and worthy of special mention, was from Miss Jennie L. Heth of Milwaukee, and Mrs. S. A. Tenney of Durham Hill.

The show of sealed and preserved fruits, etc., was quite creditable, but not so large as I hope it may be at subsequent fairs. I trust that exhibitors will see the importance of having their products in this department shown in glass jars, instead of cans, so that the fruit can be seen, and the quality of each more readily ascertained by the judges.

It is hoped that the eminent success of the fair of 1871 will stimulate the producers of our state to higher attainments in industry, and their influence be felt far and wide in helping to make all subsequent state fairs a still greater success. Every town in the state is each year showing a marked improvement in industrial operations, and this to a great extent is due to the general information diffused among the people by our agricultural gatherings, and valuable essays and other papers, which relate to industrial subjects. Let the farmers, the mechanics, and the professional man take a mutual interest in building up and sustaining these annual industrial exhibitions, thereby developing the greatest resources of our state, and the achievements of the future will astonish us all.

REPORT OF THE MACHINERY DEPARTMENT.

BY RUFUS CHENEY, SUPERINTENDENT.

It affords me pleasure to say that the agricultural and mechanical department of our annual fair is rapidly increasing both in quality and variety of machinery. At no previous exhibition has the show in machinery been anything like so great as that displayed at our last fair. Our system of giving no premium without actual trial is now understood, and gives universal satisfaction to exhibitors, as no estimate of the relative merits of agricultural machinery can be intelligently made without actual trial in the field.

Believing that field trials would stimulate competition, and greatly benefit our farmers, we strongly recommended them one year ago, and would again call the attention of the society to the subject.

The mechanical department of our fair, I fear, is not fully appreciated. To encourage the manufacture of agricultural machinery, to bring out the best mechanical talent, to stimulate competition, and then to give the farmer the benefit of all these combined, should receive the hearty support and encouragement of the society.

We live in an age which has developed, and is developing great results in all the useful arts. Never before has the farmer had such advantages for the acquisition of knowledge; and never before has the genius of the inventor and the skill of the mechanic been so earnestly engaged to relieve toil, reward labor, and multiply the comforts and blessings of life. Compare the advantages of the present day with those of our fathers, when the wooden plow, the scythe and sickle were the implements of husbandry, and the mind is filled with wonder at the progress made even within the lifetime of this generation.

Then let us give the inventor and manufacturer the credit due, the encouragement merited, that still greater results may be achieved.

The duty of making a detailed report was entrusted by me, with permission of the board, to a very competent committee, the object of which was to give proper notice of the articles on exhibition as well as to advertise, through the medium of the Transactions, the manufacturer and exhibitor; which report I have the honor herewith to present.

REPORT OF SPECIAL COMMITTEE.

Major RUFUS CHENEY, *superintendent, etc:*

SIR: Your committee, to whom was entrusted the duty of examining the machinery exhibited at the state fair of 1871, would report as follows:

The number and variety of articles on exhibition in this department rendered the labor of your committee quite arduous, and may have caused them to overlook, or to pass without due consideration, some things that were worthy of special notice; and any failure in the performance of their full duty is chargeable to this cause, rather than to lack of purpose or good intent on our part to do justice to all.

With regard to the real merits of much of the machinery, especially that devoted to farming purposes, no opportunity was given to test by actual operation, and our judgment in the main was based on their general appearance. And here your committee would, remark that it seems advisable to them, at future exhibitions, to arrange, as far as may be practicable, for a public trial of this class of machinery; offering suitable premiums and appointing judges to make the awards, if deemed expedient or necessary. This will stimulate our manufacturers to make better machinery, and will bring the real merits of their work before the public, so that the farmer and others most interested can judge by actual observation what is best adapted to their purpose.

Time and space will not permit us even to specify all the commendable articles exhibited, or to give those we deemed most worthy, anything more than a brief notice, therefore we will only attempt to note the most important.

The display of agricultural machinery made by L. J. Bush of Milwaukee, was very fine. Good specimens of Russell's reapers and mowers; Sprague's mowers, Birdsall's clover hullers, power and hand corn shellers and straw cutters of different manufacturers, the American and Hutchinson's cider mills, Buckeye wheel horse rake, Tiffin's revolving horse rake, lawn mowers, churns, etc., were presented.

Mr. A. J. Hays of Milwaukee, also made a large exhibition of the same class of machinery, among which we found Hubbard's self-raking reaper and mower combined, his light mowers, the Ithaca steel tooth horse rake, Continental feed cutters in variety, Young America cider mill, and the Philadelphia lawn mower; all very good machines.

The Beloit self and hand-raking reaper and combination mowing attachment was exhibited by Parker & Stone of Beloit.

The Wilbur Eureka mower and reaper was represented by two very fine machines.

Messrs. M. E. Fuller & Co. of Madison, made a fine display of Wood's combined reapers and mowers; a machine well known and appreciated by the farming community.

Mr. George Esterly of Whitewater, exhibited his reaper and mower combined, with self-rake or dropper, also his patent seeder and cultivator, with land measurer, agitator, or grass seed attachment; machines of his own manufacture, well made and first-class.

The Valley Chief mower and self-raking reaper were entered by Harrison & Judd of Janesville, and are regarded as very good machines.

R. C. Farthing of Ripon, exhibited the Aetna mowing and reaping machines. In appearance they seem to be excellent machines, and calculated to work equally well on rough and smooth ground. They are said to do good work.

The Dodge harvester and mower was shown by C. W. Yale of Milwaukee.

Mr. N. C. Thompson of Rockford, Illinois, had on exhibition Manny's two wheel mower, Gorham's sulky cultivator, and Diamond plow.

The Champion combined reaper and mower, manufactured at Springfield, Ohio, we judge to be a very good machine.

Daniel Ranson, of Chicago, was on hand with Kirby's improved reaper and mower combined. Several new and valuable improvements are claimed for this machine.

Aultman & Co., of Canton, Ohio, were represented by two fine machines of their manufacture.

S. L. Sheldon, of Madison, entered the Meadow King mowers, the Buckeye grain drill and grass seed sower. These mowers we consider very fine machines, and well worthy of the popularity they have gained.

The Prairie City broadcast seeder and cultivator combined, manufactured by the Harris Manufacturing Co., of Janesville, deservedly attracted much attention.

J. D. Easter & Co., of Chicago, made an exhibition of their Marsh harvester, which excited much interest among the farmers. We judge it to be justly entitled to the reputation it has earned.

The Sweepstakes combined reaper, and the Economy mower, and a pulverizing harrow, all first class machines, were exhibited by C. C. Bradley & Son, Milwaukee.

The display of Wood's reapers and mowers, iron beam plows and other farm machinery, made by W. F. Whitney, of Milwaukee, was very attractive.

E. J. Lindsay, of Milwaukee, presented the well known and celebrated Cayuga Chief reaper and mower.

The Clow self-raking reaper attracted considerable attention, to which it was justly entitled.

Little Champion reapers and mowers were also presented. Justly celebrated and good machines, in our opinion.

The old stand-by, McCormick's reaper, was exhibited by D. Carr.

A. A. Abbott, of Chicago, made a fine display of Excelsior mowers, reaper and dropper.

A large variety of hay rakes were on the grounds, and your committee consider the following as worthy of special mention:

Jerdee's, Taylor's, Hawkins', Hollingsworth's, a revolving rake from Marion, Ohio, and one manufactured by the Milwaukee Agricultural Works.

There was also a fine display of seeders and cultivators; many of them were very good machines. Of these, we will mention Case's sulky cultivator, made at Racine; the Farmers' seed drill, of Dayton, Ohio; Thomas' smoothing harrow; McSherry grain drill; Lake Mills seeder, and a sulky cultivator from Mayville, Wis.; Rowell's horse hoe and cultivator, made at Menomonee Falls; Holbrook's hand seed sower, and one made at Waupaca, Wis.

The exhibition of plows was much below, at least in number, what might have been expected, considering the very liberal special premiums offered for them by Messrs. Peirce & Whaling. Of those exhibited we would make special mention of the samples furnished by L. P. & M. P. Jerdee, of Madison, and manufactured at Beloit; also those from the establishments of Kimball, Austin & Co., Kalamazoo, Mich.; B. C. Bloomiston, Waupaca, Wis., and Dorsch & Mather, Milwaukee. E. E. Gore exhibited a very fine gang plow.

Excellent wagons were entered by the firms of Winchester & Partridge, Whitewater, G. A. Ludington & Co., Oconomowoc, and Fish Bros., Racine.

Messrs. Peaslee & Gillett, of Fond du Lac, presented a revolving tooth harrow, which we regard as worthy of special mention.

Fanning mills were represented by some very finely finished warehouse and farm mills from the manufactory of A. P. Dickey & Co., Racine, and excellent farm mills made by M. Burdick, of Monroe, and Blake & Elliot, Racine, Wis.

Of the several varieties of blacksmith's bellows on exhibition, your committee would make mention of those manufactured by W. E. Waterhouse, of Milwaukee, as being specially worthy. Sturtevant's large pressure blowers, exhibited and sold by Peirce & Whaling, Milwaukee, are very popular and have a large sale.

Washing machines and wringers were shown in their usual abundance. Of these utensils we mention those of Groat & Thompson, of Fremont, Ohio.; Stannard & Co., Milton, Excelsior wringer, and the Excelsior reel for drying clothes.

There were several feed steamers on exhibition, among which we noticed the Northwestern, Anderson, and Inman. The exhibitors of these machines got up a friendly trial among themselves to determine which could raise the heat to the highest point in ten minutes; the Anderson showing 200 degrees in eight minutes, against 174½ in ten minutes, by the Northwestern.

Among the many appliances for raising hay into barns, we consider Chapman's Railway Pitching apparatus the best exhibited.

Davis Bro's & Co. of Milwaukee, made a fine display of movable fence, land plaster of very good quality, and shingles.

There was considerable competition among upsetting and tyre bending machines. Burdick's Punch, Shear and Upsetting machine, we consider very good for light work.

J. C. Jordan of Watertown, exhibited a combination Punch, Shears, Bolt Header and Tyre Bender, which combines more power than any machine examined by us.

Mr. C. A. Whelan of Madison, exhibited a bagfilling and weighing machine which is very simple, and we should suppose a very handy machine for farmers.

Messrs. Drehr & Beurlen of Milwaukee, made a fine display of soda apparatus, ice cream freezers, beer coolers, distilling apparatus, etc., all of their own manufacture. They are deserving of a diploma.

Among the many devices for raising water, we noticed a wood pump, by E. B. Winship of Racine; also Hamilton's double bucket, and many others.

Cornells Bros., of Milwaukee, exhibited a step ladder and scaffold combined, a very useful article about the house, or for picking fruit.

Mr. F. C. Gurnsey, of Milwaukee, had a variety of his wheelbarrows on the grounds. They are strong and well made barrows.

Kimble Bros., of Fox Lake, Wis., exhibited a working model of their celebrated windmills.

The Seville Manufacturing Company, of Medina, Ohio, had on the ground several of their useful household articles, among them the Excelsor Wringer and Excelsior Clothes Frame for drying clothes; the latter article we consider worthy of especial mention as it spreads about two hundred feet of line, and when not in use can be folded and put under shelter.

Mr. J. U. Jennings of Racine, has at last hit upon something which every farmer needs, a practical seed planter. His machine will plant anything, from onion seed to corn, and does its work accurately. A diploma is recommended.

The display of sewing machines was large. It comprised the Florence Grover & Baker, Singer, Wheeler & Wilson, Howe, Domestic, Ætna, Davis, Manhattan, American Button Hole and Sewing Machine, Victor, Wilson, and the Weed.

The total number of machines of the above kinds on exhibition was seventy-seven. As there was no trial, your committee do not recommend any particular machine, but would say they consider all good; a great help to our wives and daughters, and something every family should have.

Your committee would also recommend diplomas to be given to

Messrs. Stahr & Co., Racine, on their chair and step-ladder combined;

To A. G. Trumbull, Columbus, on flour chest;

To Gaylord Martin, Milwaukee, on railroad excavator.

There was no competition on these articles but they were deemed as specially worthy of a premium.

Packard's machinery agency, of Milwaukee, exhibited a moulding machine and two planers at work. The moulding machine is very simple, doing a great variety of work, and doing it well. It combines in its operation what is generally done by several machines, such as sticking sash, getting out sash and blind rails, and stiles, blind slats, jointing door rails and stiles, planing fence pickets, etc., and does its work upon four sides at the same time. The pony planers will plane to 24 inches wide and less than one-eighth of an inch thick, doing the work perfectly. We recommend that a diploma be granted.

Filer, Stowell & Co., of Cream City Iron Works, Milwaukee, exhibited a shingle machine at work, which makes shingles with great rapidity, doing perfect work.

Also the Excelsior turbine water wheel, which they claim combines many excellencies not attained in any hitherto made. We believe it, after a close examination, to be a good wheel, and far superior to many that are better advertised.

Also a gang lath mill, which makes many lath where the old process makes but one, and must supersede the old method of manufacture.

Also an automatic bolter for sawing bolts, which was not at work, so that we could not fairly judge of its merits.

Also a gang bolter at work, upon which the bolts are placed upon an endless chain which carries them to the saws with great rapidity. It must make a revolution in the lath trade, saving as it does many hundred per cent. in the cost of handling, over the old method with which we are familiar. We believe it to be the best adjunct yet added to the lath business, and eminently worthy a diploma.

Threshing Machines.—C. F. Duvall of Milwaukee, exhibited two machines, well and substantially made, the distinguishing characteristics being a movable side gear, so that the horse-power can be set in any position to accommodate the separator. Also an extension tumbling rod, which can be moved to make up a variation in distance from an half inch to four feet, between the horse-power and separator.

E. E. Owens & Co. also exhibited two machines with steam power and horse power, both excellent machines, with improvements, by Langworthy & Owens, the principle of which is, relieving the cylinder from driving the balance of the machinery, through a shaft running from the side gear to the beater shaft, which gets its motion from gearing. They are also run with Langworthy's Patent Safety Knuckles; entirely safe from accident, so common in the old kind of knuckles. Also a Pitt's mounted power with Langworthy's improvements, and a new power called the "Little Monitor," with an entire cast iron frame and mounted on wheels.

The Geiser Threshing Machine Company of Racine, had two machines, substantially made, designed to run with steam or horse power. These machines dispense with the apron, and have some other improvements in the sieves, etc.

Case & Co. of Racine, exhibited one machine. They are well known manufacturers; and claim to raise and lower the straw stacker while the machine is in motion, which is quite a desideratum.

C. Aultman & Co. had also one of their machines on the ground exhibited by their agent, Walter C. Barnes, of Freeport, Ill. This machine is well and substantially made, and has many friends where it is used.

S. Bush of Milwaukee, exhibited the Buffalo Pitts' Threshing Machine; they are too well known to require any special mention at the hands of the committee.

B. L. Corss, of Milwaukee, entered J. B. Smith's "Boiler Feed Water Regulator," a valuable piece of machinery for keeping the water at exactly the right height in the boiler. It must have the effect wherever used to lessen the danger of explosion caused by low water. We deem it eminently entitled to a diploma.

All of which is respectfully submitted.

D. S. HARKNESS,
A. J. LANGWORTHY,
GEO. J. ROGERS.

REPORT OF THE FINE ARTS DEPARTMENT.

BY J. O. EATON, SUPERINTENDENT.

The success of the Fine Arts Department in 1870 was so marked, in view of all the unfavorable conditions, that new hopes were entertained for it in 1871—especially in view of an increase in the number and value of premiums, and the very considerable enlargement of the hall and the introduction of sky-lights into its roof. Unhappily, however, these hopes were doomed to disappointment, so that it now devolves upon the superintendent to report his department a practical failure. But few artists from any portion of state had specimens of their skill on exhibition, and the citizens of Milwaukee who contributed so handsomely of their choice works the year before, appeared to have exhausted their enthusiasm in the praiseworthy efforts then put forth and this time, with a few exception, did literally nothing. In fact, however, the society is entitled to a share of the discredit; for the lack of co-operation on the part of those citizens who made the largest and most valuable contributions in 1870 was due in a large measure, if not wholly, to the tardiness of the society in deciding to make such improvements in the exhibition hall as were demanded by them, and as were necessary to the protection and proper display of their various works. Action came so late, indeed, that the lovers of art in Milwaukee, dispairing of any suitable preparation, had already made arrangements for an independent exhibition in the city, gotten up in the interest of a worthy charity enterprise.

When, therefore, the hall had, at last been enlarged and otherwise improved, the superintendent found so large a proportion of desirable works of art pre-engaged that to make a creditable display was practically impossible.

This statement is made, not in the spirit of complaint, but by way of explaining a fact, which might otherwise be attributed to the wrong cause, and of calling the attention of the executive board, and the city of Milwaukee, to whose liberal action the society looks for the means necessary to the improvement of the grounds, to the imperative necessity of some better provision than has yet been made for this very interesting and attractive department of our annual exhibitions.

Notwithstanding the general failure of the art department as such, it remains to be said, on the other hand, that the hall dedicated to its use was crowded to overflowing with a great variety of articles into the manufacture of which art more or less entered, and which, but for the above mentioned deficiency, would have had no place on the grounds at all. For example, Messrs. Mathews Brothers, A. D. Seaman, and Stark Brothers, gladly occupied a section with really magnificent displays of elegant furniture, carpets, window curtain material, etc., etc. Messrs. J. J. Birchard, N. Brick and Goldsmith & Co., occupied an opposite section, in like manner. These strong and popular houses vied with each other in the attractiveness of their exhibitions and were successful in drawing crowds of interested observers.

Messrs. Blair & Persons, and Frackleton & Co., were there with a fine show of cutlery, glass and china-ware; and Niedecken & Co., made a splendid exhibition of blank books and general binding –among them, a set of blank books for Mitchell's bank, said to have been the best set ever gotten up in Wisconsin. At all events they were beautiful specimens of the binder's art, and worthily received the award of a silver medal.

Among the numerous other articles admitted to the hall, fine assortments of gold and silver electro-plated ware, surgical and dental instruments and apparatus, trunks and valises, millinery and ladies' clothing, embroideries, etc., shell work, hair work, perfumery, fancy soaps, and the like, were prominent.

A few articles, worthy of a place in a fine art gallery, were on exhibition, and were duly appreciated.

H. H. Bennett, Kilbourn City, showing a fine collection of stereoscopic views of Wisconsin natural scenery, taking the premium, a silver medal. W. H. Sherman and H. Broich, of Milwaukee, each made a fine show of photographs of various kinds, each taking the society's diploma.

Miss Fanny Wells, Miss Dora Park, and Master Walter O. Lydston, presented fine specimens of pencil drawings; Mr. W. Hunt, portrait in oil, and Mr. F. A. Lydston, a fruit painting in oil, all taking premiums. Messrs. Merrill & Eccles made a fine show of marble mantels and collection of marble statuary, taking the premiums. An original specimen of sculpture, by Mr. C. P. Knowles, of Janesville—a life-size bust of "Faith" in pure Carrara marble—was much admired and received the award of a silver medal.

Copper-plate and wood engraving, by John Marr; seal-engraving, by C. H. Clarke; penmanship, by S. S. Hurlbut; carving in wood, by J. F. Birchard, and lithographs, by the Milwaukee Lithographing and Engraving Co., and many other articles, bore off the society's premiums.

The well-known house of Hempstead & Co. made a fine show of pianos and musical instruments, which was a great attraction in that part of the hall.

Many thanks are also due to Messrs. Strickland & Co. for their free exhibition of chromos and oil paintings, among which were many fine specimens.

We were favored by many other exhibitors in this department whose names have passed from my recollection.

For economical reasons as well as because the work they do in these recent days comes near enough to works of art to entitle them to kinship, the sewing machines were also assigned to my care, and were invited to a place in the wing opening into the fine arts hall, on the south side. And so great was the pressure for space on the part of the various competing companies that at one time it looked as though we might have to build anew or abandon the main building wholly to their use. Having filled the wing, they were allowed to flow over into the art hall, filing right and left, until they pretty well lined the east side of it. Sixteen different companies were represented, each company exhibiting several different styles and operating their machines by a number of agents, from which it will be evident to those not present that, for once, there was click and clatter and buzz enough to satisfy the most intense lover of that sort of domestic music.

In concluding my report, I venture to urge again the importance of this department, and to urge upon the society the necessity for an entire division of the articles which have usually been assigned to it. Without such division, it is impossible to do justice to either class. The plainer articles of use are apt to receive less attention on the one hand; while on the other, the show of fine paintings and marble statuary in a rude building, ill-lighted and in no way constructed for such purposes, to say nothing of the incongruity of placing such works in the midst of millinery, fancy soaps, bedquilts and wax candles, is a thing that artists and connoisseurs may submit to once, but never willingly the second time.

These exhibitions of art may be made to exert an excellent influence upon the taste and general culture of the people who annually witness them, many of whom have no other opportunity to enjoy and study such productions, and the society must not disregard their claims to consideration.

AWARDS OF PREMIUMS.

Class 1—Thoroughbred Horses.

Best stallion, 4 years old and over, C. C. and R. H. Parks, Waukegan, Ill., $50.
Second best, John C. Corrigan, Cedarburg, $25.
Best stallion, 3 years old and under 4, C. C. and R. H. Parks, Waukegan, Ill., $30.
Best stallion, 2 years old and under 3, Ed. Wheatley, Rochester, $15.
Best sucking stallion colt, John C. Corrigan, Cedarburg, $10.
Best brood mare 4 years, W. D. McIndoe, Wausau, $30.
Second best, C. C. and R. H. Parks, Waukegan, Ill., $15.
Best filly, 2 years old and under 3, C. C. and R. H. Parks, Waukegan., $10.
Best filly 1 year old and under 2, E. S. Wadsworth, Chicago, Ill., $10.
Best sucking mare colt, C. C. and R. H. Parks, Waukegan, Ill., $10.

CHAS. H. LARKIN,
S. B. DAVIS,
HARVEY CRANDALL,
Committee.

Class 2—Roadsters.

Best stallion 4 years old and over, C. T. Bradley, Milwaukee, $50.
Second best, G. C. Stevens, Milwaukee, $25.
Best stallion 3 years old and under 4, E. S. Wadsworth, Chicago, $30.
Second best, J. M. Hall, Merton, $15.
Best broad mare, E. S. Wadsworth, Chicago, $30.
Second best, David Ferguson, Milwaukee, $15.
Best filly, 3 years old, and under 4, H. F. Jennings, Oconomowoc, $20.
Second best, C. T. Bradley, Milwaukee, $15.

GEO. A. MASON,
H. L. DOUSMAN,
I. STEPHENSON,
Committee.

Class 3—Horses for General Purposes.

Best stallion, 4 years old and over, A. Clark, Waukegan, Ill., $30.
Second best, H. F. Orvis, Fox Lake, $15.
Best stallion, 3 years old and under 4, W. Leroy, Hartland, $20.
Second best, David Loomer, Mequon, $10.
Best stallion, 2 years old and under 3, E. S. Wadsworth, Chicago, $10.
Second best, E. S. Wadsworth, Chicago, $5.
Best stallion, 1 year old and under 2, E. S. Wadsworth, Chicago, $8.
Second best, C. T. Bradley, Milwaukee, $4,
Best sucking stallion colt, C. T. Bradley, Milwaukee, $5.
Second best, J. Bush, Ives' Grove, $3.
Best brood mare, J. C. Owen, Footville, $20
Second best, E. S. Wadsworth, Chicago, $10.
Best filly, 3 years old and under 4, R. Hughes, Watertown, $15.
Second best, E. M. DePuy, East Troy Lakes, $10.

Best filly, 2 years old and under 3, Geo. Murray, Racine, $10.
Second best, S. Hickey, Milwaukee, $5.
Best filly, 1 year old and under 2, Geo. Murray, Racine, $6.
Second best, C. T. Bradley, Milwaukee, $3.
Best sucking mare colt, J. Bush, Ives' Grove, $5.
Second best, E. S. Wadsworth, Chicago, $3.

S. HAYT,
C. H. PHILLIPS,
S. DRAKELY,
Committee.

Class 4—Draft Horses.

Best stallion, 4 years old and over, Simon Ruble, Beloit, $40.
Second best, David McLay, Emerald Grove, $20.
Best stallion, 3 years old and under 4, Jas. T. Cutter, Emerald Grove, $15.
Second best, Simon Ruble, Beloit, $10.
Best brood mare, 4 years old and over, Simon Ruble, Beloit, $20.
Second best, Henry Luhring, Road Creek, $10.
Best Filly, 3 years old and under 4, David Barlas, Emerald Grove, $10.
Second best, Joseph Pilgrim, Menomonee, $5.

S. HAYT,
BENJ. MORSE,
GEO. A. MASON,
C. H. PHILLIPS,
Committee.

Class 5—Jacks and Mules.

Best pair working mules, E. B. Thomas, Dodge's Corners, $10.
Second best, J. W. Park, Dodge's Corners, $5.

Class 6—Matched Horses and Mares.

Best pair of carriage horses and mares, W. J. Smith, Racine, $30.
Second best, T. B. Rowlands, Genesee, $15.
Best pair of roadsters, S. J. Hodges, Hartford, $30.
Second best, A. F. Pratt, Waukesha, $15.
Best pair of farm horses, Chas. Cook, Milwaukee, $30.
Second best, L. B. Potter, Wauwatosa, $15.
Best pair of draught horses, David McLay, Emerald Grove, $30.
Second best, S. A. Fox, Waukesha, $15.

GEO. A. MASON,
H. L. DOUSMAN,
I. STEPHENSON,
Committee for Classes 5 and 6.

Class 7—Geldings or Mares for Harness or Saddle.

Best gelding or mare for single harness, Geo. Murray, Racine, $10.
Second best, A. M. Stacy, Hartford, $5.

GEO. A. MASON,
S. HAYT,
C. H. PHILLIPS,
BENJ. MORSE,
Committee.

Class 8—*Trotters.*

Best and fastest trotting stallion over 5 years old, J. C. Corrigan, Cedarburg, "Kimball Jackson," time, 2:34¼, $100.
Second best, G. C. Stevens, Milwaukee, "Bald Chief," $50.
Best and fastest trotting mare over 5 years old, J. I. Case, Racine, "Capitola," time, 2:39 and 2:36¾, $60.
Second best, J. Van Etta, Edgerton, "Lady Douglas," $30.
Best and fastest trotting gelding over 5 years old, A. L. Boynton, Milwaukee, "Billy Wilkes," $60.
Second best, Gilbert Adams, Racine, $30.

Class 9—*Running Horses.*

Two mile heats, best 2 in 3, A. B. Douglas, Brodhead, "Merrill," time, 3:51 and 3:58, $200.
Second best, Matt. O'Neill, Dodgeville, "Prairie Lilly," $100.
Mile heats, best 3 in 5, H. H. Barnes, Ripon, "Kitty Stacy," time, 1:51, $100.
Second best, C. C. and R. H. Parks, Waukegan, Ill., "Nathan Oaks," $50.
Best colt race, mile dash, T. C. Smith, Columbus, $50.
Second best, H. H. Barnes, Ripon, $25.

WM. HOBKIRK,
S. B. DAVIS,
C. LOFTUS MARTIN,
Committee for Classes 8 *and* 9.

Class 10—*Sweepstakes on Horses.*

Best stallion and 5 of his colts, at four years old and under, C. T. Bradley, Milwaukee, grand silver medal and $100.
Best brood mare with foal by her side, George Murray, Racine, grand silver medal and $50.
Discretionary premium awarded to C. C. & R. H. Parks, Waukegan, Ill., for Bonnie Scotland and his colts, grand silver medal and $50.

"Bonnie Scotland" and his stock came from out of the state, and not being permitted to contend for a premium in the sweepstakes, were exhibited to the committee, and examined by them with great pleasure. The horse, and his five colts exhibited, showed remarkable fine points of the thoroughbred, as well as great bone and substance for high bred stock. The committee congratulate the breeders of northern Illinois on the acquisition of so valuable a horse for breeding purposes. A cross with the large mares of that section cannot fail to produce a valuable stock of horses for the carriage, the road and farm purposes.

GEO. A. MASON,
C. H. PHILLIPS,
BENJ. MORSE,
S. HAYT,
Committee.

Class 11.—*Short Horns.*

Best bull 4 years old and over, George Murray, Racine, $40.
Best bull 3 years old and under 4, C. C. and R. H. Parks, Waukegan Ill., $30.
Second best, E. Fairbanks, Hampden, $15.
Best bull 2 years old and under 3, E. P. Brockway, Ripon, $30.
Second best, G. Lawrence, Waukesha, $15.

Best bull 1 year old and under 2, Wm. Rhodes, Salem Station, $15.
Second best, George Murray, Racine, $10.
Best bull calf over 6 months and under 12, C. C. and R. H. Parks, Waukegan, Ill., $15.
Second best, George Murray, Racine, $10.
Best bull calf under 6 months, George Murray, Racine, $15.
Second best, E. and J. Smith, Rochester, $10.
Best cow 4 years old and over, E. P. Brockway, Ripon, $30.
Second best, George Murray, Racine, $15.
Best cow 3 years old and under 4, E. P. Brockway, Ripon, $25.
Second best, C. C. and R. H. Parks, Waukegan, Ill., $15.
Best heifer 2 years old and under 3, E. P. Brockway, Ripon, $25.
Second best, George Murray, Racine, $15.
Best Heifer 1 year old and under 2, E. P. Brockway, Ripon, $20.
Second best, Wm. Rhodes, Salem Station, $10.
Best heifer calf 6 months old and under 12, E. P. Brockway, Ripon $10.
Second best, Wm. Rhodes, Salem Station, $5.
Best heifer calf under 6 months, J. C. Meachem, Genesee, $10.
Second best, George Murray, Racine, $5.

S. L. DYSART,
E. G. FOWLER,
D. W. MAXON.
Committee.

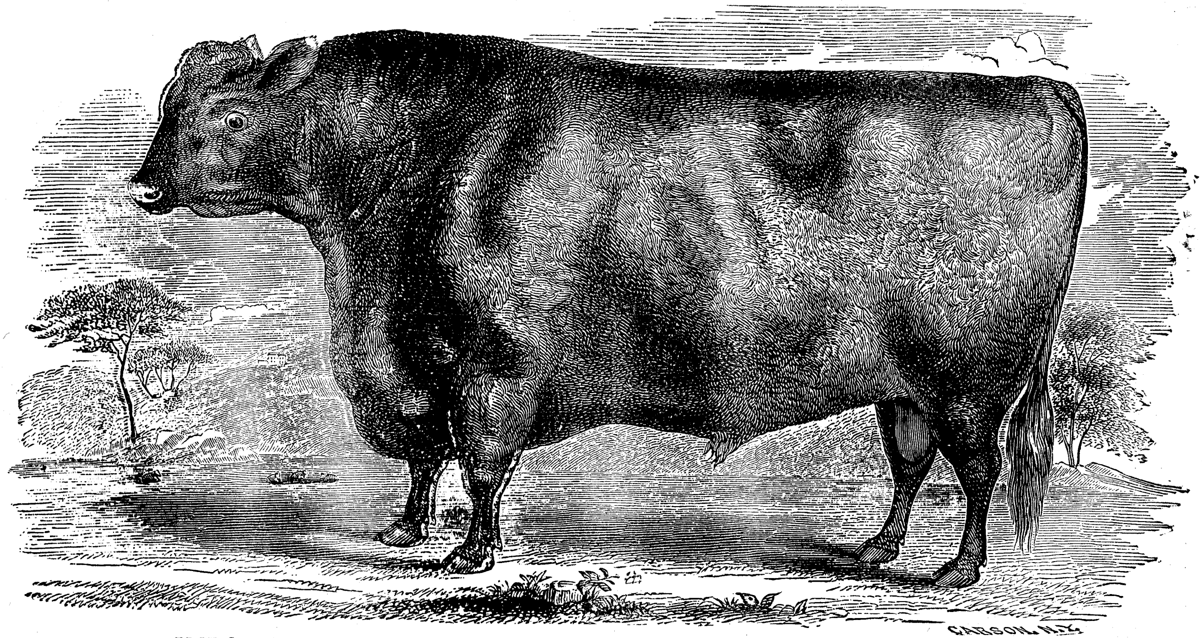
Class 12—*Devons.*

Best bull, 4 years old and over, Stephen Warren, Hartland, $20.
Second best, Luther Rawson, Oak Creek, $10.
Best bull, 3 years old and under 4, W. T. Smith, Elkhorn, $20.
Second best, Luther Rawson, Oak Creek, $10.
Best bull, 2 years old and under 3, G. C. Chaffee, Whitewater, $10.
Best bull, 1 year old and under 2. Luther Rawson, Oak Creek, $20.
Best bull calf, 6 months old and under 12, Luther Rawson, Oak Creek, $10.
Second best, Jonathan Stoddard, Greenbush, $5.
Best bull calf, under 6 months, Luther Rawson, Oak Creek, $10.
Best cow, 4 years old and over, Luther Rawson, Oak Creek, $15.
Second best, Luther Rawson, Oak Creek, $10.
Best cow, 3 years old and under, Luther Rawson, Oak Creek, $15.
Second best, Percival Sheard, Burlington, $10.
Best heifer, 2 years old and under 3, George C. Chaffee, Whitewater, $15.
Second best, Luther Rawson, Oak Creek, $10.
Best heifer, 1 year old and under 2, W. T. Smith, Elkhorn, $15.
Second best, Luther Rawson, Oak Creek, $10.
Best heifer calf, under 6 months, W. T. Smith, Elkhorn, $6.
Second best, Luther Rawson, Oak Creek, $3.

N. A. SPOONER,
ASA WILKINS,
RICHARD RICHARDS,
Committee.

Class 13—*Ayrshires.*

Best bull, 4 years old and over, Jonathan Stoddard, Greenbush, $20.
Second best, H. S. Durand, Racine, $10.
Best bull, 2 years old and under 3, Jonathan Stoddard, Greenbush, $20.
Best bull, 1 year old and under 2, Jonathan Stoddard, Greenbush, $20.
Second best, Jonathan Stoddard, Greenbush, $10.
Best cow, 4 years old and over, H. S. Durand, Racine, $15.
Second best, Jonathan Stoddard, Greenbush, $10.
Best heifer, 2 years old and under 3, H. S. Durand, Racine, $15.
Second best, F. S. Capron, Oconomowoc, $10.
Best heifer, 1 year old and under 2, H. S. Durand, Racine, $15.
Second best, F. S. Capron, Oconomowoc, $10.
Best heifer calf, 6 months old and under 12, H. S. Durand, Racine, $6.



IMPORTED GALLOWAY BULL. Owned by Michigan Agricultural College.

Class 14—*Alderneys.*

Best bull 3 years old and under 4, C. T. Bradley, Milwaukee, $20.
Best bull 1 year old and under 2, H. S. Durand, Racine, $20.
Best bull calf under 6 months, C. T. Bradley, Milwaukee, $10.
Second best, H. S. Durand, Racine, $5.
Best cow 4 years old and over, H. S. Durand, Racine, $15.
Second best, C. T. Bradley, Milwaukee, $10.
Best cow 3 years old and under 4, C. T. Bradley, Milwaukee, $15.
Best heifer 1 year old and under 2, H. S. Durand, Racine, $15.
Second best, C. T. Bradley, Milwaukee, $10.
Best heifer 6 months old and under 12, H. S. Durand, Racine, $6.
Second best, C. T. Bradley, Milwaukee, $3.
Best heifer calf under 6 months old, H. S. Durand, Racine, $6.
Special premium on exhibition of Galloway cattle, I. N. Smith, Bath, Mich., $50.

ASA WILKINS,
I. S. NEWTON,
RICHARD RICHARDS,
Committee for Classes 13 *and* 14.

Class 15—*Grade Cattle and Working Oxen.*

Best grade cow, 3 years old and over, E. and J. Smith, Rochester, $15.
Second best, H. Ludington, Milwaukee, $10.
Best heifer, 2 years old and under 3, S. A. Tenney, Durham Hill, $15.
Second best, E. and J. Smith, Rochester, $10.
Best yearling heifer, E. and J. Smith, Rochester, $15.
Best yoke working oxen, Luther Rawson, Oak Creek, $20.
Second best, H. Gregg, Elm Grove, $10.

Class 16—*Milch Cows.*

Best milch cow of any breed, 4 years old and over, M. L. Butterfield, Waukesha, $30.
Second best, E. and J. Smith, Rochester, $15.
Best milch cow, 3 years old and under 4, M. L. Butterfield, Waukesha, silver medal and $20.

WAUKESHA, September 25, 1871.

GENTLEMEN: I herewith give you my statement of milk and butter made from my cow, from the fifth to the fourteenth day of June, 1871. My cow is six years old; is a cross on the Alderney and Devon; and calved on the eighth of May. Number of quarts of milk per day, 19; number of pounds of milk per day, 42; number of pounds of butter in ten days, 27 pounds and 12 ounces.

M. L. BUTTERFIELD.

M. L. Butterfield being duly sworn, deposes and says the above statement is true, to the best of his knowledge and belief.

Subscribed and sworn to before me this 25th day of September, 1872.

O. M. TYLER,
Notary Public, Waukesha, Wis.

WAUKESHA, Sept. 25, 1871.

GENTLEMEN: I herewith give you my statement of milk and butter made from my two years old heifer, from the 15th to the 24th day of June, 1871. She is two years old, cross of Alderney and Devon, and calved on the first day of May. Number of quarts of milk per day, 15½; number of pounds of milk per day, 35¼; number of pounds of butter in ten days, 19 lbs., 15 ozs.

M. L. BUTTERFIELD.

M. L. Butterfield being duly sworn, deposes and says, that the above statement is true to the best of his knowledge and belief.

Subscribed and sworn to before me, this 25th day of Sept., 1871.

O. M. TAYLOR,
Notary Public, Waukesha, Wis.

Class 17—Fat Cattle.

Best pair of fat oxen, 5 years old and over, Daniel Wells, Wauwatosa, $20.
Second best, E. & J. Smith, Rochester, $10.
Best pair of fat oxen, 4 years old and under 5, G. N. Lyman, Ripon, $15.
Second best, G. N. Lyman, Ripon, $10.
Best fat cow, steer or heifer, E. & J. Smith, Rochester, $10.
Second best, G. N. Lyman, Ripon, $5.

J. T. KINGSTON,
D. M. ASPINWALL,
G. W. WILLIAMS,
Committee for Classes 15, 16 *and* 17.

Class 18—Herds.

Best bull and 5 cows or heifers, over 1 year old, E. P. Brockway, Ripon, $100.
Second best, S. A. Tenney, Durham Hill, $50.
Best bull of any age, E. P. Brockway, Ripon, $50.
Second best, C. C. and R. H. Parks, Waukegan, Ill., $25.
Best cow or heifer of any age, E. P. Brockway, Ripon, $40.
Second best, C. C. and R. H. Parks, Waukegan, Ill., $20.

FRED. LAYTON,
L. B. POTTER,
BEN. FERGUSON,
Committee.

Class 19—American Merinos.

Best buck 2 years old and over, John H. Paul, Genesee, $20.
Second best, John H. Paul, Genesee, $10.
Best buck 1 year old and under 2, John H. Paul, Genesee, $15.
Second best, John H. Paul, Genesee, $10.
Best pen of 3 buck lambs, John H. Paul, Genesee, $10.
Second eest, George C. Chaffee, Whitewater, $5.
Best pen of 10 ewes 2 years old and over, S. Eastman, Pleasant Prairie, $30.
Second best. John H. Paul, Genesee, $15.
Best pen of 3 ewes 2 years old and over, D. H. Donnan, East Troy, 20.
Second best, A. Humbert, Caldwell's Prairie, $10.
Best pen of 10 ewes 1 year old and under 2, A. Humbert, Caldwell's Prairie, $20.
Best pen of 3 ewes 1 year old and under 2, J. W. Park Dodge's Corners, 15.
Second best, D. H. Donnan, East Troy, $10.
Best pen of 10 ewe lambs, G. O. Lawrence, Waukesha, $20.
Second best John H. Paul, Genesee, $10.
Best pen of 3 ewe lambs, D. H. Donnan, East Troy, $10.
Second best, Geo. C. Chaffee, Whitewater, $5.

R. T. GRAVES,
F. H. GOODHUE,
GEO. E. PRATT,
Committee.

Class 20—Long Wool, Leicesters.

Best buck, 2 years old and over, E. Porter, Waukesha, $20.
Second best, Peter Wakem, Ontario, Canada, $10.
Best buck 1 year old and under 2, Peter Wakem, Ontario, Canada, $15.
Second best, E. Porter, Waukesha, $10.
Best pen of 3 buck lambs, E. Porter, Waukesha, $10.
Second best, Peter Wakem, Ontario, Canada, $5.
Best pen of 3 ewes, 2 years old and over, E. Porter, Waukesha, $20.
Second best, Ed. Carr, Oak Creek, $10.

Best pen of 3 ewes, 1 year old and under 2, Peter Wakem, Ontario, Canada, $15.
Second best, E. Porter, Waukesha, $10.
Best pen of 3 ewe lambs, E. Porter, Waukesha, $10.
Second best, E. Porter, Waukesha, $5.

Class 21—Long Wool, not Leicesters.

Best buck, 2 years old and over, F. S. Capron, Oconomowoc, $20.
Second best, William Rhodes, Salem, $10.
Best buck 1 year old and under 2, C. C. & R. H. Parks, Waukegan, Illinois, $15.
Second best, Peter Wakem, Ontario, Canada, $10.
Best pen of 3 buck lambs, C. C. & R. H. Parks, Waukegan, Illinois, $10.
Second best, E. Porter, Waukesha, $5.
Best pen of 3 ewes, 2 years old and over, C. C. & R. H. Parks, Waukegan, Illinois, $20.
Second best, C. C. & R. H. Parks, Waukegan, Illinois, $10.
Best pen of 3 ewes, 1 year old and under 2, C. C. & R. H. Parks, Waukegan, Illinois, $15.
Second best, C. C. & R. H. Parks, Waukegan, Illinois, $10.
Best pen of 3 ewe lambs, C. C. & R. H. Parks, Waukegan, Illinois, $10.
Second best, E. Porter, Waukesha, $5.

Class 22.—Middle Wools.

Best buck 2 years old and over, Peter Wakem, Ontario, Can., $20.
Second best, C. T. Bradley, Milwaukee, $10.
Best buck 1 year old and under 2, Peter Wakem, Ontario, Can., $15.
Second best, I. N. Smith, Bath, Mich., $10.
Best pen buck lambs, G. H. Daubner, Brookfield Center, $10.
Second best, Peter Wakem, Ontario, Can., $5.
Best pen of 3 ewes two years old and over, G. H. Daubner, Brookfield Center, $20.
Second best, Luther Rawson, Oak Creek, $10.
Best pen of 3 ewes one year old and under two, Peter Wakem, Ontario, Can., $15.
Second best, I. N. Smith, Bath, Mich., $10.
Best pen of 3 ewe lambs, G. H. Lamberton, Lamberton, $10.
Second best, C. T. Bradley, Milwaukee, $5.

Class 23.—Fat Sheep.

Best fat sheep, not less than three, C. C. and R. H. Parks, $10.
Second best, E. Porter, Waukesha, $5.

CLINTON MATTESON,
LEONARD COLEMAN,
HENRY STEVENS.
Committee for classes 20, 21, 22 and 23.

Class 24—Swine.

ESSEX.

Best sow and litter of pigs. John Jeffers, Darien, $15.
Best sow pig six months and over, John Jeffers, Darien, $10.
Best boar over 1 and under 2 years, John Jeffers, Darien, $10.

LANCASHIRE.

Best boar 2 years old and over, Byers & Campbell, Nevada, Ohio, $15.
Best boar over 1 year and under 2, Byers & Campbell, Nevada, Ohio, $10.

Best breeding sow 2 years and over, Byers & Campbell, Nevada, Ohio, $15.
Second best, Byers & Campbell, Nevada, Ohio, $10.
Best boar pig over 6 months, Byers & Campbell, Nevada, Ohio, $10.
Best sow pig 6 months and over, Byers & Campbell, Nevada, Ohio, $10.

CHESHIRE.

Best boar over 1 and under 2 years, J. Taylor, Waupun, $10.
Best breeding sow with litter of pigs, J. Taylor, Waupun, $15.
Best boar pig over 6 months, L. J. Hobart, Milwaukee, $10.
Best sow pig over 6 months old, L. J. Hobart, Milwaukee, $10.

SUFFOLK.

Best boar, over 1 and under 2 years, Jonathan Wing, Oconomowoc, $10.
Best sow, 2 years and over, Jonathan Wing, Oconomowoc, $10.
Best sow pig, over 6 months, R. B. Allen, Hartland, $10.

M. DU BOISE,
A. SUTHERLAND,
Committee.

CHESTER WHITE.

Best boar, 2 years and over, J. Taylor, Waupun, $15.
Second best, W. E. McClure, Genesee, $10.
Best boar, 1 year and under 2, J. Taylor, Waupun, $10.
Second best, Jas. W. McCready, Milwaukee, $5.
Best boar pig, six months and over, D. W. Rowlands, Racine, $10.
Second best, J. Taylor, Waupun, $5.
Best sow, 2 years and over, J. Taylor, Waupun, $15.
Second best, Jas. McCready, Milwaukee, $10.
Best sow, 1 year and under 2, J. Taylor, Waupun, $10.
Best breeding sow, with litter of pigs under 6 months, J. Taylor, Waupun, $15.
Second best, H. Lumb, Brookfield, $10.
Best sow pig, over 6 months, J. Taylor, Waupun, $10.
Second best, D. W. Rowlands, Racine, $5.

BERKSHIRE.

Best boar, 2 years old and over, E. P. Brockway, Ripon, $15.
Second best, P. Wakem, Ontario, Can., $10.
Best boar, 1 year and under 2, R. Richards, Racine, $10.
Second best, S. H. Seamans, Wauwatosa, $5.
Best breeding sow, 2 years old and over, Peter Wakem, Ontario, Can., $15.
Second best, E. P. Brockway, Ripon, $10.
Best breeding sow, with litter of pigs, James Magson, $15.
Second best, R. Richards, Racine, $10.
Best sow, 1 year and under 2, R. Richards, Racine, $10.
Second best, Peter Wakem, Ontario, Can., $5.
Best boar pig, over 6 months, R. Richards, Racine, $10.
Second best, E. P. Brockway, Ripon, $5.
Best sow pig, over 6 months old, Peter Wakem, Ontario, Can., $10.
Second best, E. P. Brockway, Ripon, $5.

POLAND CHINA.

Best boar, 1 year and under 2, J. L. Owens, Mokena, Ill., $10.
Second best, John Jeffers, Darien, $5.
Best sow, 1 year old and under 2, J. L. Owens, Mokena, Ill., $10.
Best breeding sow, with litter of pig, J. L. Owens, Mokena, Ill., $15.
Second best, John Jeffers, Darien, $10.
Best sow pig, over 6 months old, J. L. Owens, Mokena, Ill., $10.
Second best, J. L. Owens, Mokena, Ill., $5.
Best boar pig, 6 months old, J. L. Owens, Mokena, Ill., $10.
Second best, J. L. Owens, Mokena, Ill., $5.

SPECIAL PREMIUMS.

[Offered by Messrs. Plankinton & Armour, Layton & Co., Jas. T. Woolley, L. Farlan, Van Kirk & McGeoch, Pork Packers of Milwaukee.]

Best boar, of any age, Byers & Campbell, Nevada, Ohio, $100.
Best sow, of any age, Peter Wakem, Ontario, Canada, $100.
Best six pigs, under 6 months, E. Wheatly, Rochester, $100.
Best fatted hog, for packing purposes, J. Taylor, Waupun, $50.
Best boar, sow and 5 pigs, of any age or breed, under 7 months, E. P. Brockway, Ripon, $100.
Second best, J. L. Owens, Mokena, Ill., $50.

T. C. DOUSMAN,
L. B. POTTER,
J. McCREADY,
Committee.

Class 25.—Poultry.

Best trio Gray Dorkings, S. H. Seamans, Wauwatosa, $3.
Second best S. H. Seamans, Wauwatosa, $2.
Best trio White Dorkings, S. H. Seamans, Wauwatosa, $3.
Second best S. H. Seamans, Wauwatosa, $2.
Best black Spanish, S. H. Seamans, Wauwatosa, $3.
Second best, Alcott & Van Vranken, Wauwatosa, $2.
Best trio Polands, S. H. Seamans, Wauwatosa, $3.
Best trio Hamburgs, Alcott & Van Vranken, Wauwatosa, $3.
Second best S. H. Seamans, Wauwatosa, $2.
Best trio game fowls, S. H. Seamans, Wauwatosa, $3.
Second best, S. H. Seamans, Wauwatosa, $3.
Best White Leghorns, Lee & Judson, Milwaukee, $3.
Second best, S. H. Seamans, Wauwatosa, $2.
Best trio Buff Cochins, Lee & Judson, Milwaukee $3.
Second best, C. C. and R. H. Parks, Waukegan, Ill., $2.
Best trio Partridge Cochins, S. H. Seamans, Wauwatosa, $3.
Second best, Lee & Judson, Milwaukee, $2.
Best trio Light Brahmas, Lee & Judson, Milwaukee, $3.
Second best C. C. and R. H. Parks, Waukegan, Ill., $2.
Best trio Dark Brahmas, C. C. and R. H. Parks, Waukegan, Ill., $3.
Second best, S. H. Seamans, Wauwatosa, $2.
Best trio Houdans, Alcott & Van Vranken, Wauwatosa, $3.
Second best, Lee & Judson, Milwaukee, $2.
Best trio Bantams, S. H. Seamans, Wauwatosa, $3.
Second best, L. A. Curtis, Wauwatosa, $2.
Best pair bronze turkeys, S. H. Seamans, Wauwatosa, $3.
Second best, P. Putnam, Dodge's Corners, $2.
Best pair common turkeys, C. H. Jacobs, Wauwatosa, $3.
Second best, C. H. Jacobs, Wauwatosa, $2.
Best pair Muscovy ducks. H. L. Stoltz, Milwaukee, $3.
Second best, H. L. Stoltz, Nilwaukee, $2.
Best pair Aylesbury ducks, C. C. and R. H. Parks, Waukegan, Ill., $3.
Second best, S. H, Seamans, Wauwatosa, $2.
Best pair Rouen ducks, S. H. Seamans, Wauwatosa, $3.
Second best, S. H. Seamans, Wauwatosa, $2.
Best pair Bremen geese, S. H. Seamans, Wauwatosa, $3.
Best and greatest variety of poultry, S. H. Seamans, Wauwatosa, silver medal and $15.

JOHN DEARSLEY.
G. P. KELLOGG,
S. A. PHILBROOK.
Committee.

Class 26—Field Products.

SPECIAL PREMIUMS OF CHAMBER OF COMMERCE.

Best bushel spring wheat, Wm. Simpson, Lisbon, $25.
Best bushel winter wheat, R. M. & W. Andrus, Reedsburg, $25.

Best sample spring wheat (club), N. Stearns & Son, Galesville, $5.
Second best, D. D. Bryant, Madison, $3.
Best sample spring wheat (fife), H. Bourse, Milwaukee, $5.
Second best, Thomas Davis, Oshkosh, $3.
Best bushel spring wheat (Rio Grande or China Tea), Wm. Simpson, Lisbon, $5.
Second best, Thomas Davis, Oshkosh, $3.
Best white winter wheat, R. M. & W. Andrus, Reedsburg, $5.
Second best, Thomas Davis, Oshkosh, $3.
Best red winter wheat, G. W. Williams, Oconomwoc, $5.
Second best, D. McVean, Oconomowoc, $5.
Best bushel of rye, Thomas Davis, Oshkosh, $5.
Second best, Geo. Lawrence, Jr., Waukesha, $3.
Best bushel of oats, Thomas Davis, Oshkosh, $5.
Second best, J. C. Starkweather, Oconomowoc, $3.
Best sack hops, E. B. Thomas, Dodge's Corners, $5.
Second best, G. H. Lamberton, $3.
Best bushel timothy seed, J. C. Starkweather, Oconomowoc, $5.
Second best, John Howard, Milwaukee, $3.
Best bushel clover seed, E B. Thomas, Dodge's Corners, $5.
Second best, Geo. Wolf, Staatsville, $3.
Best bushel peas, Thomas Davis, Oshkosh, $5.
Second best, S. A. Tenny, Durham Hill, $3.
Best bushel beans, Thomas Davis, Oshkosh, $5.
Second best, F S. Capron, Oconomowoc, $3.
Best bushel dent corn, J. J. Pellett, $5.
Second best, P. B. Stewart, Eagle, $3.
Best bushel flint corn, J. C. Starkweather, Oconomowoc, $5.
Second best, E J. Grover, Wauwatosa, $3.
Best bushel barley, E. B. Thomas, Dodge's Corners, $5.
Second best, J. C. Starkweather, Oconomowoc, $3.
Best bushel buckwheat, G. H. Lamberton, Lamberton, $5.
Second best, E. M. De Puy, East Troy Lakes, $3.
Best bushel flax seed, D. W. Rowlands, Racine, $5.
Second best, T. Davis, Oshkosh, $3.
Best bale broom corn, M. Steele, Milwaukee, $5.
Second best, R. Van Alsyace, Delavan, $3.
Best bushel early potatoes, Geo. Jeffrey, Wauwatosa, $5.
Second best, J. S. Wilcox, Milwaukee, $3.
Best bushel late potatoes, D. W. Rowlands, Racine, $5.
Second best, Reuben Strong, Milwaukee, $3.
Best bushel carrots, James Eager, Milwaukee, $3.
Second best, E. B. Thomas, Dodge's Corners, $2.
Best bushel turnips, H. Swallow, Hartland, $3.
Second best, James Copper, Bay View, $2.
Best bushel onions, Geo. S. Haskell & Co., Rockford, Ill., $5.
Second best, J. Wilcox, Milwaukee, $3.
Best ten pounds tobacco, W. H. Jennings, Caledonia Center, $5.
Second best, J. C. Starkweather, Oconomowoc, $3.
Best six squashes, G. H. Lamberton, Lamberton, $5.
Second best, L. S. Curtis, Wauwatosa, $3.
Best six pumpkins, E. B. Thomas, Dodge's Corners, $5.
Second best, L. Rawson, Oak Creek, $3.
Best dozen watermelons, E. Elliott, Lone Rock, $5.
Best and largest exhibition of field crop, E. B. Thomas, Dodge's Corners, silver medal and $30.
Second best J. C. Starkweather, Oconomowoc, bronze medal and $15.

SPECIAL PREMIUM FOR SHOW FIELD PRODUCTS.

Geo. S. Haskell & Co., Rockford, Ill., silver medal.

Class 27—Garden Vegetables.

Best twelve stalks celery, I. N. Jones, Milwaukee, $2.
Best six heads cauliflower, J. H. Jones, Milwaukee, $2.
Second best, J. S. Wilcox, Milwaukee, Transactions.
Best twelve beets, E. B. Thomas, Dodge's Corners, $2.
Second best, J. H. Jones, Milwaukee, Transactions.
Best twelve parsnips, J. S. Wilcox, Milwaukee, $2.
Second best, J. C. Starkweather, Oconomowoc, Transactions.
Best three heads of cabbage, James Cooper, Bay View, $2.
Best twelve tomatoes, F. S. Capron, Oconomowoc, $2.
Second best, J. S. Wilcox, Milwaukee, Transactions.
Best twelve sweet potatoes, D. P. Myers, East Troy Lakes, $2.
Second best, H. Bourse, Milwaukee, Transactions.
Best half peck Lima beans, J. C. Starkweather, Oconomowoc, $2.
Second best, D. M. Aspinwall, Farmington, Transactions.
Best half peck Windsor beans, Geo. S. Haskell & Co., Rockford, Ill., $2.
Best show of garden products, Geo. S. Haskell & Co., Rockford, Ill., $10.
Special premium for fine show of garden seeds, Geo. S. Haskell & Co., Rockford, Ill., diploma.

A. A. BENNETT,
L. G. ARMSTRONG,
J. J. MANN,
Committee on Classes 26 and 27.

Class 28—Products of the Flouring Mill, Dairy and Apiary.

Best barrel winter wheat flour, W. A. Austin, Galesville, silver medal and $10.
Best barrel spring wheat flour, August Ehnert, West Granville, silver medal and $10.
Second best, W. S. Austin, Galesville, bronze medal and $5.
Best cheese, factory made, C. Hazen, Ladoga, silver medal and $10.
Second best, J. H. Ham & Co., Whitewater, bronze medal and $5.
Best cheese, farm made, W. C. White, Kenosha, silver medal and $10.
Second best, Nicholas Rechtmeyer, Woodworth, bronze medal and $5.
Best twenty-five lbs. June made butter, Wm. Simpson, Lisbon, silver medal and $10.
Second best, D. P. Webster, Mukwonago, bronze medal and $5.
Best twenty-five lbs. butter made at any time, Mrs. D. M. McVean, Oconomowoc, silver medal and $10.
Second best, C. H. Phillips, Lake Mills, bronze medal and $5.
Best ten lbs. maple sugar, D. M. Aspinwall, Farmington, $5.
Best gallon maple syrup, Mrs. D. M. McVean, Oconomowoc, $5.
Best ten lbs. honey, D. M. Aspinwall, Farmington, $10.
Second best, John Root, Oshkosh, $5.
Best twenty-five lbs. beet sugar, Sauk County Beet Sugar Co., Black Hawk, silver medal.

W. D. HOARD,
L. BASFORD,
W. B. PHILLIPS,
Committee.

Class 29—Household Products.

Best two loaves Graham bread, Mrs. J. W. Park, Dodge's Corners, $3.
Best two loaves corn bread, Mrs. L. S. Curtis, Wauwatosa, $3.
Best two loaves white bread, (hop yeast), Mrs. W. P. Lynde, Milwaukee, $3.

Best two loaves white bread (milk rising), Mrs. Jas. Heth, Milwaukee, $3.
Best five pounds soda crackers, A. T. Riddell, Milwaukee, $2.
Best five pounds picnic crackers, A. T. Riddell, Milwaukee, $2.
Best five pounds Boston crackers, A. T. Riddell, Milwaukee, $2.
Best ten pounds starch (Wisconsin made), Chas. Hermann & Co, Milwaukee, diploma.
Best sponge cake, Miss Jennie L. Heth, Milwaukee, $2.
Best pound cake, Miss Jennie L. Heth, Milwaukee, $2.
Best jelly cake, Mrs. C. T. Farnham, Waukesha, $2.
Best gold cake, Miss Jennie L. Heth, Milwaukee, $2.
Best fruit cake, Mrs. S. A. Tenny, Durham Hill, $2.
Largest and best exhibition of bread and cake, Miss Jennie L. Heth, Milwaukee, diploma and $10.
Best two bottles cider vinegar, A. F. W. Boden, Milwaukee, diploma.
Best two bottles wine vinegar, A. F. W. Boden, Milwaukee, diploma.
Best canned peaches, Mrs. J. W. Park, Dodge's Corners, $2.
Best canned plums, S. B. Smith, Dodge's Corners, $2.
Best canned currants, Mrs. J. W. Park, Dodge's Corners, $2.
Best canned tomatoes, W. G. Benedict, $2.
Best canned gooseberries, Mrs. J. W. Park, Dodge's Corners, $2.
Best canned raspberries, S. B. Smith, Dodge's Corners, $2.
Best canned strawberries, Abbie Ogden, Milwaukee, $2.
Best preserved apples, S. B. Smith, Dodge's Corners, $2.
Best preserved grapes, Mrs. J. W. Park, Dodge's Corners, $2.
Best apple butter, S. B. Smith, Dodge's Corners, $2.
Best raspberry jam, Mrs. J. W. Park, Dodge's Corners, $2.
Best blackberry jam, Abbie Ogden, Milwaukee, $2.
Best crab apple jam, Mrs. N. Stackhouse, Milwaukee, $2.
Best sour pickled cucumbers, S. B. Smith, Dodge's Corners, $2.
Best pickled mangoes, Mrs. J. W. Park, Dodge's Corners, $2.
Best pickled pears, Mrs. J. W. Park, Dodge's Corners, $2.
Best sweet pickled apples, S. B. Smith, Dodge's Corners, $2.
Best tomato catsup, W. G. Benedict, Milwaukee, $2.
Best two bottles sparkling wine, Otto Zweitusch, Milwaukee, diploma.
Large and excellent collection of household products exhibited by W. G. Benedict, Milwaukee, highly commended.

Mrs. L. COLEMAN,
Mrs. N. D. FRATT,
Mrs. A. H. ATKINS.
Committee.

Class 30—*Fruit by Professional Cultivators.*

Best and greatest variety of apples, A. G. Tuttle, Baraboo, $10.
Second best, G. P. Peffer, Pewaukee, $7.50.
Third best, G. J. Kellogg, Janesville, $5.
Fourth best, Geo. Wolf, Staatsville, $3.
Best ten varieties adapted to the Northwest, G. J. Kellogg, Janesville, $7.50.
Second best, A. G. Tuttle, Baraboo, $5.
Third best, Geo. P. Peffer, Pewaukee, $2.50.
Best five varieties adapted to the Northwest, Geo. P. Peffer, Pewaukee, $3.
Second best, G. J. Kellogg, Janesville, $2.
Third best, A. G. Tuttle, Baraboo, $1.
Best and largest variety winter apples, A. G. Tuttle, Baraboo, $7.50.
Second best, Geo. P. Peffer, Pewaukee, $5.
Third best, Geo. Wolf, Staatsville, $2.50.
Best five varieties winter apples, G. J. Kellogg, Janesville, $3.
Second best, A. G. Tuttle, Baraboo, $2.
Third best, C. H. Greenman, Milton, $1.
Best three Fameuse, A. G. Tuttle, Baraboo, $2.
Second best, C. H. Greenman, Milton, $1.
Largest apple, A. G. Tuttle, Baraboo, $1.

Second best, Geo. P. Peffer, Pewaukee, 50 cents.
Heaviest apple, Geo. P. Peffer, Pewaukee, $1.
Second best, D. M. Aspinwall, Farmington, 50 cents.
Best and greatest variety of pears, Geo. P. Peffer, Pewaukee, $7.50.
Second best, Geo. Wolf, Staatsville, $4.
Third best, A. G. Tuttle, Baraboo, $2.50.
Fourth best, G. J. Kellogg, Janesville. $1.
Best three varieties pears, A. G. Tuttle, Baraboo, $3.
Second best, Geo. P. Feffer, Pewaukee, $2.
Best Flemish beauty, Geo. P. Peffer, Pewaukee, $3.
Second best, A. G. Tuttle, Baraboo, $2.
Best variety plums, Geo. P. Peffer, Pewaukee, $3.
Second best, A. G. Tuttle, Baraboo, $2.
Best Miner plums, C. H. Greenman, Milton, $1.
Second best, Geo. P. Peffer, Pewaukee, 50 cents.
Best show peaches, Geo. P. Peffer, Pewaukee, $2.
Second best, G. J. Kellogg, Janesville, $1.
Best variety grapes, A. G. Tuttle, Baraboo, $7.50.
Second best, G. J. Kellogg, Janesville, $5.
Third best, C. H. Greenman, Milton, $3.
Best five varieties grapes, C. H. Greenman, Milton, $5.
Second best, A. G. Tuttle, Baraboo, $3.
Third best, G. J. Kellogg, Janesville, $2.
Best three varieties grapes, A. G. Tuttle, Baraboo, $3.
Second best, G. J. Kellogg, Janesville, $2.
Third best, C. H. Greenman, Milton, $1.
Best two varieties grapes, A. G. Tuttle, Baraboo, $2.
Second best, C. H. Greenman, Milton, $1.
Best single variety grapes, G. J. Kellogg, Janesville, $1.
Best three bunches Concords, C. H. Greenman, Milton, $1.
Best three bunches Delaware, C. H. Greenman, Milton, $1.
Best single variety grapes (quality to rule), C. H. Greenman, Milton, $1.
Best show foreign grapes, I. H. Jones, Milwaukee, $3.
Fine collection of apples, 75 varieties, shown by L. Woodward & Co., Marengo Ill., highly commended.
Twenty-five varieties of apples grown on crab stock, shown by G. J. Kellogg, Janesville, commended.

S. G. BRAND,
F. C. CURTIS,
H. BECKWITH,
A. A. BOYCE,
Committee.

Class 31—Fruit by Non-Professional Cultivators.

Best and greatest variety apples, E. B. Thomas, Dodge's Corners, $10.
Second best, B. B. Olds, Clinton, $7.50.
Third best, L. Woodworth, Woodworth, $5.
Fourth best, C. C. Dewey, Milwaukee, $3.
Very fine show apples (94 varieties), Warren Lee, Spring Lake, Michigan, silver medal.
Best ten varieties apples adapted to the northwest, E. B. Thomas, Dodge's Corners, $7.50.
Second best, B. B. Olds, Clinton, $5.
Third best, C. H. Jacobs, Wauwatosa, $2.50.
Best ten varieties, without regard to adaptation, E. B. Thomas, Dodge's Corners, $3.
Second best, H. Gregg, Elm Grove, $2.
Third best, L. S. Curtis, Wauwatosa.
Best five varieties adapted to the northwest, C. C. Dewey, Milwaukee, $3.
Second best, Austin Wheeler, Pewaukee, $2.
Third best, B. B. Olds, Clinton, $1.

Best variety winter apples, S. A. Tenny, Durham Hill, $7.50.
Second best, Geo. Jeffrey, Wauwatosa, $5.
Third best, Daniel Gelser, Milwaukee, $2.50.
Best five varieties winter apples J. J. Pellett, Oconomowoc, $3.
Second best, Wm. Reid, North Prairie, $2.
Third best, C. C. Dewey, Milwaukee, $1.
Best three Fameuse, E. B. Thomas, Dodge's Corners, $2.
Second best, L. Rawson, Oak Creek, $1.
Largest apple, D. Gelser, Milwaukee, $1.
Second best, Austin Wheeler, Pewaukee, 50 cents.
Heaviest apple, D. Gelser, Milwaukee, $1.
Second best, A. A. Boyce, Lodi, 50 cents.
Best variety pears, E. B. Thomas, Dodge's Corners, $7.50.
Second best, J. W. Park, Dodge's Corners, $4.
Third best, John Johnson, Milwaukee, $2.50.
Fourth best, J. L. Pierce, Milwaukee, $1.
Best three varieties pears, E. B. Thomas, Dodge's Corners, $3.
Second best, J. Johnson, Milwaukee, $2.
Best Flemish Beauty, J. L. Pierce, Milwaukee, $3.
Second best, A. A. Boyce, Lodi, $2.
Fine show Sickle pears, J. T. Stevens, Madison, highly commended.
Fine show Bartlett pears, J. L. Pierce, Milwaukee, highly commended.
Splendid show peaches (11 varieties,) Town, Spring Lake, Mich., diploma.
Best Miner plum, A. W. Barber, Lancaster, $1.
Second best, J. T. Stevens, Madison, 50 cents.
Best and greatest variety grapes, F. S. Lawrence, Janesville, $7.50.
Second best, Wm. Reid, North Prairie, $5.
Third best, A. Von Baumbach, Milwaukee, $3.
Best five varieties grapes, Wm. Reid, North Prairie, $5.
Second best, F. S. Lawrence, Janesville, $3.
Best three varieties grapes, Wm. Reid, North Prairie, $3.
Second best, F. S. Lawrence, Janesville, $2.
Best two varieties grapes, Wm. Reid, North Prairie, $2.
Second best, E. B. Thomas, Dodge's Corners, $1.
Best single variety grapes, E. B. Thomas, Dodge's Corners, $1.
Best three bunches Concord on one cane, Wm. Reid, North Prairie, $1.
Best three bunches Delaware on one cane, E. B. Thomas, Dodge's Corners, $1.
Best single variety, quality to rule, J. J. Pellett, Oconomowoc, $5.
Best plate hyslop crabs, David Morgan, Wauwatosa, $1.
Best plate transcendant crabs, David Morgan, Milwaukee, $1.
Extra fine show cranberries, James Carey, Berlin, highly commended.

A. G. TUTTLE,
G. J. KELLOGG,
C. H. GREENMAN,
G. P. PEFFER,
Committee.

Class 32—*Seedlings.*

Best seedlings, Geo. P. Peffer, Pewaukee, $10.
Second best, C. H. Greenman, Milton, $5.
Third best, N. N. Cornwall, Wauwatosa $3.
Best collection deciduous nursery grown trees (quality to rule,) Stickney & Baumbach, Waupun, $10.
Second best, J. C. Plumb, Milton, 5.
Best collection evergreens, Geo. J. Kellogg, Janesville, $10.
Second best, Stickney & Baumbach, Waupun, $5.
Best collection of fruit trees, E. Wilcox & Son, Trempealeau, diploma.
Second best, G. P. Peffer, Pewaukee, Transactions.
Fine fig tree, Mrs. C. Kœning, Milwaukee, $2.
Fine collection strawberry plants, H. H. Cott, Lake Mills, commended.
Fine collection hedge plants, J. C. Plumb, Milton, commended.

Method of pruning raspberry plants; to obviate trellises, M. DeWolf; Delavan, highly commended.

I. J. HOILE,
M. DEWOLF,
F. S. LAWRENCE,
Committee.

Class 33—Flowers by Professional Cultivators.

Best floral design, J. W. Dunlop & Son, Milwaukee, $10.
Second best, Whitnall & Ellis, Milwaukee, $5.
Best collection cut flowers, Miss Kate Peffer, Pewaukee, $5.
Best basket flowers, Whitnall & Ellis, Milwaukee, $3.
Second best, A. Middlemas, Milwaukee, $2.
Best pyramidal bouquet, J. W. Dunlop & Son, Milwaukee, $3.
Best pair round bouquets, Miss C. E. Stevens, Madison, $3.
Best pair flat bouquets, J. W. Dunlop & Son, Milwaukee, $2.
Best bouquet everlasting flowers, Miss C. E. Stevens, Madison, $3.
Best display dahlias, not less than 20 varieties, Wm. Kitsrow, Milwaukee, $5.
Best ten named dahlias, Wm. Kitsrow, Milwaukee, $3.
Best display roses, Whitnall & Ellis, Milwaukee, $5.
Second best, H. G. Roberts, Janesville, $3.
Best five named varieties roses, Whitnall & Ellis, Milwaukee, $3.
Best display verbenas, not less than 20 varieties, Whitnall & Ellis, Milwaukee, $3.
Best ten named verbenas, Wm. Kitsrow, Milwaukee, $2.
Best show seeding verbenas, Miss Kate Peffer, Pewaukee, $2.
Best show phlox, H. G. Roberts, Janesville, $1.
Best show pansies, J. W. Dunlop & Son, Milwaukee, $1.
Best show dianthuses, Miss Kate Peffer, Pewaukee, $2.
Best show gladiolas, H. G. Roberts, Janesville, $2.
Best show tuberose, Wm. Kitsrow, Milwaukee, $1.
Best twenty varieties green-house plants, Wm. Kitsrow, Milwaukee, $10.
Best ten geraniums, Wm. Kitsrow, Milwaukee, $5.
Best six fuchsias, I. H. Jones, Milwaukee, $3.
Best six carnations, Wm. Kitsrow, Milwaukee, $2.
Best display of flowers raised by exhibitor, Whitnall & Ellis, Milwaukee, $10.
Second best, Wm. Kitsrow, Milwaukee, $5.
Best show ornamental foliage plants, not more than fifteen varieties, Wm. Kitsrow, Milwaukee, $5.

PROFESSIONAL, NON-COMMERCIAL.

Best floral design, Mrs. A. Mitchell, Milwaukee, $10.
Best display of greenhouse plants, Mrs. A. Mitchell, Milwaukee, $10.
Best twenty varieties greenhouse plants in bloom, Mrs. A. Mitchell, Milwaukee, $10.
Best show ornamental foliage plants, Mrs. A. Mitchell, Milwaukee, $5.
Best show foreign grapes, Mrs. A. Mitchell, Milwaukee, $3.

J. T. STEVENS,
KATE PEFFER,
H. G. ROBERTS,
Committee.

Class 34—Flowers by Non-Professional Cultivators.

Best floral design, D. Ferguson, Milwaukee, $10.
Best collection cut flowers, E. B. Thomas, Dodge's Corners, $5.
Second best, J. W. Park, Dodge's Corners, $3.
Best basket flowers, Mrs. J. Joy, Madison, $3.
Second best, Mrs. P. Yale, Milwaukee, $2.
Best pyramidal bouquet, Mrs. P. Yale, Milwaukee, $3.
Best round bouquet, Mrs. J. Joy, Madison, $3.

Best flat bouquet, Mrs. J. W. Park, Dodge's Corners, $2.
Best bouquet everlasting flowers, E. B. Thomas, Dodge's Corners, $3.
Best display dahlias, A. A. Boyce, Lodi, $5.
Best ten named dahlias, A. A. Boyce, Lodi, $3.
Best show seeding verbenas, E. B. Thomas, Dodge's Corners, $2.
Best show asters, Mrs. J. W. Park, Dodge's Corners, $2.
Best show dianthus, E. B. Thomas, Dodge's Corners, $2.
Best six foliage lawn plants, D. Ferguson, Milwaukee, $3.

Class 35—Machinery for Agricultural Purposes.

The articles in this class were not entered for competition. The following list comprises the principal ones on exhibition:

REAPERS AND MOWERS COMBINED.

Harrison & Judd, Janesville.
A. A. Abbott, Chicago.
Warder, Mitchell & Co., Chicago.
D. M. Osborne & Co., Chicago, Ill.
Dodge—C. W. Yale, Milwaukee.
Wood's—M. E. Fuller & Co., Madison.
Cayuga Chief—E. J. Lindsay, Milwaukee.
Esterly—Geo. Esterly, Whitewater.
Little Champion—Harris Manufacturing Company, Janesville.
Manny's—N. C. Thompson, Rockford, Ill.
Ætna—Ætna Manufacturing Company, Salem, Ohio.
Eureka—Conroe, Jackson & Co., Racine.
McCormick—F. J. Smith, Madison.

REAPERS.

A. A. Abbott, Chicago.
D. M. Osborne & Co., Chicago.
Warder, Mitchell & Co., Chicago.
Hubbard—A. J. Hayes, Milwaukee.
Johnson's—C. C. Bradley & Son, Milwaukee.
Harvest King—S. D. Carpenter, Milwaukee.
Russell's—L. J. Bush & Co., Milwaukee.
Advance—D. Carr, Milwaukee.
Marsh Harvester—J. D. Easter & Co., Chicago.
Esterly's—Geo. Esterly, Whitewater.
Little Champion—Harris Manufacturing Company, Janesville.
C. Aultman, Canton, Ohio.
Beloit—Parker & Stone, Beloit.
Ætna—Ætna Manufacturing Company, Salem, Ohio.
Clow—H. L. Smith, Janesville.

MOWERS.

A. A. Abbott, Chicago.
C. Aultman, Canton, Ohio.
Warder, Mitchell & Co., Chicago.
D. M. Osborne & Co., Chicago.
Dodge—C. W. Yale, Milwaukee.
Hubbard's—A. J. Hayes, Milwaukee.
Climax—A. J. Hayes, Milwaukee.
Economy—C. C. Bradley & Son, Milwaukee.
Wood's—M. E. Fuller & Co., Milwaukee.
Russell's—L. J. Bush & Co., Milwaukee.
Cayuga Chief—E. J. Lindsay, Milwaukee.
Manny's—N. C. Thompson, Rockford, Ill.
Ætna—Ætna Mfg. Co., Salem, Ohio.
Eureka—Conroe, Jackson & Co., Racine.
Meadow King and Sherwood's—S. L. Sheldon, Madison.

THRESHING MACHINES.

E. E. Owens, Milwaukee.
C. Aultman, Canton, Ohio.
J. I. Case, Racine.
Geiser & Co., Racine.
C. F. Duvall, Milwaukee.

HORSE POWERS.

C. Aultman, Canton, Ohio.
Geiser & Co., Racine.

PORTABLE STEAM ENGINES.

J. I. Case, Racine.
Geiser & Co., Racine.

GRAIN SEPARATING STACKER.

Geiser & Co., Racine.

STUMP PULLER.

Depere Iron Works, Depere.
J. G. Fox, Oregon.
F. R. Parish, Kalamazoo, Mich.

WINDMILL MODEL.

Samuel Kimball, Fox Lake.

RAILROAD EXCAVATOR.

Gaylord Martin, Milwaukee.

Class 36—Implements, etc., for Agricultural purposes.

The articles in this class were not entered for competition. The following list comprises the principal ones on exhibition:

SPECIAL PREMIUM ON PLOWS,

Offered by Peirce & Whaling, Milwaukee:

Best street crossing plow, L. P. & M. P. Jerdee, Madison, (manufactured by J. Thompson, Beloit,) $50.
Second best, Kimball, Austin & Co., Kalamazoo, Mich., $25.

PLOWS (SOD).

Dorsch & Mathers, Milwaukee.
Kimball, Austin & Co., Kalamazoo, Mich.
W. F. Whiting, Milwaukee.
D. C. Bloomston, Waupaca.
J. J. Vollrath, Sheboygan.
C. W. Yale, Milwaukee.

PLOWS (STEEL CROSSING).

Kimball, Austin & Co., Kalamazoo, Mich.
W. F. Whiting, Milwaukee.
E. J. Lindsay, Milwaukee.
J. J. Vollrath & Co., Sheboygan.
L. P. & M. P. Jerdee, Madison.
C. W. Yale, Milwaukee.
N. C. Thompson, Rockford, Ill.

GANG PLOW.

E. E. Gore, Atchison, Kansas.

HARROWS.

Thomas'—E. J. Lindsay, Milwaukee.
Revolving Tooth—Peaslee & Gillett, Fond du Lac.
J. W. Park, Dodge's Corners.

FIELD ROLLER.

Josiah Lanyon, Mineral Point.

CORN CULTIVATOR.

Kimball, Austin & Co., Kalamazoo, Mich.
D. C. Bloomiston, Waupaca.
L. J. Bush & Co., Milwaukee.

SULKY CULTIVATORS.

Philip Magee, Mapleton.
James Mills, Rock Prairie.
N. Steele, Salem, Ohio.
Jerry Pattison, Freeport, Ill.
N. C. Thompson, Rockford, Ill. (3 styles.)
H. L. Smith, Janesville.
George D. Rowell & Co., Menomonee Falls.

HAY RAKES.

A. & O. Flom, Madison.
Simeon Perkins, Akron, Ohio.
E. J. Lindsley, Milwaukee.
Huber, Gunn, & Co., Marion, Ohio.
L. P. & M. P. Jerdee, Madison.
A. J. Hayes, Milwaukee.
M. E. Fuller & Co., Madison.
L. J. Bush & Co., Milwaukee.
D. Carr, Milwaukee.

HAY FORKS.

J. Sheldon & Co., Wauwatosa.
E. J. Cable, Lake Maria.
L. J. Bush & Co., Milwaukee.

HAY DERRICK.

J. Sheldon & Co., Wauwatosa.

HAY CARRIER.

J. Sheldon & Co., Wauwatosa.

BROADCAST SEEDERS.

L. P. & M. P. Jerdee, Madison.
S. L. Sheldon, Madison.
D. E. McSherry & Co., Dayton, Ohio.
W. F. Whitney, Milwaukee.
Geo. Esterly, Whitewater.
Harris Manufacturing Company, Janesville.

GRAIN DRILLS.

Lamont & Roach, Madison.
S. L. Sheldon, Madison.
D. E. McSherry & Co., Dayton, Ohio.
Harris Manufacturing Company, Janesville.
J. W. Park, Dodge's Corners,

CORN PLANTERS.

Maxon & Coburn, Milwaukee.
A. O. Hall, Milwaukee.
Isaac U. Jennings, Racine.
Geo. P. Sherman, Milwaukee.

WASHING MACHINES.

A. G. Stannard, Milton.
J. A. McHenry, Racine.
Stevens, Wright & Conan, Prairie du Chien.

CLOTHES DRYER.

E. W. Harris, Springfield.

CLOTHES WRINGER.

E. W. Harris, Springfield.

DOUBLE ACTION IRON PUMP.

B. W. **Felthausen, Milwaukee.**

WOODEN PUMP.

E. P. **Winship, Racine.**

FEED STEAMERS.

A. P. Dickey & Co., Racine.
Inman, Withington & Co., Janesville.
Carter & Smith Bros., Janesville.
Crook, Howland & Co., Janesville.
K. & T. Adland, North Cape.
E. Stoner, Freeport, Ill.

PORTABLE FENCE.

Davis Bros., & Co., Milwaukee, (3 varieties.)
Frank Digger, Springville, N. J.

FARM AND AUTOMATIC GATES.

D. Merrill, Beloit.
T. B. Elmore, Columbus.
A. E. Boyington, Oconomowoc.
Squire Sackett, Waukesha,

CHURNS.

W. H. Kirchoff, Milwaukee.
Bucholz & Wergen, Milwaukee.
Reynolds & Kellogg, Omro.
W. G. Whitney, Milwaukee.
G. P. Sherman, Milwaukee.
N. Stearns & Son, Galesville.

PLOW AND CULTIVATOR COMBINED.

Dorsch & Mather, Milwaukee.

WATER ELEVATOR.

W. G. Hamilton, Milton.

COCKLE MILL.

H. M. Brooks, Ripon.

GRAIN RIDDLES.

Wm. Frankfurth, Milwaukee.

MEAT ROCKER.

John Pritzloff, Milwaukee.

STAKEHOLDER.

F. Canright, Waukesha.

WIRE SCREENS.

Wm. Frankfurth, Milwaukee.

SAUSAGE STUFFER.

John Pritzloff, **Milwaukee.**

FEED CUTTERS.

B. C. Bloomston, **Waupaca (2 varieties.)**
E. J. Lindsay, **Milwaukee.**
A. J. Hayes, Milwaukee.

CORN SHELLERS.

K. L, Hassel, Windsor (in assortment.)
L. J. Bush & Co., Milwaukee.
St. Joseph Manufacturing Company, Mishwaukee, Ind.,
M. M. McHair, Brodhead.

FEED MILLS.

St. Joseph's Manufacturing Company, Mishwaukee, Ind.
R. T. Adland & Co., North Cape.

BOILER, FEED AND WATER REGULATOR.

L. B. Cross, Milwaukee.

STONE CUTTERS.

L. J. Bush & Co., Milwaukee.

CIDER MILLS.

L. J. Bush & Co., Milwaukee.
A. J. Hayes, Milwaukee.

GLASS OILERS.

Filer, Stowell & Co., Milwaukee.

SCRAPERS—FARM AND RAILROAD.

Winchester & Partridge, Whitewater.
A. P. Dickey & Co., Racine.

FANNING MILLS.

A. P. Dickey & Co., Racine.
Blake & Elliott, Racine.
Hiram Burdick, Monroe.

WHEELBARROWS.

T. C. Gurney, Milwaukee.

PATENT STEP LADDER.

Cornilie Bros., Milwaukee.

FARMERS' GRINDERS.

E. J. Lindsay, Milwaukee.

CHAIR AND STEP LADDER.

Stahr & Co. Racine.

LARD PRESS.

E. J. Lindsay, Milwaukee.

SCRAPER.

John Stinson, Boston.

HUSKING GLOVES.

M. & L. Stein, Milwaukee.

POST-HOLE DIGGER.

C. R. Sherman, Freeport, Ill.

FLOUR CHEST.

A. S. Trumbull, Columbus.

BEEHIVE.

Squire Sacket, Waukesha.

MILK SAFES.

O. M. Martin, Ann Arbor, Mich.

CLOVER HULLER.

L. J. Bush & Co., Milwaukee.

BAG FILLER AND HOLDER.

C. A. Whelan, Madison.
W. F. Lumm, Waterloo.

CORN HUSKER HORSE POWER.

Chas. Colburn, Menasha.

Special premiums awarded on recommendation of the committee appointed to examine the articles on exhibition in this class.

FLOUR CHEST.

A. S. Trumbull, Columbus, dipoma.

CHAIR AND STEP LADDER COMBINED.

Stahr & Co,, Racine, diploma.

RAILROAD EXCAVATOR.

Gaylord Martin, Milwaukee, diploma.

Class 37—Machinery, Tools, Etc., for Manufacturing Purposes.

The articles in this class were not entered for competition. The following list embraces the most important articles on exhibition:

Turbine water wheel, Henry Spears, North Lake.
Gang bolter, Filer, Stowell & Co., Milwaukee.
Gang lath mill, Filer, Stowell & Co., Milwaukee.
Shingle mill, Filer, Stowell & Co., Milwaukee.
Automatic bolter, Filer, Stowell & Co., Milwaukee.
Excelsior water wheel, Filer, Stowell & Co., Milwaukee.
Saw mill model, J. R. Luce, Cedar Point.
Horse power saw mill, Smith & Bennett, Watertown.
Pressure blower, Peirce & Whaling, Milwaukee.
Bellows, N. C. Waterhouse, Milwaukee.
Beer cooler, Dreher & Beurlin, Milwaukee.
Distillery apparatus, Dreher & Beurlin, Milwaukee.
Soda water apparatus, Dreher & Beurlin, Milwaukee.
Carving tools, Wm. Frankfurth, Milwaukee.
Ship carpenter tools, Wm. Frankfurth, Milwaukee.
Blacksmith's bellows, John Pritzloff, Milwaukee.
Moulding machine, A. L. Packard, Milwaukee.
Pony planers, A. L. Packard, Milwaukee.
Power punch and shears combined, A. C. Stannard, Milton.
Soda water apparatus, O. Zwertusch, Milwaukee.
Assortment circular saws, Filer, Stowell & Co., Milwaukee.
Assortment steam guages, Filer, Stowell & Co., Milwaukee.
Assortment pulley blocks, Filer, Stowell & Co., Milwaukee.
Punch, shears, bolt holder and shrinker, combined, D. C. Benedict, Milton.
    J. C. Jorden, Watertown.
Sewing machines—Domestic—Wolcott & Gregg, Milwaukee.
    Weed—H. Palmer, Milwaukee.
    Button Hole—C. A. Smith, Milwaukee.
    Finkle & Lyon—L. H. Joslin & Bro., Milwaukee.
    Florence—Florence Sewing Machine Company, Milwaukee.
    Ætna—C. F. Kleinstuber, Milwaukee.
    Manhattan—Manhattan Sewing Machine Company, Milwaukee;
    Wilson—J. G. Bloomer, Milwaukee.
    Howe—G. T. Bryant, Milwaukee.
    Singer—Kassen & Noyes, Milwaukee.
    Davis—Davis Sewing Machine Company, Chicago, Ill.
    Wheeler & Wilson—G. E. Treat, Milwaukee.

Knitting machines—Hinkley's—M. Bliss, agent, Chicago, Ill.
Cram—N. F. Hopkins, Ft. Atkinson.
Lamb's—Hurlburt Bros. & Co., Chicago; Squire Sackett, Waukesha.
Universal coupling joint—S. D. Carpenter, Milwaukee.
Shears, punch, upsetter and binder combined—Charles Colburn, Menasha.
Blacksmith's bellows—George Lawrence, Milwaukee.
Bottle corker—Robert Menzel, Fond du Lac.

Special premiums awarded on recommendation of the committee appointed to examine articles on exhibition in this class.

Pony planer, A. L. Packard, Milwaukee; diploma.
Exhibitions of gang lath and shingle machines and automatic bolter combined, Filer, Stowell & Co., Milwaukee; diploma.
Boiler feed water regulator, J. B. Smith, Milwaukee; diploma.

At the request of the different exhibitors of blacksmiths' bellows, a special committee was appointed to examine and report upon the merits of those articles, and in accordance with the recommendation in the following report, the executive committee awarded to the

Blacksmiths' bellows, Milwaukee Blacksmiths' Bellows Co., a diploma.

REPORT.

We, the undersigned, a committee appointed to examine into the merits of the blacksmiths' bellows exhibited, have to report that we consider those shown by the "Milwaukee Bellows Company" superior to any we have ever seen. They appear to be carefully made from the best of material. They are provided with patent self-packing valves which effectually prevents the gas from being drawn into them. They have a much stronger and more uniform blast, and are evidently of superior construction and finish. We desire also to make special mention of their "double-acting bellows," a novelty in this line, of great strength and durability, and an article which must come into very general use. We recommend a diploma.

J. S. PARTRIDGE,
WM. THOMPSON,
Committee.

Class 38—*Stone-Cutters' Work and other Building Material.*

Best specimen drain-tile, H. Berthelet & Co., diploma.
Best roofing material other than shingle, Northwestern Roofing and Felting Co., diploma.
Best metallic cornice, Bowman & Jones, Milwaukee, silver medal.
Best display of earthern ware, Fred. Hermann, Milwaukee, diploma.
Best lightning rod, J. S. Johnson, Milwaukee, diploma.
Best display of gas fixtures, W. E. Goodman, Milwaukee, diploma.
Best elastic stone roofing, Northwestern Roofing and Felting Co., Milwaukee, diploma.
Best quartz cement roofing, Rock River Paper Co., Beloit and Chicago, diploma.
Best cement chimney tops and flues, H. Berthelet & Co., Milwaukee, diploma.
Original architectural designs in plaster, John Thompson, Milwaukee, diploma.
Display of stone ware, Charles Hermann, Milwaukee, commended.
Machine and kerosene oil cabinets, Pierce & Newbre, Milwaukee, commended.
Stone sewer pipe, Loren Blanchard, Milwaukee, commended.

Class 39—Metallurgic Products.

Best show of iron castings, Geo. W. Abert, Milwaukee, diploma.
Best bar steel, John Pritzloff, Milwaukee, diploma.
Best exhibition spelter, Union Britannia Co., Milwaukee, diploma.
Best sample cast steel, J. J. Vollrath, Sheboygan, diploma.
Best malleable and gray castings, E. A. Harris, Milwaukee, diploma.
Assortment heavy hardware, Peirce & Whaling, Milwaukee, highly commended.
Display of malleable castings, L. J. Bush & Co, Milwaukee, commended.
Best display of Babbitt metal, Union Britannia Co., Milwaukee, diploma.
Best display of agricultural steels, L. J. Bush & Co., Milwaukee, diploma.

E. H. SYLLA,
F. S. COLE,
Committee on Classes 38 and 39.

Class 40—Stoves, Furnaces, Hollow-ware and Articles of Hardware.

Best cooking stove for wood, C. A. Buttles, Milwaukee, $3.
Best ornamental parlor stove, C. A. Buttles, $3.
Best exhibition brass and copper ware, C. A. Buttles, $3.
Best display of scales, Fowler & Pennell, Milwaukee, diploma and $2.
Best display plumber's work, W. E. Goodman, Milwaukee, diploma.
Best refrigerators, Cornille Bros., Milwaukee, diploma.
Best fire-proof safes, Fowler & Pennell, Milwaukee, diploma.
Patent spittoon, F. H. Osborn, Milwaukee, commended.
Refrigerator, Wm. Bogt, Milwaukee, commended.
Best wire work, Charles Gochner, Racine, diploma.
Combination scale beam, Fowler & Pennell. Milwaukee, commended.
Best seives and wire screens, D. Daggett, Milwaukee, diploma.
Patent door butt, Kasson Manufacturing Co., Milwaukee, diploma.
Folding dinner pail, J. Fairbairn, Milwaukee, commended.
Heating apparatus, (Baltimore fire place), C. A. Buttles, Milwaukee, commended.
Parlor cooking stove, C. A. Buttles, Milwaukee, commended.

M. LOURY,
GEORGE PHELPS,
Committee.

Class 41—Silver and Britannia Ware.

Best display of Britannia ware, Union Britannia Plate Company, Milwaukee, diploma.
Best display of gold and silver electro plating, Union Britannia Plate Company, Milwaukee, diploma.
Best sample gold and silver plating, C. W. Allen, Milwaukee, diplcma.
Best sample close silver plating, H. F. Croft, Milwaukee, diploma.

CH. PREUSSER,
Committee.

Class 42—Surgical and Dental Apparatus.

Best display of surgical appliances by manufacturer, Hendley & Co., Milwaukee, diploma.
Case artificial limbs, E. J. Gardner, Milwaukee, diploma.

SAT. CLARK,
L. G. ARMSTRONG,
GEO. W. LEE,
Committee.

Class 43—Chemical Manufactures.

Best sample carbonate of lead, J. E. Patton & Co., Milwaukee, diploma.
Best sample oxide of zinc, J. E. Patton & Co., Milwaukee, diploma.
Best sample of yeast cakes, J. W. Edwards, Waupaca, diploma.
Best sample of bar soap, Warfield Cold Water Soap Company, Milwaukee, diploma.
Best show of parlor matches, W. B. Curtis, Oshkosh, diploma.
Best caddy lucifer matches, J. L. Clark, Oshkosh, diploma.
Best show of fancy soap and perfumery for the toilet, by manufacturer, Delorme & Quentin, Milwaukee, diploma.
Best show of candles and wax, Joseph Studens, New Coln, diploma.
Boston yeast cakes, W. S. Benedict, Milwaukee, commended.
Display candles and wax, Edward Waerst, Milwaukee, commended.
Best show perfumery, Keifert & Ludwig, Milwaukee, diploma.
Toilet glycerine soap, Marx & Rawolle, New York, highly commended.
Essence of coffee, Chas. Hummel, Milwaukee, commended.
Best cream baking powder, Thompson, Steele & Price, Chicago, diploma.
Best show flavoring extracts, Thompson, Steele & Price, Chicago, diploma.
Best essence of coffee, J. M. Sanders, Milwaukee, diploma.
Best patent leather dressing, L. M. West, Rockford, Ill., diploma.

JOHN H. TESCH,
Committee.

Class 44—Carriages, Wagon Work, etc.

Best double carriage, Wechselberg, Brown & Co., Milwaukee, silver medal or $20.
Best single top buggy, L. Mock, Milwaukee, $10.
Best single open buggy, F. W. Rice, Milwaukee, $10.
Best trotting wagon, Geo. W. Ogden & Co., Milwaukee, $10.
Best double sleigh, Sherin Bros., Milwaukee, $10.
Best single sleigh, Geo. W. Ogden & Co., Milwaukee, $5.
Best lumber wagon, Winchester & Patridge, Whitewater, $10, and special premium offered by Peirce & Whaling, $50.
Second best, special premium offered by Peirce & Whaling, G. A. Ludington & Co., Oconomowoc, $25.
Best three spring and three-seated wagon, G. A. Ludington & Co., Oconomowoc, $10.
Two springed phæton, Wechselberg, Brown & Co., Milwaukee, commended.
Best display of hubs, spokes and felloes, A. J. Archibald, Fond du Lac, diploma.

T. E. BIRD,
J. W. BAKER,
S. L. SHELDEN,
Committee.

Class 4—Cabinet Ware, Furniture, etc.

Best parlor set, A D. Seaman & Co., Milwaukee, silver medal.
Best chamber set, A. D. Seaman & Co., Milwaukee, diploma.
Best extension table, Mathews Bros., Milwaukee, $5.
Best book-case, J. F. Birchard, Milwaukee, $5.
Best center table, N. Brick, Milwaukee, diploma.
Best writing table and desk, Matthews Bros., Milwaukee, $5.
Best spring bed bottom, A. D. Seaman & Co., Milwaukee, $2.
Best display of cooperage and wooden ware by manufacturer, C. S. Redfield, Madison, diploma.
Best splint baskets of oak or ash, W. E. Grover, Oak Creek, $2.
Best willow baskets, Wisconsin Industrial School, Waukesha, $2.
Best display of willow ware, A. Meinecke, Milwaukee, diploma.
Best dozen brooms, A. F. Lampke, Milwaukee, diploma.

Best dry earth closet, Phillips & Co., Milwaukee, diploma.
Best four window blinds, Rodway, Smith & Co., Milwaukee, $5.
Best four window sash, Rodway, Smith & Co., Milwaukee, $5.
Best four doors, Aussium, Dopperstein & Schmidt, Milwaukee, $5.
Best newell posts, Wm. Weller & Co., Milwaukee, $5.
Best show of doors, sash, blinds, mouldings and other house building and house furnishing materials, Rodway, Smith & Co., Milwaukee, diploma.
Best ten styles of mouldings, Wm. Weller & Co., Milwaukee, $5.
Woven wire spring bed bottom, E. Cooben & Co. agents, Milwaukee, highly recommended.
Window shades, Adolph George, Fond du Lac, commended.
Best wire woven spring pillow, E. Cooben & Co., Milwaukee, diploma.
Dining floor, Wm. Weller & Co., Milwaukee, commended.
Rosewood and white caskets, Judson & Morse, Milwaukee, diploma.
Patent weather strip, E. Fielding, Milwaukee, commended.
Thousand shingles, Davis Bros. & Co., Milwaukee, commended.
Anderson's sash balance, Peterman, Stredy & Co., Milwaukee, diploma.
Hall rack, N. Brick, Milwaukee, diploma.
Cane seating and willow furniture, Industrial School, Waukesha, highly commended.
Tarred sheathing and prepared plastering board, Rock River Paper Co., Beloit and Chicago, diploma.

J. W. BAKER,
GEO. W. WESTOVER,
A. B. BAKER.
Committee.

Class 46—Leather and Leather Manufactures.

Best six sides of harness leather, Laukhaft & Kiefer, Alleghany, Pennsylvania, $5.
Best six kip skins, Trostel & Gallum, Milwaukee, $5.
Best six calf skins, Wm. Gallum, Beaver Dam, $5.
Best display of colored leather, Aug. Hirpich, Milwaukee, diploma.
Best carriage mats, Isaac Baldwin, Milwaukee, $2.
Best three trunks manufactured in Wisconsin, Rodmadke Bros., Milwaukee, silver medal.
Best exhibition of pegged leather boots and shoes, 12 pairs of each style, manufactured in Wisconsin, Bradley & Metcalf, Milwaukee, silver medal and $20.
Second best, Copeland, Ryder & Co., Jefferson, bronze medal and $10.
Best exhibition of sewed boots and shoes, 1 pair of each style, manufactured in Wisconsin, Bradley & Metcalf, Milwaukee, silver medal and $10.
Best display of leather, Laukhaft & Keifer, Alleghany, Pennsylvania,, silver medal.
Second best, Trostel & Gallum, Milwaukee, commended.
Heavy and light calf skins, Trostel & Gallum, Milwaukee, commended.
Best carriage harness, Wm. Leihammer, Milwaukee, diploma.
Display of trunks, M. M. Secor, Racine, commended.
Exhibition of pegged boots and shoes, Industrial school, Waukesha, highly commended.
Display of satchels, valises, etc., Romadke, Bros., Milwaukee, diploma.
Stuffed sheep skins, R. Andrews, Milwaukee, commended.

W. B. STICKNEY,
T. J. FREEMAN,
W. K. WILSON,
Committee.

Class 47—Paper, Printing and Book Binding.

Best exhibition of plain and fancy binding, H. Neidecken & Co., Milwaukee, silver medal.
Book keeping and business practice, B. D. Atwell, La Crosse, diploma.

SAT. CLARK,
Chairman Committee.

Class 48—Textile Fabrics.

Best piece doeskin, not less than 10 yards, McFetridge, Burchard & Co., Beaver Dam, diploma.
Best piece cassimere or plain cloth, Chandler, Congdon & Co., Beaver Dam, diploma.
Best piece blanketing, McFetridge, Burchard & Co., Beaver Dam, diploma.
Best piece flannel, Blake & Co., Racine, diploma.
Best display cloths and shawls, McFetridge, Burchard & Co., Beaver Dam, silver medal and $10.
Best suits men's clothing, V. Zimmerman, Milwaukee, silver medal.
Best ladies' shawls, Blake & Co., Racine, diploma.
Best scarfs and woolen yarn, Hilgen & Wittenberg, Cedarburg, diploma.
Pique, Chandler, Congdon & Co., Beaver Dam, commended.
Black tricot, McFetridge, Burchard & Co., Beaver Dam, highly commended.

CHARLES JONES,
ADAM SCHANTZ,
Committee.

Class 49—Domestic Manufactures.

Best ten yards flannel, Miss Josie Peffer, Pewaukee, $4.
Best rug of any material, Mrs. R. M. Jameson, Waukesha, $4.
Best fifteen yards rag carpet, Mrs. D. P. Webster, Mukwanago, $4.
Best woolen stockings, Rachel Lapham, Milwaukee, $2.
Best woolen mittens, E. Schuyler, Aztalan, $2.
Best pair cotton stockings, E. Schuyler, Aztalan, $2.
Best silk quilt, Mrs. David West, Mukwanago, $3
Best double carpet coverlet, H. Bourse, Milwaukee, $3.
Best knit counterpane, Mrs. E. Travis, Milwaukee, $3.
Best wrought counterpane, Miss Carrie Bliss, Racine, $3.
Best gents' shirts, Mrs. M. Shanks, Milwaukee, $3.
Best specimen darning, Miss C. P. Root, Verona, $1.
Pair cotton stockings, Miss Rachel Lapham, Milwaukee, highly commended.
Log cabin quilt, Sarah Folleit, Menomonee, commended.
Best rag carpet, Mrs S. Bell, Greenfield, (78 years old) diploma.
Rag carpet, Mrs. E. M. DePny, East Troy Lakes, highly commended.
Rag carpet, Mrs. A. Folsom, Milwaukee, commended.
Rag carpet, Miss Kate Peffer, Pewaukee, highly commended.
Rag rug, Mrs. G. T. Jacobson, Milwaukee, commended.
Best embroidered rug, Mrs. J. W. Malthers, Watertown, diploma.
Silk quilt, Mrs. G. A. Wheatcraft, Mukwanago, commended.
Knit counterpane, Mrs. Jane Carr, North Prairie, commended.
Gent's shirts, Miss C. P. Root, Verona, (Juvenile) commended.
Best ten yards full cloth, Mrs. S. Bell, Greenfield, diploma.
Best fancy table coverlet, Mrs. C. G. Sprangler, Milwaukee, diploma.

MRS. GEO. MURRAY,
MARY FAALL,
Committee.

Class 50—Millinery.

Best straw bonnet, Mrs. O. E. Meyer, Milwaukee, $3.
Best ladies' cloaks, F. J. Elton, Milwaukee, $2.
Best bonnet flowers, Mrs. O. E. Meyer, Milwaukee, $3.
Best variety articles of millinery, Mrs. O. E. Meyer, Milwaukee, silver medal.

Best and greatest variety articles of ladies' clothing, Mrs. J. McAlpine, Milwaukee, silver medal.
Best infant's wardrobe, Miss E. & J. McIntosh, Milwaukee, diploma.
Best children's cloaks, E. J. Elton, Milwaukee, diploma.
Wreath of fish scale flowers, Henrietta Peck, Prospect Hill, a work of patience and ingenuity.

Mrs. A. W. PHELPS,
Mrs. JAMES SEVILLE,
Committee.

Class 51—Needle, Shell, Wax Work, etc.

Best sample plain sewing, Mrs. J. McAlpine, Milwaukee, $4.
Best sample plain sewing, by a girl 12 years of age, Miss C. P. Root, Verona, $3.
Second best, Miss Kate Smith, Dodge's Corners, $2.
Best crochet or fancy knitting work, Mary E. Elliott, Milwaukee, $4.
Second best, Mrs. R. M. Jameson, Waukesha, $2.
Best tidy by child under 12 years old, Miss C. P. Foot, Verona, $3.
Second best, Miss Minnie Boden, Milwaukee, $2.
Best specimen (landscape), worsted, Lydia Davis, Milwaukee, $4.
Best worsted embroidery, Mrs. W. O. Stillman, Milwaukee, $4.
Second best, M. D. Lewis, Milwaukee, $2.
Best needle work or floss embroidery, Mrs. James McAlpine, Milwaukee, $4.
Second best, Miss Gildersleve, Waukesha, $2.
Best silk embroidery, Miss Susie Connor, Fox Lake, $4.
Second best, Mrs. H. Russell, Milwaukee, $2.
Best work in wax, Miss Mary F. Fowler, Milwaukee, $2.
Second best, Miss Mattie Rawson, Oak Creek, $1.
Best sample shell work, H. G. Roberts, Janesville, $2.
Best sample bead work, Miss Augusta Bernhard, Milwaukee, $2.
Best exhibition hair jewelry, A. Suhr & Co., Milwaukee, diploma.
Best gents' and ladies' wigs and toupees, A. Suhr & Co., Milwaukee, diploma.
Best exhibition ladies' head dress, A. Suhr & Co., Milwaukee, diploma.
Best sample feather work, Susan Worth, Mequon, $2.
Crochet work (tidy), Miss Kate Smith, Dodge's Corners, commended.
Sample needle work, Miss Mary Shank's, Milwaukee, highly commended.
Worsted embroidered ottoman, Mary E. Elliott, Milwaukee, commended.
Embroidered towel rack, Miss J. Weil, Merton, commended.
Worsted work by juvenile, Miss Cora A. Dickey, Racine, commended.
Floss embroidery, Miss Alice Stewart, Beaver Dam, commended.
Best wax work by invalid boy, Herman Bohn, Sauk City, diploma.
Sea mosses and shells, H. G. Roberts, Janesville, commended.
Best ornamental stand made of Wisconsin shells, Miss E. M. King, Milwaukee, diploma.
Best ornamental hair-work wreath, Miss Augusta Reinhard, Milwaukee, diploma.

MRS. L. P. C. BIGELOW,
MRS. A. W. PHELPS,
Committee.

Class 52—Music and Musical Instruments.

No competition; following entries made:

Assortment musical instruments, H. W. Hempstead, Milwaukee.
Assortment flutes, N. D. W. Ainsworth, Milwaukee.

Class 53—Works of Art.

Best pencil drawing by boy under 16 years, Walter O. Lydston, Milwaukee, $5.
Best pencil drawing by girl under 15 years, Miss Dora Park, Dodge's Corners, $5.
Best collections stereoscopic views of Wisconsin (not less than 12), H. H. Bennett, Kilbourn City, silver medal.

Best exhibition of lithographs, Milwaukee Lithographing and Engraving Co., Milwaukee, diploma.
Best exhibition penmanship, S. S. Hurlburt, Racine, diploma.
Best exhibition of sun pictures, W. H. Sherman, Milwaukee, diploma.
Most important discovery in photography, W. H. Sherman, Milwaukee, silver medal.
Best specimen stencil cutting, Chas. H. Clarke, Milwaukee, diploma.
Best specimen sculpture, C. P. Knowles, Janesville, silver medal.
Best collection statuary, N. Merrill, Milwaukee, silver medal.
Best carving on wood, J. F. Birchard, Milwaukee, silver medal.
Best copper-plate engraving, John Marr, Milwaukee, silver medal.
Best specimen seal engraving, C. H. Clarke, Milwaukee, diploma.
Best specimen wood engraving, John Marr, Milwaukee, diploma.
Best marble mantel, Merrill & Eccles, Milwaukee, diploma and $10.
Second best, Merrill & Eccles, Milwaukee, $10.
Best portrait in oil, W. Hunt, Milwaukee, $10.
Best fruit painting in oil, F. A. Lydston, Milwaukee, silver medal.
Best original pencil drawing by person under 20 years of age, from nature, Miss Fanny Wells, Milwaukee, the special premium offered by Mrs. Alexander Mitchell, silver medal.
Best photographs in India ink, H. Broich, Milwaukee, diploma.
Best crayon portrait, H. Broich, Milwaukee, diploma.

W. W. DANIELLS,
E. R. PERSONS,
AUG. GAYLORD,
J. H. DODGE,
J. B. LAKEY,
MR. PERKINS,
J. C. PICKARD,
Committee.

Class 54—Miscellaneous Articles.

Best display carpets, Stark Bros., Milwaukee, diploma.
Best children's toys and carriages, A. Meineke, Milwaukee, diploma.
Best display crockery and china ware, Frackleton & Co., Milwaukee, diploma.
Best tuck marker, Kasson & Noyes, Milwaukee, diploma.
Best canvas tent, Wm. Armstrong, Milwaukee, diploma.
Best glass and china ware and table cutlery, Blair & Persons, Milwaukee, diploma.
Best Babcock's fire extinguisher, Gore & Dryer, Milwaukee, diploma.
Ornamental patch work chair, Mrs. Mary A. Smith, Milwaukee, commended.
Paper hangings and decorations, T. P. Collingbourne, Milwaukee, commended.
Dress pattern charts, Mrs. P. Cheney, Chilton, commended.
Best display carpets and house furnishing goods, Goldsmith & Co., diploma.
Best patent standard billiard balls, Hyatt Manufacturing Co., Albany, N. Y., diploma.
Best bag filling machine, Bowen, Whelan & Wakeley, Madison, silver medal.
Swarm bees, N. Stearns & Son, Galesville, commended.
Wall paper hanging, W. P. Yeomans, Waukegan, Ill., commended.

S. D. HASTINGS,
WM. E. SMITH,
Committee.

Class 55—Natural History.

Best collection Wisconsin iron ores, Blanchard & Arnold, De Pere, diploma
Best collection of woods of Wisconsin, Johnny W. Thomas, Dodge's Corners, diploma and $10.
Best collection zinc ores, of Wisconsin, John Nondorf, Highland, diploma.
Best collection economical minerals of Wisconsin, W. Geotz, Milwaukee, silver medal.

J. G. KNAPP,
H. W. DUNLOP,
M. BARRETT,
Committee.

PRACTICAL PAPERS.

MANAGEMENT AND ROTATION OF CROPS OF A FARM FOR MIXED HUSBANDARY.

Prize Essay.

BY GUSTAVE DE NEVEU, FOND DU LAC.

In entering upon our subject we desire to express a want of sympathy for that mode of farming which confines itself solely to the raising of grain; firmly believing that such a practice must eventuate in the impoverishment of the land, if persisted in, and that the larger the returns the more rapid the exhaustion that must inevitably follow. A grain farm is generally one upon which only the teams required for its working are kept, with, perhaps, a few cows sufficient to supply the immediate wants of the farmer, his family and laborers. It is a farm from which its owner or occupant, like a cruel task-master, constantly exacts the highest cash returns, blind to the fact, yearly made more manifest in lessened production, that the energies of the soil are becoming more and more reduced and shattered. It is such a man that Virgil must have had in his eye when he called the farmer a miser—*avarus arator.* Virgil was a great lover of agriculture; his bucolics and georgics are imperishable witnesses of this fact. No one has described the happiness of rural life with such a poetic hand, and his indignation was aroused to see that those men, whose mission it is to beautify the earth and make it more fruitful, were the very ones who destroyed its productive powers.

The two-fold object of all regulated systems of farming is:

1st. To make the earth yield the greatest possible amount and variety of products necessary or desirable for the sustenance and comfort of the human family, and

2d. While doing this, to steadily increase the productive powers of the soil, or at least retain them undiminished.

The second of these propositions appears to us incompatible with a mode of farming exclusively devoted to the raising of grain; because, as we have before remarked, it does not permit a sufficient number of animals to be kept on the farm for producing an amount of manure adequate to counterbalance the exhaustion caused by the grain crops.

Even the man who carries on a sytem of mixed husbandry, is frequently at a loss how to dispose of his surplus straw. His cattle have access to his straw stacks; he beds them, as well as his stabled animals, with straw; hauls straw to his pig pen and wherever he can spread it for the comfort of his stock; yet there is frequently a large surplus which he finds difficult to convert into manure. Mark, that in this case, the farm does not need so much manure as a purely grain farm does; because a goodly portion being used for pasture in its term of rotation, is almost sufficiently enriched by that process alone; whereas the grain farm has no such recuperative process applied to it. Not that we consider it impossible to raise cereals extensively, in fact to make the raising of grain the leading feature or interest, without destroying the productive capacities of the soil. We think it may be done to a certain extent, by a systematic and judicious feeding of the straw, particularly by cutting it up and mixing it with mill-stuffs to make it more palatable; but in our opinion, this is a more expensive and less easy way of maintaining the fertility of the soil, than by cultivating the grasses and consuming them on the farm in feeding and pasturing. On the grain farm, the straw is too apt to be burnt upon the field that has produced it, or to find its way to the paper mill, being generally deemed an incumbrance.

If we consider the land as it is bought from government, in its various conditions of timber, prairie, openings, marsh, and with its no less various characters and qualities of soil, no rules can be laid down which will suit the different conditions. Peculiar conditions demand peculiar treatment; each farmer must be guided by the requirements of his soil, by the position of roads, exposure, currents of water, etc. On this subject we can only offer a few general hints.

In laying off a farm it is desirable, whenever practicable, that the lots be so distributed that each may have access to running water. The division into lots and the arrangement of the buildings must be made with a proper regard to convenience and to the saving of labor. It is hardly necessary to mention that in this age of labor-saving machines, the farmer who neglects to free his land from stumps, stones and other obstacles to their use, greatly mistakes his interest. Every lot should be provided with a light, secure and easily worked gate. Bars are poor things, being slow, inconvenient and not very safe, although they cost about as much as a gate. Good gates can be made and set up at a cost not much exceeding one dollar. Who would do without them and have his fences constantly put out of joint, when gates can be had so cheaply?

Where the circumstances will admit of it a private road running through the center of the farm, as far as the two most distant lots, with a gate opening into it from each field, is found to be a very great convenience. This road does not need to be more than 20 or 30 feet wide, for the passage of teams, and driving cattle to and from pastures. The land required for this purpose is well and profitably employed, as it obviates the necessity of driving your cattle upon the public road, and of taking your teams or stock through one lot in order to reach another, by which a great deal of useless labor and sometimes of loss, will be saved in the course of a year.

Perhaps the system of rotation which we intend to advocate might be entered upon at once on the first breaking of the land, commencing with wheat, then corn and oats in succession, seeding down with the latter; but we do not deem it very material or necessary that the rotation should commence at this early stage of cultivation; because the land, having all its natural fertility, may be drawn upon for a few years without serious detriment, and because, also, the farmer who just opens a farm is apt to be sadly in need of the means to establish it upon a proper basis, having everything to do. Wheat and other grains, cheap as they are apt to be, most readily and conveniently supply those needful means; but we warn him not to continue that practice for a long period, for it is much easier to destroy fertility than to restore it. Let him conduct the raising of grain with a view to the future introduction and cultivation of the grasses and to a regular system of rotation of crops. We conceive that the best method of farming for Wisconsin, (we might say for all the northern states), whether stock raising, dairying or the raising of grain, is to predominate; or whether, as appears to us preferable, all these are carried on in fair proportions, must have for its basis the raising in a large measure, of the cultivated grasses, and more particularly, of clover.

To illustrate our meaning: let us suppose the farm to consist of a quarter section or 160 acres of land. Allowing of this, twenty acres for a timber lot, ten acres for an orchard and garden, and ten more for farm buildings, yards, calf and hog pastures and lanes, there would remain 120 acres to be specially devoted to crop culture and rotation. These 120 acres we would divide into six lots containing twenty acres each; three of these lots should be kept constantly in clover or clover and timothy; one to be used for pasture in connection with the timber lot; the other two, grass-lots to be cut for hay; of these the oldest seeded may be used for fall pasture and the other mowed for a second crop of hay or grass seed. The lot used for summer pasture having now been in grass three years, we would break up the next spring for a crop of corn, potatoes, and other hoed crops.

It may, perhaps, be objected that we are writing more upon the subject of rotation of crops than about the management of a farm. To this we answer that management obviously includes system and that we cannot conceive of a systematic management of a farm, which should not include a regular rotation of crops. Any other method of farming must be based upon a random availability or caprice; having no reference to the actual conditions or necessities of the soil, devoid of all system and dependent upon the more or less accurately formed estimates of the prospective values of agricultural products in the markets. A farm thus conducted would exhibit no good management, but much of its opposite. Therefore, while a regular rotation of crops may be said to be only one branch of the management of a farm, it is certainly by far the most important and inseparable.

We prefer to break up our corn ground in the spring, our experience having satisfied us that the crop is more easily kept free from weeds in this way. We have tried fall plowing for corn with less satisfactory results; when the time for planting arrived we generally found, when the land had been broken in the fall, that it was covered with grass and weeds thickly started, which have proved troublesome and expensive to destroy; the ground, in spite of the action of the frost upon it, has not been so mellow, and has been more inclined to bake; the corn has not come up so readily or evenly and, strange as the statement may appear, the sod has resisted the process of decomposition and assimilation much longer than when broken up in the spring. The reason of the latter fact we are unable to give; but that it is a fact, we are well assured. We presume that fall breaking might be preferable in more southern locations, where the process of fermentation and decomposition would go on uninterruptedly during the winter months, which is never the case in our latitude. So well satisfied are we that spring breaking is better for corn, that were it in our power to do so and at the same time to have our corn planted in straight rows both ways, we would plant it immediately behind the breaking plow; but this cannot be done. We have not found that fall breaking destroyed the cut worm; yet, we think it has, in this respect, some advantage over spring breaking; the cut and wire worms are the greatest enemies to the corn crop; they probably destroy more corn, one year with another, than the frost. We have tried lime, plaster, ashes, with poor success. Salt seems to be the most effective, but if used in sufficient quantity, it is apt to destroy the corn also.

Manure may be applied at any time to the field intended for corn; taking care not to leave it in heaps over winter, as these retain the frost so long that they are serious impediments to the breaking up of the land in spring.

The planting should take place as early as the ground is sufficiently warm to germinate the seed. First rate seed does not rot in the ground so easily as many suppose. But poor seed will decay in cool ground, that might do well if the ground were warm. Many more fields of this noble plant are injured or destroyed by early frosts in autumn than by late frosts in spring. One day gained in spring planting is nearly equal, in maturing the plant, to two days in the fall; because the altitude of the sun, as well as the duration of sunshine, are much greater in May than they are in September. Corn planted between the fifth and fifteenth of May is almost certain to mature. In this case, from ninety to one hundred days are generally sufficient. When planted very late in May or early in June it requires about one month longer time, and is much more exposed to killing frosts.

The planting should be done rapidly, so as to secure uniformity in ripening; and for this reason the farmer ought to employ a sufficient number of hands to finish the work in three or four days at the most. The ground should be thoroughly dragged and made quite mellow, then marked straight both ways. From three feet and a quarter to three feet and a half is sufficiently wide between the rows for the kinds generally raised in our state. Dent corn possibly requires wider spaces. Where more room is given than necessary, the vacant space is usurped by unprofitable weeds, causing more labor in cultivation and a smaller crop of corn. We prefer to plant corn with the hoe, not having yet discovered a planting machine as reliable as the primitive way. Not more than four nor less than three kernels should be dropped in each hill. Three good stalks are sufficient for a full crop. We never plant more than three kernels, having first ascertained that the seed is reliable. In

1864, while tending a piece of corn, I marked with a small stake a hill that had but one plant at the first hoeing. The next tending showed three strong suckers; at the third hoeing these had thrown out four suckers, making eight stalks. At the fourth and last, five more suckers had appeared, which I pulled up. That hill of corn could not be distinguished from the rest, and yielded nine sound ears and four nubbins.

Stamping the ground hard over the seed with the hoe, as many persons do, is bad practice; it tends to make the surface crust and bake, so that the young shoot is frequently unable to pierce through, but curls under it, turning yellow and perishing, if not assisted.

A good method of raising potatoes is to plant them around the corn, which saves a great many stalks of the latter from being broken in turning the teams about while cultivating; the potatoes suffer but little injury. Besides, green corn is a great temptation to cattle, and should not be raised too near the fence.

We are not fully satisfied as to the wisdom of planting pumpkins in a corn field. This practice results in diminishing the crop of corn by an amount fully equal to the value of the pumpkins, if not greater. Yet, pumpkins make excellent feed for milch cows, and are valuable to start cattle, which it is intended to fatten, and they sometimes succeed very well when the corn partially fails. We are in the habit of planting them; our practice is to go over the field immediately after the corn planting is over, when every hill can yet be plainly seen and stick pumpkin seed in every third hill of each fourth row. In this way the plants are equally distributed throughout. The operation is very rapid, and is far preferable to mixing the pumpkin-seeds with the corn in the planting-bags, as many do. Where corn has failed to make an appearance at the first hoeing, many plant beans, which have time to ripen.

The soil intended for corn or other hoed crops should be thoroughly cultivated. In 1860, the writer raised 107 bushels of corn to the acre; the cultivation was entirely done with the common plow and the hoe. We advocate running a cultivator both ways for the first working; plowing deeply for the second and using again the cultivator for the third, and, if possible, for a fourth working. The hoe should cut every weed which the cultivator and the plow have not reached. This is a light and rapid operation when the cultivation has been thorough. If our farmers would always do full justice to this crop, it would grow into still greater favor, for the more is done for it, the better it pays.

As soon as the ears are fairly glazed the corn should be cut and put up in solid, upright, compact shocks, and well bound. Corn stalks, when properly cured, make very valuable fodder, but if frozen before fully matured, both they and the grain are of very slight value. Early planting and maturing allow to the farmer longer time and much more favorable weather to secure both in first-rate condition. As the stalks afford about as much fodder as the hay of an equal area, full of saccharine matter and highly relished by cattle, they should be secured in stacks from time to time *as the husking progresses*, avoiding all unnecessary exposure to the weather.

We look upon the corn crop as the most profitable, and when properly cultivated, perhaps, the surest, excepting oats, of any that is raised in our state. We believe that facts warrant the assertion that corn oftener fails in northern and central Illinois than it does in Wisconsin. It has more than once been killed in Illinois, by frosts, late in August or early in September, that have hardly touched or injured it in our State. Wisconsin is also less subject than Illinois to heavy protracted rains at the time of planting. These statements may appear startling, but they are proved by facts. Spring wheat also has been known to ripen in Manitoba in 75 to 80 days. Indian corn frequently ripens on the Saskatchewan in latitudes 51° to 53°! In 1848 we knew corn planted on the 20th of June to be fit to cut on the 25th of August. Failures with us nearly always arise from late planting or from neglect.

No farmer who has tended a crop of corn or other hoed crop well and thoroughly has failed to observe the great benefits accruing to subsequent crops from that cultivation. By comparison of results with lands that have been treated differently the beneficial effects can readily be traced through a period of four or five years, and in making our estimate of the value of the corn crop this fact should be taken into consideration.

Wheat should follow the corn, and the corn should be husked and the land cleared as early as possible, so that the ground may be plowed in the fall for early spring sowing. Wheat cannot be sown too early; the earliest sowing of this grain (and indeed of oats and rye) almost invariably produces the best crop, as well as the heaviest and plumpest berry. A late sowing of wheat is rarely profitable. Corn is a tropical plant, but wheat is not. When the ground is hot, the young wheat plant grows up too rapidly and does not stool, as it has not time to throw out strong roots. Generally, cereals give a heavier crop as they are longer in growing and maturing. May and April have more to do with the filling of wheat heads than July and August.

It is universally admitted that spring grains succeed best on land that has been plowed the fall previous. This is undoubtedly due, in a measure, to the beneficial action of the frost in dividing the lumps; yet, this explanation is not quite satisfactory in every instance, as we have known the winter to leave the fall plowed land baked quite hard, so that the drag or even the cultivator made but slight impression upon it. Such land always requires manuring. The best course to pursue in this case is to spring plow and seed down to grass. By fall plowing only can grains be sown early; the cultivation and dragging root up many of the weeds before they get much start, and the growing grain further keeps them in check. Many of our farmers have adopted the practice of planking their spring grains. This consists in dragging a heavy plank over the land, to finish with. In this way many lumps are torn and crushed fine, which would only be pressed in by a roller. This method is undoubtedly preferable, for it performs all the good offices expected from a roller in a more efficient way, and costs less.

If we have made ourselves clearly understood, it will be seen that the lot under consideration (which we take as a specimen for the whole farm), has now reached the fifth year in its course of rotation, having been the first and second years in clover, or clover and other grasses mixed; the third year in pasture; the fourth in corn and hoed crops, and the fifth in wheat. With land of ordinary quality, treated in this manner, the yield of wheat will usually average about 25 bushels per acre. There remains one more season to complete the course. For this, we plow the wheat stubble under as soon as practicable. If there is manure to spare after putting enough on the pasture lot, we spread it on that which is to be sown with the light grains, oats, barley, etc., and seed down. We prefer to sow grass seed before the last dragging of the field; never having met with a failure when sown in this way. Seeding immediately after the last dragging, is also a good method, providing no heavy rain intervenes to pack the ground before it is done. Grass seed cannot be buried as deep as other grains; as a general rule, the larger the seed, the deeper covering it requires; for this reason we do not approve of mixing grass seed with the grain in the drilling machine or the broad-cast sower, as much of it must be covered up so deep as to never come up. Where the ground is freshly worked, a good rain is sufficient to cover it, but when the rain precedes the seeding, the seed is liable to remain exposed on the surface, and to dry up and perish.

For the next three years this lot is to remain in grass, being cut for hay the first two years and returning to pasture the third, or even the second year, according to the fancy or necessities of the farmer, and being broken up at the end of that period, is to go again and again through the ccurse we have been describing. In this manner there will be constantly upon the farm, one lot in corn, potatoes, etc.; one in wheat; one in oats, barley and light grains, and three lots, or one-half of the farm, in grass.

The manure we prefer to plow under with the breaking up of the pasture and with the plowing of the wheat stubble. Many persons spread their barn-yard manure on the surface of the land after it is plowed. This we think is a good way, as its effects are much more prompt and it agrees better with the order of nature; but we doubt whether the effects are equally enduring as when covered, for then nothing can be lost by evaporation. No particular time can be prescribed for the hauling of manure. This work is always in order; the great trouble is that, from pressure of other work, it is not sufficiently attended to, although it is probably the most important work on the farm. When the manure has accumulated to a good depth, or has been thrown up in heaps, much valuable time can be saved by hauling it on sleds in winter, taking care to spread it as it is drawn.

All the lots in grass should receive a dressing of plaster each year; the corn should also be plastered at least once during the early stages of its growth. We plaster ours twice, at the rate of eighty or ninety pounds per acre each time, and think it well repays both trouble and expense.

The correctness of the following propositions is so well established and so evident, that they ought to be accepted as axioms, and duly considered by every farmer in the cultivation of the soil:

That there exist no lands of inexhaustible fertility.

That the fertility of the soil is measured by the amount of mineral and vegetable elements, favorable to the production of plants which it contains, and that these exist in limited quantities.

That so much of the above elements as has been required to produce a crop is removed from the soil upon the removal of that crop; that, therefore, such removal leaves the land, by so much, poorer in those necessary elements than it was before such removal.

That all plants which are essentially different in their nature, taste, growth, hardiness or other properties, are likewise different in their component elements; or, if composed of the same elements, then in different proportions and combinations.

That some soils may be deficient in certain elements which are absolutely requisite for the perfect production of certain plants, and that therefore these plants cannot be successfully raised upon such soils.

That if any soil be entirely deficient in some of the mineral or vegetable elements common to all the plants existing in nature, that soil is barren.

That a soil may be barren for some plants, but not for others.

That by restoring to the soil those elements in which it is deficient for the production of certain plants, those plants may be produced, climate permitting.

That when a piece of land has been exhausted of indispensable soluble minerals by a long course of shallow cultivation, a fresh supply of those minerals may always, to some extent, be brought to the surface and made available by deeper plowing and subsoiling; and that this method, though costly, is the simplest and cheapest way of restoring fertility to such worn out lands; enabling the owner to further restore them by plowing under green crops or by pasturing.

That nothing in nature is perishable or can be annihilated, and therefore, when a plant or other body disappears as an entity, either by combustion, fermentation, decomposition, etc., each of the moleculæ or atoms of which it was composed, still exists in nature, in new combinations.

That air, as well as the fluid and volatile elements which it holds in suspension, are as necessary to vegetable as to animal life; that some of these elements are constantly absorbed by and become assimilated with the plant during the process of growth and maturity.

That when we return a crop to the earth, we restore to it all the soluble non-volatile elements drawn from the soil and also many of the volatile elements absorbed from the atmosphere during the process of its growth.

That before these elements, so restored, can become available for the production of new vegetation, total, or at least partial decomposition of the vegetable matter thus restored must take place, *i. e.*, the plants must be totally, or at least partially, resolved again into their component elements.

That the most usual ways of returning plant-food to the earth are in the form of barn-yard manure; plowing under green crops; pasturing the land; as well as by applying to it those minerals in which it is deficient, such as plaster, lime, salt, ashes, etc.

That, of all the above methods, pasturing must be the least expensive and the most profitable; since the farmer's animals are made to perform the work of enriching his land while accumulating valuable products in flesh, milk or wool at the same time.

From the above we are led to enquire: which are the plants that derive their growth most largely from the atmosphere? If we succeed in discovering them, we can make the surrounding air contribute to the maintenance, and even to the increase of the fertility of our land in the largest possible degree, by fixing in the soil, through fermentation and decomposition, a large portion of volatile elements which have become incorporated in the plant, through atmospheric absorption, during its growth.

Turnips are perhaps, among roots, the plant by means of which the soil may be most enriched; but one of the peculiarities of our climate–a climate otherwise healthy, delightful and having many more days of sunshine during the year than western Europe—is that they cannot be raised here with the same certainty as there. It may be said that turnip culture has created in the agricultural systems of England, during the last fifty years, a revolution as complete as it has been beneficial. But here, on account of our dry and hot summers, they are seldom successful, except on newly cleared timber-land, for want of moisture at the time of germination, and because of the attacks of myriads of insects. Therefore, this valuable product, by means of which such great results have been achieved in the naturally thin soils of England, must be omitted in our regular system of rotation, as unreliable. Carrots and beets are more reliable, as well as intrinsically more valuable. Both are full of sugar. Carrots are especially acceptable as food for horses and cows. These roots are best grown on small lots specially devoted to their culture, highly enriched and deeply plowed.

Of all the available plants with which we are acquainted, none seems to be endowed with the power to recuperate soil in the same degree as clover. This plant, when sown with some cereal grain to protect it from the scorching rays of the sun, is very easily raised; but the heat of the sun is quite dangerous to it during the early stages of its germination and development. Plaster has a wonderfully beneficial effect upon its growth; which fact has been attributed to the absorption by the plaster of the ammonia of the atmosphere, when the clover absorbs it in its turn, whereby it becomes fixed in the plant; and to the sulphuric acid which the plaster contains. Whatever the cause, the effect is undeniable, having been proved in thousands of instances.

Clover is also superior to other grasses in that it sends down its roots to a great depth, frequently several feet, and consequently it feeds upon mineral and vegetable elements in the soil, by which many other grasses and cereal plants, feeding only near the surface, would never be benefited. Clover possesses great fattening properties, especially in its green state. It also makes excellent fodder, when cut early and cured in the cock, without being exposed to rain or dews. It is not considered so desirable for feeding to horses, who are apt to eat it to excess; but fed moderately, mixed with timothy hay or with clean straw, it is as good and as wholesome for horses as any other fodder. For all ruminants, clover hay is excellent and safe; they prefer it to any other hay, when properly cured as above. Even hogs devour it.

Clover thrives in almost all kinds of soils. It is especially valuable on sandy land, drawing its nourishment from great depths and from the atmosphere, it brings back to the surface many soluble elements of fertility that had been washed down through the sands by leaching; yet it makes the heaviest growth on the loamy soils of the oak openings, and there best resists the effects of freezing and thawing. It is the only grass we know of (except lucerne, which is a kind of clover), that will yield two or more crops of hay in one year.

A few remarks here on cutting and curing hay may not be out of place, not that we think our ideas or practices new, or better than those of many farmers, but as much valuable grass is yearly spoiled by poor management, what we say may effect some good, even though it be but a repetition of old methods. In the first place, grass should be cut early. Late cutting may produce a greater bulk of hay, but it weighs less to a given volume, and is less nutritious, the saccharine juices having been converted into woody fibre just in proportion as the grass was more nearly ripe. Clover, especially, has little value as fodder when ripe; neither cattle nor sheep will eat its long, tough stems. A late cutting also prevents the possibility of a second crop.

Never cut in the forenoon a larger area than you can rake and cock up the same afternoon. Large quantities of hay are yearly spoiled from this practice. Shake and turn over the grass cut before the dew was off. Clover requires longer curing than other grasses. It should be raked up about four o'clock in the afternoon, in the same order as it was cut, and all put up in cocks before night. The next day these cocks, if small, are to be turned completely over about ten o'clock; if large, they are to be opened into four or five forkfuls; the bottom must be completely turned and lifted up. Clover should never be left spread out over night: the dew is almost as fatal to its good qualities as the rain, turning the leaves black and also making them drop off. When your hay cocks get wet, do not touch them, unless you *lift* them up to prevent fermentation; as soon as better weather permits, spread them out completely, and draw as soon as cured. Timothy may generally be drawn to the barn the same day that it is cut.

Do not stack hay if you have barn room. Better stack the grain and store the hay in the barn. If compelled to stack a portion of your hay, top out the stacks completely with prairie or marsh grass, to shed the rain. Clover stacks cannot be saved without such protection, as they take in all the rain, be they ever so well made.

The system of rotation which we have developed above, allows of all the branches of farming being carried on at the same time: grain raising; pasturing and dairying; stock raising, including sheep, and the growing of fruit. We give the preference to that mode of farming which markets hay and corn by first converting them into beef, hides, pork, butter, cheese and wool; that is to say, into their greatest concentrated market values, retaining the bulky raw materials on the farm in the shape of valuable manures, thereby arresting the deteriorating tendency of cultivation as much as possible.

This course is also the most economic, for the reason that the larger proportion of the marketed agricultural products of our state are transported to great distances before they reach the consumer. The cost of that transportation is a very serious item. We hardly think it an exaggeration to estimate the cost of delivering a bushel of corn or of wheat in European ports, from average distances in Wisconsin, including insurance, interest and profits of forwarders, at not less than fifty-five cents, which is equal to the full value of the corn and about two-thirds that of the wheat, where produced. These expenses lessen the price paid to our farmers by just so much.

Now a bushel of corn will make just as much pork or beef here as it will in England. It will produce as much cheese or wool; and as these articles are worth much more a pound than corn, and cost but little more to transport, it follows that by feeding the corn at home, a large percentage is saved, which accrues directly to the profits of the farmer. Could we have sufficient manufactories to consume all the agricultural produce of Wisconsin, this worse than useless tax for transportation would be saved to our people. Few persons realize the vast difference to our material prosperity which such a state of things would cause.

While we regret to perceive by the last Report of the Secretary, (Vol. IX., Trans., page 33) that the proportionate cultivation of the grasses to other crops is not larger in our state than it was ten years ago; perhaps, indeed, not even so large, if we take into consideration the increased area of improved acres, it gives us pleasure to be able to state that this lamentable state of things does not prevail in the vicinity of Fond du Lac, and that here, more especially on the upland, oak-openings surrounding the city to the east and south, the cultivation of the grasses, particularly of clover, is receiving constantly increased attention, greatly to the benefit of the farmer and of his land. Farmers in this section have begun to realize that one-sixth of their land in wheat every year is sufficient; and that one acre yielding 25 bushels of this cereal, returns them as much, nay more, actual net profit than three times that amount of land yielding 12 or 13 bushels per acre, even without taking into account the difference in the deterioration of the land. Let any doubter make the calculations, including interest on land, taxes, use of fences, plowing and cultivation, harvesting and difference in quantity of seed required, and he will be convinced.

Our main idea in writing this article has been to show the farmers of Wisconsin that good profits and the retention or even the increase of fertility are not incompatible; that those farmers who yearly plow their lands for wheat and other grains, without giving them time to recuperate are ruining those lands for future production, and that, while doing this, they realize but meager returns; that the most profitable, as well as least exhausting system of agriculture embraces many branches: dairying; raising and feeding of stock; keeping constantly a large share of the land in grass; the raising, in proper proportions, of corn, wheat and the smaller grains; of root crops, such as can be successfully raised here; the keeping of bees; a good orchard of such varieties of fruit as the dearly bought experience of the last thirty years has demonstrated to be reliable; also a garden well supplied with vegetables. This course affords to the farmer all the comforts to be derived directly from his land, leaving far less necessities to be supplied by purchase, and in a measure insures him against a total failure of crops. Grass may do well when wheat fails; corn and oats may yield bountifully when wheat is struck with blight; beef, mutton, pork and wool can nearly always be raised with profit; but he, who confines his operations to the raising of cereals alone, sometimes meets with almost entire failure to which the man who carries on all the various branches of husbandry is never subjected.

We think that for every eight or ten acres composing a farm, at least one head of horned cattle and three sheep, exclusive of calves and lambs, should be kept. Many more might be kept with proper management.

From the census of 1870, we gather the fact that 101,384,678 pounds of wool were raised in that year, in the United States, being a little over $2\frac{1}{2}$ pounds to each person in the country; a quantity far less than is required for use. We have no desire, in a purely agricultural paper, to touch upon questions of foreign or domestic policy, or of political economy. We merely state the fact, to show that the keeping of sheep must be eminently profitable, seeing that we raise less wool than the home consumption requires, whereas we grow a large surplus of almost every other agricultural product.

Aside from this, we are fully convinced that no sort of stock is, agriculturally speaking, so beneficial as sheep. They improve all the lands on which they graze. Much might be said of the beneficial effects resulting from the keeping of sheep. They can thrive on herbage that would be too thin and too short for the grazing of cattle; they can dispense with water when the dews are abundant, although water is of course preferable; they increase more rapidly than other stock, because they attain their maturity much earlier, and are more prolific; altogether, we think they return the largest profits for investment, care and keeping. Some one has said very truly, that sheep leave a track of gold wherever they tread.

We had designed, in commencing this writing, to allude to the management of the wood lot, without which a farm can hardly be considered complete, and to the wholesale destruction of timber that is constantly going on in our state, as well as elsewhere; a destruction for which the coming generation will have no reason to be particularly thankful; but the length which this article has attained admonishes us to forbear. Mixed husbandry is composed of many branches of agriculture, which can best be treated separately, as well as in greater detail, in special articles upon those various branches, with a view to harmonize them all into a happy whole, in which the cultivation of the grasses and the keeping of cattle and sheep and a judicious rotation of crops must always hold the most prominent positions.

MARKET GARDENING.

Prize Essay.

BY J. B. ROOT, ROCKFORD, ILL.

Rules and instructions for growing vegetables for market, for a few years past, have received much attention from the pens of experienced and skillful gardeners. Early in 1867, Peter Henderson of New York, published his book on "Gardening for Profit," which had a large sale, and with those horticulturally inclined became the subject and center of a vast deal of study and speculation. It read as well as a first class romance, and yet was so thoroughly practical and bore such proof that it came from a horny-fisted tiller of the soil, that there seemed no Archilles' heel where we could thrust in the dart of criticism. So beautifully did he picture it, and figure out the gains in his gardens near the great metropolis of $400 to $800 per acre, that every owner of a ten acre lot was sure his next year's income could not fall short of $4,000, and perhaps $8,000.

Under the stimulus of such hopes, many a narrow-chested young man in the professions, or mercantile pursuits, ordered to seek health only in the open air, invested near town, believing "ten acres" enough to make a large income. Owners of a few acres formerly growing a few small fruits and perhaps the coarser vegetables, at once, with Henderson in hand, devoted their attention to market gardening as a profession. In the vicinity of our western towns, and I presume the eastern also, the number and average of market gardens tripled and quadrupled. In the spring of 1868, perhaps no class of men in the whole country were so hopeful or more energetic than our young gardeners, who at once demonstrated that they understood their profession, by flooding the markets with fine vegetables, so that the prices in the cities and larger towns went below living rates. At the close of the same year, there was not in the whole country, perhaps, a class of men more thoroughly disgusted with their calling, than these same men, and they have steadily, ever since, been working into some other business.

Now these men did not fail for a want of knowledge or ability to *grow* vegetables, but the failure was in the *selling*—and right here is where they were misled. Eastern gardeners in their books and writings always speak as though the products could be sold, of course, and devote no attention to this matter, but spend all their energies in directions and rules for growing the crops. With them it is poor land at great cost, to be enriched with expensive manures; but after the crop is grown it finds a hungry and insatiable market, ready to pay a handsome price for everything. With us, on the contrary, lands are rich, manures cheap, and with ordinary industry crops certain; but they go to a market overstocked, exacting and penurious. Hence the books and writings of these men, and especially their estimates of profits, should be taken with many grains of allowance, always bearing in mind that though an excellent crop may be grown, no money comes from it until it is sold.

In company with an associate I began market gardening at Rockford in 1867. For this purpose we procured twenty acres of warm, early land, of sandy loam, which had been cropped nearly thirty years in succession, hence badly run down. But this we overlooked in consideration of its nearness to market, being within the city limits. If a gardener expects to do much at his business, nearness to market is one of the most important considerations. Take our own case: from May till late in November, from three to six loads of produce go to town daily, and during the remainder of the year, twice as many loads of manure come back. Now suppose we were one mile further out; then in a year our teams would travel 2,400 miles further, which would require the time of one team, if loaded, 60 days of ten hours each, at a cost of $180, to say nothing of loss from reaching the market at a later hour in the morning.

Our land had no preparation when we took it, except two acres of bearing raspberries and two acres of strawberries in very fair condition. Taking possession in September, we at once began to manure at the rate of 50 good two-horse loads to the acre, and to plow under. All winter long, the same as every winter since, we were steadily hauling manure, except for a few days of very stormy weather. This we procure mostly from private stables of parties in town who regard it as of little value, so that it costs little except the hauling; and we get every load we possibly can before spring work begins. Manure not only strengthens the land so as to produce good crops, but it also brings them much earlier; moreover, in case of drouth, by rendering the soil more friable and porous, it is a protection, as we have found repeatedly. With a plenty of manure and thorough tillage, good crops are almost certain, and with an abundance of the former, so easily to be had, and the facilities for the latter, no one need fail in gardening in Wisconsin for the lack of crops to sell. Our practice has been to apply from 50 to 70 two-horse loads to the acre for root crops, cabbages, and all early vegetables, and about 20 to 30 to the vines, potatoes, tomatoes, sweet corn, and the coarser crops in the manner described hereafter.

In addition to vegetables we grow in connection with our garden several acres of small fruits, but as they are rarely considered a part of a market garden I confine myself to the market garden proper.

ASPARAGUS.—First on the list of vegetables and first in the season is asparagus. This can, and should be made one of the most important vegetables of the garden, for we have never known a market to be flooded with it, nor have we ever known it to fall below a paying price, though every other vegetable does at times; nor have we ever heard of any other gardener who ever knew of such an occurrance. Moreover, it comes in at a season when little else is producing an income, and withal is very easily cared for. The only objection is the fact that it takes three years from seed, or two years from bedding before it begins to yield a return, but it then yields so bountifully, is so easily harvested, ships so nicely, and is in such active demand at home that it well repays the waiting. We grow our own plants and at one year old set them out in rows three feet apart, and nine inches apart in the row, on land heavily manured—at least eighty loads to the acre—and stirred as deep as a Mapes' subsoil plow can get, following after an ordinary turning plow. Annually we dress the ground six inches each side of the rows with enough salt to make the ground look white, or a corresponding amount of fish, pork, or pickle brine, and cultivate in as much manure as can be worked under from that applied as a mulch in the fall. On this rich ground we often sow midway between the rows early radish, spinage or lettuce. They grow very fast and are pretty much out of the way when we cease cutting the asparagus in June. Our plantation consists of three-fourths of an acre, and we shall add one-half acre more to make what we think a due proportion in a garden of twenty acres. Last year, the first season ours was cut, it yielded $400 per acre.

String Beans and Sweet Corn, as garden crops, are only moderately profitable, yielding in our experience a gross return of $50, and net profit of about $30 per acre; and since neither of them allows a second crop to follow in the same season, we cannot afford to use our most valuable land for this purpose, but lease cheaper lands in the neighborhood. Of the former one half acre, and of the latter three to four acres are marketed.

Beets.—Of early beets we annually grow about one third of an acre. We sow them in rows alternately ten to twenty inches apart; allow plants to stand six inches apart in the rows, and begin to sell as soon as the roots are an inch and a half thick—usually about the middle of June—and clear the ground in about four weeks. They retail at five cents for bunches containing five roots while small, and three when full grown. Marketed at retail prices, as we do, it is a good crop and of ready sale, yielding a gross return of about $500 per acre, but involves a good deal of labor in bunching and handling; so that only about half this amount is net profit. Late in May we run the subsoiler through the wide rows, level with a rake, and sow ruta bagas, or transplant, if quite late, from seed beds.

Of late beets we always sow a few of the long blood at the same time with our Early Bassano, and early turnip, to keep up a succession until the main fall crop is marketable. For the main crop we usually grow from one-half to two-thirds of an acre on the ground used for early peas. We grow the plants in a seed bed, sowing about the 25th of April, so that by the 10th of June, when the peas are pulled the roots are as large as butternuts. Taking them up carefully with the spading fork we cut off all the tops to within two inches of the crown, and the same proportion of the root. The ground having been well prepared is marked with the garden marker into rows a foot apart each way, and at every intersection a plant is set, leaving them a foot apart each way. Of course a wet or cloudy time is to be preferred, but new plowed ground is always favorable to root growth, and though they droop for a time and look quite dead, yet the store of nourishment in the root, together with the small amount of leaf surface left sustains life till little rootlets are thrown out, when they at once begin a vigorous growth in the soft soil. We find this superior to the old method, because—

1st. We get two crops from the ground.

2d. Transplanting is not near the labor of a single weeding, to say nothing of two.

3d. The ground being soft and fresh from so recent a plowing, and not compressed by the tramping during sowing, two weedings and two or three hoeings is much more favorable to root growth and produces a larger yield per acre.

Beets do best on ground heavily manured the year previous. Laebee ts usually net about two-thirds as much as early ones.

CABBAGES.—Of early cabbages we find market for only about two thousand. These we grow in manured furrows, in rows three feet apart, and the plants eighteen inches apart in the rows. In the place of every fifth plant on every third row, we plant a hill of Hubbard or Marrow Squash. The cabbages begin to be marketable about June 20th, and are cleared off in about a month, when the squashes have the ground, and if kept clean and well tilled, yield a fair crop. The early crop yields a fair profit, and in towns having a large foreign population, sells well.

Of late cabbages we grow usually two acres—three feet by two—set out about June 10th, on land upon which early peas have been grown, or between hills of early potatoes, planted on manured furrows. The ground cannot be too rich, nor too often stirred. They sell here at $3 to $5 per hundred, usually the former figure, owing to the large amount grown in this vicinity. At this rate they return $120 to $150 to the acre, but the crop is so bulky to handle that not more than half of this is profit. In localities where late cabbages sell readily at $5 to $8 per hundred, few crops are more profitable.

CAULIFLOWER, both early and late, is uncertain in this climate, but by mulching and maintaining moisture it is a profitable crop at $10 to $20 per hundred, and we usually grow about 500 of the early and twice as many of the late ones.

CARROTS.—Early carrots with us have never paid the cost of the seed, but of the Long Orange we always find market for about half an acre at fifty to seventy-five cents per bushel, which yields a profit of $100 to $150 per acre. We sow them early, thin out to one foot by six inches, keep clean, and by running a lifting subsoil plow under the rows are able to pull them as easily as we would radishes. Our sales are chiefly to the Swedes who are very fond of them; but in every town there is a moderate demand for them by livery men and horse owners for a spring feed. This crop, like the parsnip, admits of no second crop, and therefore is not a favorite with us, and we do not grow so largely of it as the market would justify.

CELERY involves a great deal of labor, but pays more to the acre, if there is a market for it, than any other vegetable. We use for this crop the very richest land we have, and grow on it an early crop of radish, lettuce, and sometimes early potatoes. We clear the ground for the second crop sometime in the last half of June, and at once set out—in shallow trenches deeply stirred and enriched—stocky, well-grown plants from seed sown in early April in the seed bed. We sometimes start our plants in the hot-bed in March, and transplant two inches apart in a rich, shady bed in May, to be sure of large, stout plants. Otherwise we treat as described in all the recent works on gardening, and think it a good crop. It has never been less than five, and once as high as twenty-five cents a bunch, generally ten cents. At these prices an acre returns from $1,000 to $5,000; generally $2,000. We find market for about one half acre in this town of 12,000 inhabitants, and perhaps other growers raise one fourth acre more. The demand is constantly growing, and we hope soon to market an acre annually. I understand that in the vicinity of our large cities more money is made from this crop than any two others together, and my own experience leads me to think it probable true.

CUCUMBERS.—Early cucumbers started on sods in the hot-bed and transplanted to the open garden have never paid us because of small demand, and low price considering the great labor involved, and we have ceased to grow them in this way, but plant them as early as we dare, on warm rich soil, and by frequent cultivation and hoeing hasten forward the crop. Dust the plants while the dew is on both *above* and *beneath* with plaster or ashes to keep off the striped bug. Grown in this way we market about one-half acre at twenty-five to forty cents per dozen for large sized fruit for table use, yielding a gross return of $250 per acre or about $160 net. The white spined is by far the best for this purpose.

Of cucumbers for pickles we always find a good demand for all we can grow on three or four acres. We usually plant them between hills of early potatoes on manured furrows about the middle of June, so that they will be well up by the time the potatoes are dug. Under frequent cultivations they usually are ready to begin picking in from 50 to 60 days. They are picked at a cost of about 25 cents a bushel and sorted into three sizes; the largest selling for $1.00, the medium at $1.50 and the very small at $2.00 per bushel. At these rates we usually get about $140 from an acre, of which $80 is net profit. Green cucumbers will bring more than pickled ones when offered side by side. We have grown cucumbers for the pickle factories but never made anything at it. The Long Green is usually preferred by private buyers and Short Green or Early Frame by the factories and dealers, for pickles.

EGG PLANT.—Of the egg plant we have every year grown a goodly number, but of the fruit we have never yet marketed a specimen. If a potato bug loves a potato vine, he is perfectly ravished with the egg plant. Millions, gathering from miles around, pay their undying attentions to it. Plaster it so thick with paris green that any bug in his cooler moments would see only certain death about it, and still on they come. My opinion is that the surest way to protect potatoes is to set out a sufficient number of egg plants coated with paris green anywhere within ten miles of your potato patch. I cannot say that my egg plant business of itself has been profitable.

HORSE-RADISH is a profitable crop. We make cuttings of roots one-fourth to one-half inch thick and six inches long, and set them in holes made with the crowbar or spade between the rows of early cabbages deep enough so that the cultivator does not tear them up. As soon as the cabbages are removed they have the whole ground, and it being very rich they make a large growth. They should always be dug at one year old, washed and trimmed, when they bring from seven to ten cents per pound, or, if a good crop, about $450 per acre. For a garden of twenty acres, one-sixth of an acre is none too much.

LETTUCE near our small cities will never sell enough to pay for growing, except the very earliest. Therefore, we sow the head winter lettuce in September, mulch it for winter protection, and as soon as the frost leaves the ground in the spring, transplant it one foot each way. A portion even of this hardy kind winter-kills, but we sow plentifully to provide for this. Early in the spring we begin selling the small heads, two or three for five cents. At this rate it is a fair crop, but only a small quantity can be sold. Taking the crop for four years, it has been to us a losing one.

MELONS constitute one of our most important, and for the labor and capital employed, one of our most profitable crops. Our early peas are usually sown thickly in rows, two and a half feet apart. If we intend to follow the crop with watermelons, we omit every third row, and if for muskmelons, we omit every other row, leaving a space wide enough to get through with a cart or wagon loaded with manure. About the middle of May, when warm enough to plant the melons, we open a furrow in the place of the third row omitted, spread in it well rotted manure, and cover a few inches deep with soil; at regular distances of eight feet for watermelons, and five for muskmelons, plant the seed. The culture and picking of the peas do not interfere with the culture of the melons, and as soon as the peas are marketed the pea vines are at once pulled, drawn off, and the ground kept well cultivated till the growth of vines interferes. In this way we grow, usually, six to eight acres of peas, returning about $60 gross and $35 net, per acre, four to six of watermelons, and one to two of muskmelons, on the same ground, returning, usually, $100 gross, and $80 net, per acre, or the two crops together, $115 net per acre. For the labor required this is a good return.

ONIONS.—Our onion bed consists of two acres, usually one acre of Large Red, two-thirds of an acre of Danvers Yellow, and one-third of an acre of Silver Skins. Our soil does not seem to be so well suited to this crop as to some others, and for two years past the yield has only been 250 bushels to the acre, costing us about $130 per acre. The price has ranged from twenty-five cents to a dollar per bushel, so that it has been moderately profitable; but the main labor on the crop —the weeding—comes in at a time when much else is to be done, so that it is not a favorite with us, and we shall sooner decrease than enlarge our bed. We sow the seed in rows alternately ten and eighteen inches apart, and about the tenth of July run through the wide spaces with a one-horse subsoil plow, and after it sow a row of Strap Leaf turnips, or transplant ruta bagas, skipping a few rows every fifty or sixty feet whereon to spread the onions to cure when pulled. In this way we keep the ground clear of weeds the whole season and get two crops from our abundant application of manure.

PARSNIPS.—Of parsnips we grow about the same amount as of carrots, but at double the profit. We never can understand why parsnips, yielding the same or more per acre than carrots growing immediately by the side of them, sell for twice as great a price.

PEAS.—Of these we have spoken under the head of melons.

POTATOES.—Of late potatoes we grow none, but of early ones (entirely Early Rose) from six to ten acres, planted very early, upon manured furrows, in hills three feet apart each way. Early in June we run a subsoil plow between the rows crosswise of the manured furrows, and between the hills on this furrow plant sweet corn for late sales, or if early, set out tomato plants, or, when late, Drumhead cabbage, or plant cucumbers for pickles as described under that head. The potatoes alone yield a return of about $100 per acre, and the succeeding crop as mentioned under that head.

RADISHES involve little labor except pulling, washing and bunching, and as many as can be sold are usually grown at a profit. We usually mix the seed with that of early beets, onions and other crops that need to be weeded while very small, and by the quick growth of the radishes the rows can be traced sooner than otherwise. As soon as the radishes are large enough to market we pull them out and sell them at five cents for bunches of six to ten. Thus treated as a stolen crop we usually realize from $50 to $70.

SQUASHES.—Of squashes, we grow a few Early Crooknecks in the same manner and at the same profit as early cucumbers. Of marrow squash, we usually find sales for one-half acre, and of Hubbard's, two to four acres; grown in the same manner as melons, and at about the same profit and expense.

EARLY TOMATOES we grow in limited quantity, but find sales slow until the price falls to a dollar a bushel, when we sell off rapidly the products of about two acres, our main crop —about three hundred bushels of good fruit. Our plants are grown in hot beds, twice or thrice transplanted in the bed to make them stocky, and from the middle of May till the middle of June set out in clear ground, or between potato hills, as described under that head. They have always returned us $100 per acre net, and one year as high as $300.

In this way all our land, except that occupied by asparagus, carrots, parsnips, and a few early tomatoes, is double cropped, so that from 20 acres of land we get 40 acres of crops, and the whole value of our manure. Not only is the crop doubled, but the land is kept cleaner and in better tilth. But to accomplish this are needed manure without stint, a lively action of the elbow joint, and that every crop be promptly "on time." We are so well satisfied with this system that had we twice as much land we should still double crop and put our surplus to some other use. With proper care, under this course, gardening cannot help but pay, *provided* the crops are *marketed* well, and to this point—the keystone of the whole business upon which all else depends—we will now give our attention.

MARKETING.—When we entered upon gardening we intended to wholesale all our crops to the dealers. For a few weeks, while fresh early vegetables were still scarce, all went "merry as a marriage bell," but as soon as our main crops began to come in, so did everybody else's, and not only did the prices go below a living profit, but dealers who before were glad to pay any price, would not take them at the lowest rates,— "some farmer had brought in a lot and would take his pay in trade, or a friend had spoken for his patronage, etc., etc." Chicago market was no better, and we had to thank the commission men that they did not call on us for a bonus above the proceeds of the sales to pay percentage and the expenses. Crops began to accumulate on our hands; something must be done, and that quickly, or it would be all over with our little venture of twenty acres. We noticed one marked peculiarity of this flooding the market in our city; the consumer was paying all the while nearly or quite as much as before, and it occurred to us that if *we* could sell at that price our little venture would be safe.

Accordingly, early one morning we started out a salesman with a good load under instructions to seek retail sales from hotels, boarding-houses and private families, with a promise of daily calls if sufficiently patronized. At noon he returned with an empty wagon, and the proceeds, not only the wholesale price but also the retailer's profits, which usually range from twenty-five to fifty per cent. From that day to this, nearly four years, we have pursued the same course, and now keep three and sometimes four wagons going through the season. True, this is a considerable expense, but the retail profits more than pay it, and we secure what is so necessary for success in gardening—*a certainty of a market at paying rates.* I am confident that outside of the immediate vicinity of Milwaukee and Chicago no other way of marketing his products will insure the gardener such liberal and certain results. Shipping to a distant market is very rarely profitable, and always risky. First, the expenses are heavy—careful packing, cost of packages, exorbitant freight and commission all come from the lowest wholesale price, often of a flooded market. Then again even with the greatest care in packing, unfavorable weather, bad handling and storage will cause large quantities often to heat and spoil, and then you not only lose the crop but added thereto all these expenses and an additional charge for carting them to the river. Whereas with our method of marketing we avoid all these expenses and obtain the highest retail price, and never yet failed to sell our crop.

Each wagon soon secures as many regular customers as can be called on in an half day, who are glad to give their patronage, provided they can be assured a daily or tri-weekly supply. We have had many customers seed down their own gardens under such assurance, and have never yet lacked for buyers. The best salesmen we have had were Swede boys from 17 to 20 years old. They are quiet, attentive, honest, and ambitious to improve, and yet work for moderate wages, and have proved more serviceable than mature Americans of considerable business experience and ability whom we have employed. The first half of the year the sales are all made in the forenoon, and afternoons horses and hands go to the fields. Later in the season the wagons run all day.

Thus I have sought, as briefly as possible, to give such hints upon the management of a market garden as the peculiarities of our locations, our western soil and markets render necessary; particularly as in contrast with the eastern soils and markets, on the basis of which all of our books and authorities on gardening are founded. Taking into account the differences and the suggestions regarding them in the forepart of this article, we cannot commend too highly the standard works on gardening of recent publication, particularly Henderson's "Gardening for Profit," and Quinn's "Money in the Garden." By the aid of the former, with what was to be learned from a few volumes of agricultural papers, I acquired such a knowledge of the business, that driven by poor health from the profession to which I had devoted all my energies—knowing previously not enough of gardening to grow a decent cabbage—I was able, except as to some little matters, which nothing but experience could teach, to grow as good crops the first year of our business as I have ever grown or seen grown since.

In leaving this subject I would commend it to all as a business full of pleasure and satisfaction to one who enjoys the tilling of the soil and country life, while still unwilling to leave the town and its commercial spirit. While it demands of one that he be up early and out late, yet the long hours are not severe hours, nor wearisome; and if he but bring to it the application, the study, forethought and skill, which he would give to any of the professions, or any commercial pursuit it will not fail to reward him with a competence, while it gives him health and quiet, and that restful life which so few employments of equal remuneration do give.

PRACTICAL MANAGEMENT OF SANDY LAND.

Prize Essay.

BY HON. J. G. KNAPP, MADISON.

Lying in the center of Wisconsin is the largest development of the lower silurian, or Potsdam sand-stone, known in North America, if not in the world. These rocks are too porous to contain minerals in economical quantities, and frequently too friable to be of value as building stone. In many places, the surface to great depths consists of loose sands, liable to be drifted by the winds, and if cleared of vegetation may become dunes and uninhabitable. The thin soil is nearly destitute of the important elements for vegetable growth, such as potassa, sodium, phosphorus, lime, and humus. Crystalized silex abounds, forming almost the entire surface. The native forms of vegetation show the scarcity of these essential elements to plant growth; and where the cultivation of farm crops has been undertaken, their dwarfed condition makes the deficiency most glaring. Geologists concede that this region has been exposed to the action of the rains, snows and air, since the distant epoch when the lower magnesian lime rocks were formed beneath the upper silurian sea. The currents of fresh water passing over these sands during this vast cycle have carried off the salts and soil, and with the sediment filled the basins of the Mississippi and its tributuries; the vast ice-fields of the glacial period spread over them, ground down the soft rocks, and scraped the crystals into the valleys and plains as far south as central Illinois. Innumerable years of sparse vegetation have not been equal to the task of making a soil over these ancient dunes.

Are these townships and counties valueless, and shall they be abandoned to wild beasts? If not, how can they be managed so as to pay for the labor and means of enriching them, or covering them with an artificial soil, where they are deficient?

The sandy lands may be classified into the high, dry ridges; the low, wet swamps, often submerged in water, beds of ancient lakes, sloughs and fens; and the lands intermediate, where water is found on or near the surface in wet seasons, but which are dry during the heats of summer. Each of these will produce very different crops, and must receive a different culture.

FIRST.—The dry ridges composed almost entirely of loose sands. These naturally produce shrub pines, *Pinus banksiana*, shrubby black oaks, *Quercus tinctora* and *coccinea*, blue-berries, *vaccinium Pennsylvanicum*, dwarf willows, dogwoods, and a few other bushes and coarse grasses, with other plants always found on sands. Here the decayed vegetation has produced a coating of soil, so thin, that when the land is cleared of stumps and turned with the plow the vegetable matter is lost, and remains imperceptible to human eyes ever afterwards. When one or two crops are taken off, the land will no longer pay for the work bestowed on it, unless largely manured; and finally under ordinary culture becomes a barren, drifting sand dune, and will produce nothing except some of the crops noticed below.

The very best use to which this land could be put, would be to plant it with conifers, red or Norway pine, or pines from the Rocky mountains, European and American larch, Norway spruce and the Douglas spruce from the mountains. A slight mulching applied for the first three years, and keeping down other growths would be all the cultivation these trees would need until they required thinning. Such land is admirably adapted to the growth of the red and Rocky mountain pines, and the European larch; and in due time a large yield of timber may be expected, returning a handsome remuneration for the outlay. These plantings might be so arranged as to provide shelter and wind-breaks for other portions of the farm, and thus be an advantage during the period of their growth.

Many portions of these dry lands are naturally stocked with blue-berries. The bushes, if preserved while everything else is killed by the grubber, would soon take entire possession of the soil, and would yield a crop of fruit which would pay better than wheat on the richest soil of the state. If the blueberry fields are located sufficiently near the railroad stations to allow the fruit to be carried to market, it might be disposed of while ripe. It is unnecessary to state what an acre of such berries would be worth to the owner. All that can be shipped are now sold at such prices as almost to preclude their use by the poorer classes in the cities and villages where they are offered for sale. A few years experience would determine the best methods of growing and marketing them. Of their value there can be no question. Such lands as lie too distant from railroads to allow their produce to be shipped, ought nevertheless to be cultivated for their berries; such berries may be dried and then marketed. When these dried berries are better known in the cities, they will command prices equal to or approaching raisins. Dry or green the crop will be very remunerative. Other pieces of land are naturally stocked with whortleberries (*gaylussacica resinosa.*) These should also be cleaned out and saved, and will prove a remunerative crop. Whortleberries carry better than blueberries, command nearly as high prices, and have a ready sale, but owing to their hard, round seeds they would not be as valuable for drying. They are as productive, and ripen a little later than the blueberries.

Among these dry ridges are sags and swales, where the wash from the higher lands has settled; there the timber grows taller and more thrifty, and a thick undergrowth of brakes, grass, pea-vine and many other plants are constantly adding to the soil. Such land will produce good crops of cereals, corn, roots and grasses, and have naturally a fair quantity of humus in the soil. An annual addition of this vegetable matter, about equal to the natural growth, would keep this soil up, and it would continue to produce good and sure crops. From these lands farmers must at first raise their grains, potatoes and other crops, and on these spread the manures from the barn yard, until other lands may be enriched. A careful study of these rich swales will indicate what all the sandy lands need to make them productive—a little clay to compact the sand, a thick coating of vegetable matter to produce humus, and a yearly addition of manure. These would keep the soil in heart, and with a little salt and lime would greatly increase its productiveness.

The first great want is clay, or its equivalent; a want that in many places cannot be supplied except at too great expense. In places where the clayey material is found near at hand, in banks, or in a stream carrying clay in suspension, and by which it may be carried and spread over the surface by irrigation, a fine soil may soon be made in the sandy lands. Salt, lime and wood ashes will do much to supply the want of clay, as these materials dissolve the sand, and fit it for the food of plants. Salt and ashes, and plenty of vegetable manure should never be omitted in the culture of sandy lands.

SECOND.—The low, wet swamps, often submerged in water, beds of ancient lakes, sloughs and fens. These demand careful attention. In no portion of the state is there such plateaus, so much surface lying at a water level, and on which the water stands without natural drainage, as in these sandy lands. Some of these swamps are peat bogs, but more frequently they are covered only a few inches deep with a semi-peat, composed of the decaying vegetation that has grown there. Generally they are traversed by or connected with a running stream, which renders it difficult, if not impossible to drain sufficiently to produce corn and other grains, or to adapt them for pasture lands, though they can be made to yield some of the wet meadow grasses. This difficulty of perfect drainage should not be obviated; but on the contrary, advantage ought to be taken of it, and the land if not naturally stocked, be planted to cranberries. Such lands may often be stripped of most of the surface muck, to be carted to the dry lands, which, when sufficiently rotted, may be spread and incorporated into the surface, furnishing a soil of great value. In the mean time the swamp, wherever it can be flooded at pleasure, should be fitted for the culture of cranberries. The manner of rearing, harvesting and marketing these berries, and the profits of the crop, belong to another hand, and must be passed, however much we might be disposed to write of them. The wet lands of Wisconsin are situated in the narrow belt, where these berries grow. When the character of this soil, the facilities for flooding these swamps, and the climate are understood and applied in practice, these swamps will be found admirably adapted to the growth of this crop. The unlimited demand for cranberries, the prices they always command, the facilities with which they may be transported to distant markets, and the limited region in which they can be grown, indicate that they will always command a remunerative price for labor bestowed, and that no danger exists of a glutted market, even if every piece of land which would produce them were planted, and well stocked with vines. This is the crop of all others on which the farmers, who possess such lands can rely for profit, and every piece of land that will produce them, should be planted with cranberries in preference to any other crop.

Those portions of the swamps not adapted to the culture of cranberries, may be sowed to some of the wet-meadow grasses, of which the fowl-meadow is preferable as a hay crop, and is not liable to be destroyed by the frosts and ice in winter. Large hay crops fed on the farm, supply an important element for enriching the soil, and are the basis of large piles of manure for the cultivated fields. Other portions of these swamps might be profitably planted with the American larch, black ash and white cedar, and thus be made to yield large profits, in supplying timber, fuel and shelter to the cultivated fields.

THIRD.—The lands intermediate between the swamps and the dry lands. These we have in great variety. Some portions are dry most of the year, some are often submerged, and others have water constantly in the low places, and everywhere just beneath the surface. On some portions there is a thick coat of decayed vegetable matter, and the surface is a mat of roots, that will decay in the soil when plowed; on others the soil is very thin, and only plants of the lowest order, or of a purely aqueous growth are found. Other places have a luxuriant growth of bushes and other plants, nourished by the moisture in the ground, the decaying material on the surface, and the great heat of the Wisconsin summers. All portions of these lands are wet, sour and mossy, and will not naturally grow either the best meadow grasses or other crops, until they are freed from stagnant water; yet very little of it is so situated that it cannot be sufficiently drained to produce almost any cultivated crop. To these lands the farmers in the sandy regions must look for their main plow lands. When drained they will become warm, and the muck being incorporated with the sands of the surface, their tillage will be easy, and productive crops may be expected.

In cultivating sandy lands one principle must not be lost sight of, a continuous application of vegetable matter to the surface of the ground to form and renew the soil; to act as a mulch during the heats of summer; to prevent the sand from blowing by the winds, and to keep up the needed supply of plant food, for whatever crop may be grown. A large supply of vegetable matter can be secured by using no fire in clearing the land, or afterwards; but on the contrary burying all the small bushes, brush, weeds, and bogs with the plow. Afterwards the supply must come from rearing such crops as will give the greatest amount of vegetable matter, that may fall upon the ground where it grew, or that may be carted from the barn-yard. Straw and hay give the most vegetable matter, and are best prepared for the use of the land after passing as food and bedding to cattle and horses. The more concentrated manures furnished by sheep, hogs and fowls are better adapted to lands of a clayey texture. Some of these animals should, however, be reared and kept on every farm. Grasses and grain, wherever they will grow, should form the principal crops, and should be fed at the farm barn, and all the manure be carefully spread on the surface.

From the best information furnished by science, of the manner in which plants grow, it is inferred that they find their main supply of food near the surface of the ground. From that fact it may be adduced, that in the thin soils of the sand, the soil should always be kept, as far as possible on the surface, and never be buried beneath a thick layer of the lower barren sand. This principle is well understood and acted on by the tillers of the sands in the Southern States; and to it may be traced their opposition to the "turn over" plow, as they term the plows used in the Northern States. This sub-soil of barren sand, ought nevertheless, to be stirred, though it be not brought to the surface. Roots of plants in quest of water will penetrate into the ground, and the stirring of the sub-soil to the depth of eight, or even twelve inches, will greatly aid this plant action. Such roots penetrating and decaying in the sand, will in time form a soil to a proper depth. After that depth of soil has been obtained, the furrow may then be turned as deep as desirable. This result may be expedited by a free use of salt, wood-ashes, lime or sulpher, all of which dissolve the silex of the sand, and fit it for the use of plants, hence a free use of these or some of them, applied to the surface in connection with vegetable manures, is of great value, and would largely compensate for a natural deficiency of clay in the soil, or where that material cannot be procured; some or all of them are valuable on all lands in this State.

Until a good depth of rich soil has been formed, the surface only should be turned over; and in these sands, the turning should be done while the herbage is yet green, or after the first frosts. The subsoil can be stirred by means of the teeth or knives of a properly constructed cultivator, penetrating to the desired depth in the bed of the shallow furrow. Such an implement would thoroughly loosen the earth, but would not bring the barren sands to the surface. A plow and cultivator might be combined in such manner as completely to mix and pulverize the surface, retaining the soil on the surface, where the young plants and feeding rootlets of large plants would find their supply, and yet would furnish a good depth of mellow earth below, whence the plants could draw their supply of water.

Wherever there is sufficient vegetable matter in the soil to grow the plants, no lands in Wisconsin produce grain, corn or potatoes of so fine a quality as do these same sands. The wheat grows here heavy in the kernel, and the straw is so stiff that it seldom or never falls. Corn matures rapidly, and always is sound and ripe. Potatoes yield much larger crops, ripen better, are more mealy and consequently are more nutritious and valuable than those grown farther south, or on the clay soils. This is an exhaustive crop, but the proper manures to keep up the lands for its production are found in the fireplace and the stable. To these lands our large cities and villages must yet look for their supply of this useful article of diet.

Whatever crops may be grown on these lands, those are preferable which yield a large amount of leaves, straw or other vegetable matter, to be left where they grow, or returned to the ground in the shape of stable manures. The grasses and clovers are foremost of all, followed by corn and grains. These need no special notice, as all will grow them, who grow any crop. But, a few special crops require a notice, and the pumpkin, squash, grapes, raspberries, blackberries, mustard, poppies and hemp will be spoken of.

Pumpkins and squashes should be largely grown on every farm where sand predominates. The Hubbard squash is the best. What are not sent to market, will be eaten raw by all stock, and furnish a great amount of nutriment. The yield is large, and they are easily preserved in a dry cellar through most of the winter, if gathered before they have been frozen in the fall. The seeds of pumpkins and squashes ought to be removed before feeding, as they contain but little nutriment, and are injurious. They can, however, be manufactured into a valuable oil, and thus be made profitable. These vines can be grown by applying manure to the hills, and where there is a deficiency of that useful material, a small supply will thus answer for a large extent of land. The leaves and vines remain on the surface, and bind the sands during the high winds of the fall and winter, and decaying readily will soon be incorporated into the soil.

These lands lie in the belt of the early ripening grapes, and with proper care and a good supply of vegetable manures large crops of grapes might be realized. The great heat of our summers, and the character of the soil would force grapes forward in a less number of days, than they would require on more tenacious soils, and in days less bright. The berries for the same cause would mature better and contain more sugar, consequently make better wine, if raised for that purpose. The great amount of foliage and trimmings of the vines will add largely to the mulch needed, and furnish manure for the growth of the vines. Owing to the climate and soil the leaves and fruit would be entirely free from rot and mildew. Grape culture would be very easy on such friable and perfectly drained soils; and it is believed that one acre set in Delawares, well tended, and five years of age, would yield more clear profit than ten acres planted to grain or grass; and the annual yield thereafter would continue. The presence of large quantities of wild grape vines, indicate that this soil is congenial to the grape.

Many of these lands, and especially those north of the grape belt, are naturally set with raspberries and blackberries wherever mulch and wash have accumulated. These produce yearly large crops of fruit of excellent qualities. From these wild bushes stocks might be selected that would possess all the good qualities of the Antwerps, Doolittles and Lawton, and of sufficient hardiness under cultivation, to endure the excessive cold of Wisconsin winters. Near the stations of the railroads, these could be made profitable for market; and at more remote places they could be preserved or dried, and thus disposed of. Like grapevines, these bushes would add largely by their leaves and trimmings to the richness of the soil, perhaps a sufficient supply to keep up its fertility.

Black mustard is a crop that delights in a sandy soil, and leaves a large amount of leaves and stalks to enrich it. All of this refuse should be allowed to rot on the surface, or be buried in the soil while green. Few crops, when the modes of handling are understood, yield more profit. Mustard seed is brought to market as mustard flour, or manufactured into table oil; in the production of which, it rivals the rape, olive and almond. Mustard seeds itself, and the land only requires working with a cultivator or harrow each spring as a preparation for the crop. When required for other crops, the land is easily cleared by turning under the green plants, or by cultivating corn. The soil would increase in quality by continued croppings of mustard, as it does not exhaust the salts.

Hemp is another crop which yields a very large amount of leaves, chaff, roots and stems. If the leaves are left in rotting, and the shives are returned to the ground, they will be sufficient to maintain the fertility, and the soil will never depreciate while cultivated with hemp. If there is sufficient humus in the soil to force the crop, returning the refuse afterwards, is all the soil requires. Hemp fibre is almost pure carbon, and the seeds are not allowed to mature when fibre is the object of the crop; therefore, as it takes the smallest portion of salts from the soil, it exhausts the soil less than any other cultivated crop. Its true value is less understood than any crop grown by our farmers. It is safe to estimate that for fibre it will produce from $75 to $100 per acre; and for seed from $50 to $75. There is no doubt of the possibility of growing and maturing hemp in Wisconsin of better fibre than farther south. The seeds may be sown in the fall, too late to sprout, or at the earliest possible period in the spring, on lands prepared in the fall. The young plants, unlike flax, are not destroyed by spring frosts. When grown for fibre, hemp kills all other plants, as it covers and shades the entire surface. For seed it must be grown in drills, and cultivated in its early growth. The yield is as high as forty bushels of seed to the acre. Unlike ordinary farm crops it prefers the same tract of land from year to year, if its refuse is left on the ground.

The large single flowered or opium poppy is another crop, which, producing a large amount of leaves and stems, would thrive well on these lands. After frosts or age have dried the leaves, they will be eaten by cattle, horses and sheep; the same is also true of the mustard. The great value consists in the very large crop of seeds—from 20 to 40 bushels of 60 pounds to the acre—which are gathered by cutting off the bolls, so that all the leaves and stalks are left on the ground to enrich it. These seeds produce fifty per cent. of oil superior to the olive, which can be extracted in any flax-seed mill, with less heat. The oil cake is far superior to linseed to feed cattle. The poppy matures too rapidly in Wisconsin to be profitable for opium. All things considered, this would be an excellent crop for the sandy lands, and the oil market cannot be overstocked.

Mustard and poppies have been named, and their culture urged in this paper, because they will grow in lands of too thin soil to produce any other crop, even grass; and for the amount of vegetable matter they will yield, in the form of taproots, leaves and stems, which will in a very few years convert drifting sands into a soil capable of yielding good crops of clover, grass and grain. The objection to black mustard, that its seeds will remain in the soil and spread to adjoining fields, can be obviated by raising a smaller plant, the white seeded mustard, which will not retain its vitality through the winter in the ground. Such sandy lands as naturally grow only the most worthless and noxious weeds, will produce mustard and poppies; and their seeds, without injury to the amount of vegetable matter left on the surface, will yield a crop that will compensate for the labor bestowed, better than the crops usually cultivated on the farm. Give these plants sand to bury their roots, water, light and air, and they will live, thrive and mature their bountiful supply of seeds, and decaying, leave their substance to enrich the soil for other crops.

In conclusion, it may be averred that these Potsdam sands, and those in the magnesian strata, when knowledge and science shall apply proper manures and rear crops adapted to the soil, will become the most productive in the state. Then land that is now unproductive and almost valueless, will become the best, richest and most desirable farms, more sought for than the more tenacious soils that surround them.

DAIRY FARMING.

Prize Essay.

BY REV. S. B. LOOMIS, LONE ROCK.

It has not been many years since the exclusive dairy became known. In the northern part of Herkimer county, New York, where frosts rule early in autumn and late in spring, where long continued cropping and precarious harvests had compelled "some other way," there the dairy exclusive was first formed. Backed as those northern towns were by continuous forests northward for eighty miles, situated also among the highlands of the Adirondack mountains, with springs and streams of the purest water, with copious and frequent showers in summer, and deep snows in winter, made them probably the best place in the world to give this important industry the rank and place it has assumed, at present, among the other employments of man.

That it has proved profitable, it is only necessary to study the market reports of each week, as they are chronicled by the metropolitan and agricultural press, and also to become personally acquainted with those families following this avocation. Their homes, their social position, all denote that it is as remunerative as any branch of agriculture. It has an advantage over grain raising, as ordinarily pursued, in that it *must* improve the soil, while grain raising *may* deplete it. Another advantage it has, that not only lands favorable to the raising of grain but those where the plow may not go, the hill sides, ravines, and the bluffs may be made to pay tribute; in fact, from such sources the sweetest herbage is derived, to such places the herd instinctively wanders and from thence brings the burden of greatest reward; and also lands that are too wet for other purposes may supply to some extent, the demands of the dairy.

THE PASTURE should be formed from grasses blooming in succession, from May to September; different varieties in close proximity, forming a seamless turf, where weeds should have no place to grow. Such a condition is not secured in one year; it requires several. Weeds will appear during two or three years after seeding, and should be cut down with the scythe or mower before the ripening of their seeds. While to all weeds the scythe is destruction, nature has provided that the grasses shall not suffer by its use.

A well established turf furnishes more nutritious herbage than one in process of formation; the herd will neglect the latter for the former where the opportunity is given.

Those farms where dairying has proved most successful have pastures that have never been disturbed with the plow. Twenty years is short enough time to fully establish a first-class pasture. England boasts of those that are rich with two hundred years of cropping, and show no sign of distress for want of scarifying.

MULCHING PASTURES.—We have found that the best method of mulching is to withdraw the herd in August, and let the growth fall down in autumn to protect the grass roots in winter; but as this is not always practicable, the use of straw secures a great improvement. To those who have never tried this cheap manure we can say from actual experiment that its beneficial results will be found marked and permanent. It may be applied at any time of the year; it is never in the way; it decays slowly; keeps the earth moist—an important item for abundant feed; furnishes nourishment to the plants without adding a rank flavor to be communicated to the milk; it will cover a far greater area when spread dry than when left to decay in the stack or rot in the yard to be then applied, and requires far less labor. Beyond what is necessary to make the stock comfortable in the winter season, straw should be spread to make the grass roots warm in winter, cool in summer and moist always.

It is found necessary, sometimes, to scarify with a sharp cutting harrow the surface of pastures, and if there be any places not sufficiently seeded, (not thick enough,) to sow seeds to increase the number of plants. The best time for this work we have found to be in the last of August or first of September, to be succeeded with mulching.

We have said nothing of barn yard manure because we deem it best applied elsewhere; but of the use of gypsum we can speak highly especially where white and red clover form part of the forage plants; it is considered essential among the dairy farmers of central New York.

SOILING as an adjunct to pasturage has attracted much attention of late years, and has been more or less followed by the best farmers, particularly those who have pursued the plan of giving their pastures the opportunity to recuperate before the winter cold begins, and also during the earlier growth of grass. In the last of May and during the month of June a small quantity of sweet hay will be eaten with avidity by dairy cows, placed before them while in the milking stall; it serves to antidote the fluid state of the droppings, while it adds perceptably to the flow of milk. Later in the season, when the astringent qualities of the grasses become apparent, corn fed green, or better, when wilted by the sun, takes the place of grass, and comes as near to being a perfect substitute for it as any plant yet used for the purpose. Until land shall be dearer and labor cheaper, soiling will not be generally, or at least, entirely practiced, yet at seventy dollars an acre, it seems like waste to give a place to pasturage in any arrangement of the farm. At present it is a necessity; with so much uncultivated land, with farms in size partaking more of the nature of ranches we shall have to go on in the old ruts, till the new and better highway is formed.

This brings us to consider the farm with reference to the winter feed of stock.

THE MEADOW furnishes the material best calculated to sustain the life of the stock, contributing the exact substance necessary to form flesh and furnish milk, when made of the best variety of grasses. In preparing the ground for a meadow it is of the highest importance that the mechanical condition of the soil should be attended to, that it should be finely pulverized and to a depth of one foot at a minimum measurement; it should be naturally or artificially underdrained so as to be neither water-logged in wet weather nor hardened to the consistence of brick when dry; while the chemical condition should be such as the word "rich" conveys to the mind. The meadow, is not for one year, but for many; therefore, the surface should be as smooth as the harrow and roller can make it, to facilitate the gathering of the crop in as cheap and rapid a manner as possible.

The quantity of seed necessary to stock an acre of land should be determined somewhat by the quality of the land to be seeded the first quality needing less than that which is less fertile. Enough should be sown to ensure a "catch" sufficiently thick to make the plants fine and more succulent than that which is produced from thin seeding, which is usually coarse and harsh, with too much woody fibre. In my own practice twelve quarts of timothy and four quarts of medium red clover have been sufficient. Should Alsike clover be added, one quart would make an improvement, while June grass, red top and white clover will soon find the way to, and fill all vacant places. The time of seeding should be as early in the spring as the condition of the soil will admit, or, if in autumn, the last of August or the first of September, not later than the fifteenth. We have had the best results at the last named period.

With what crop shall we seed down? If our main object be to establish the meadow, we would answer with none of them, but if any, we would name barley in the spring seeding, or rye in the autumn; but it is not best to so tempt Providence with our penuriousness; not well to make either land or beast carry double, as one or the other of the burdens will be likely to be thrown. The seed should be covered by dragging with a fine harrow or with a bush prepared for the purpose.

To maintain the meadow and have its production profitable for a long term of years, avoiding the labor the plow imposes, and the expense entailed by re-seeding is certainly an object to be desired. To secure permanence, the first thing to be avoided is, the ripening of the seeds of the grass. While it is yet grass, while the strength is in the stalk, and leaf, it should be cut down; it contains at this stage of its growth that nutriment which the herd can appropriate and give returns for in flesh or milk.

If mowing early be the first great rule, the second is like unto it, viz: Abstain from making a *pasture* of your meadow. Let the after growth go down upon the ground; when the earth is frozen it will be a protection to the roots; when it decays it will be their nourishment. Should there be sufficient to make a covering for the mice, a few days tramping by the cattle in the early winter will dispose of them; in any event their teeth are not so dangerous as those of colts and sheep. What is true of autumn feeding of meadows is much more applicable to spring pasturing, for then the ground is capable of being made rough by trampling, and two evils follow instead of one. We have seen a meadow of thirty years standing, with not the best of soil to sustain it, yielding desirable and remunerative returns, treated as above indicated, without any manure whatever, save that supplied from nature's laboratory tempered with light, heat and moisture. Upon that meadow there had not a foot pressed in those thirty years except what were necessary to cut and harvest the crop.

Whatever course we may pursue in manuring plow lands for the raising of grain, there is but one way to enrich the meadow, that is by top-dressing. The mineral manures within the reach of the majority of farmers are gypsum (land plaster,) wood ashes and salt. Of gypsum, my experience makes it invaluable, while the effects of wood ashes are barely perceptible on most soils. Salt is spoken of highly by those who have used it as a fertilizer. The best returns from the use of land plaster with me, have been where sown upon clover at that stage of its growth when the leaf is near a quarter inch in diameter. Not more than one hundred pounds to the acre need be sown; more than that quantity will be wasted. My neighbors speak highly of results from early sowing, as soon as the snow melts in the spring.

Wood ashes are highly appreciated in those sections of the country where cropping has been long continued. Near the Atlantic seaboard ashes find a ready sale at twenty-five cents per bushel after being leached. It will be well to use all that may be made upon the farm, and where the capital exists, what can be purchased at the reasonable rates now prevailing. One of the best farms known to the writer had upon it an ashery, from which ashes were drawn and spread after being leached, thousands of bushels each year for over twenty years. The effects were shown upon the grass, clover and all kinds of cereals, while potatoes and turnips were marvelous in their yield. Farmers cannot go amiss in saving ashes.

The stables must be resorted to as the best and greatest source of fertilizing material yet known to agriculture. The most important business of the farmer is to increase manurial substance, and apply it where most needed. The dairy farmer is happily placed for this object. To save all, both liquid and solid substances, within his province will be the test of his good husbandry and the measure of his prosperity. Capital cannot be better used than for erecting such buildings as will secure the manure crop, and to prepare it for application to the surface of the meadow. The time to apply it is, at all times when there is not a growing crop to be harvested in the way. The best time is immediately after the crop has been removed and continued until the grass begins to grow in the spring. Much has been said and written upon the best time to manure, some say when the ground is moist, others when dry, one in autumn, another in spring, one when the manure is fresh, another when well rotted. All times have proven best for me, when I had leisure to haul it, or manure to haul. The earth is jealous of the air, and will fix the essential properties with great rapidity, that nothing be lost, except where man in his singular ingenuity may pile it by half loads, to prevent the earth from appropriating, and even then it will show its voraciousness by the spotted appearance of the fields long after. Spread as soon as possible, and when the first rain has throughly softened the lumps, sweep the field with a smoothing harrow or brush and the work will be well done.

Great profit will be found in mulching meadows with straw in the winter and early spring. By this process the yield has been doubled in a single season, and there has never been an instance in my experience that the crop has not been largely improved. I cannot urge the farmers too much to try the plan for themselves. The objection usually urged, that the rake will mix the straw and hay and both will be carried to the stack together, is practically small. The revolving horse rake scarcely disturbs the mulch, but the steel tooth sulky rake will require more careful management. In a moist season, and especially when plaster has been sown, the straw will be decayed; in a dry season there will be but little trouble, well remunerated. Let none but the most careful (and we would add, interested person) be employed in spreading the straw in order to secure a thin and even coating.

To build up and maintain a dairy farm as set forth in these pages, would seem to be an easy task, yet there is more in the *man* than in the surroundings. There are but few first-class dairymen; such have dairies corresponding. While it is quite essential that there should be a rich and well managed farm, this is only one of the many items that must be combined to the attainment of the greatest success. In observing the wide difference between dairymen on adjoining farms of equal fertility in the net results, in not only one but many seasons, we arrive at the conclusion that good first-class dairymen are 'born, not made." The first-class are those who, in a good season, from selected cows, will average six hundred pounds of cheese to the cow; individuals have gone as high as eight hundred, but such are rare. The second, and popular class (that is the majority) do not reach the half of eight hundred. The profit of dairying is in going above three hundred and fifty pounds of cheese to the cow in one season's milking; hence the importance of keeping only the best milking stock.

The difference between a good cow and a poor one for the dairy is the difference between success and failure. A poor cow is to be estimated by the pounds of flesh she carries—a good one by the milk she gives, the former may be worth say twenty dollars, the latter twice and thrice that sum in proportion to the milk given. Cows are purchased at thirty dollars that are costly, others at one hundred, that are cheap. In dairy districts we have seen cows sold from one hundred to one hundred and fifty dollars, and were cheaper, as their work would show, than others at the same sales that were disposed of at forty dollars; the former *had a record* not disputable, the latter were known as fair milkers only.

How to raise the best cows is a difficult question to answer, as there are so many contingencies to be considered. Sometimes an extra milker is bred from an indifferent one, while on the other hand, a good cow may have but an ordinary milker; yet a first class cow must be looked to as the dam for good milkers. It is of importance that the sire should be descended from the best milking stock as well as the dam. A poor cow may be expected to produce better than herself with such a sire to the calf at the first cross, after that, all "signs" may fail. It is folly to attempt to raise a good dairy from *poor* bulls, let the cows be what they may. The first requisite then is to find a bull that has been bred from milking stock until the type is fixed in him, and then breed to that type, breeding "in and in" to the point where some sign is shown of deterioration. Such a course of breeding has given us the "Booth" and "Bates'" type of cattle; the "Leicester" and "South Down," among sheep; such breeding will give us milkers as well.

To determine which of all the bloods and breeds extant to choose from, is to simply follow fancy, or rather, faith. An old and successful farmer says, "the breed that you have most faith in." The question of feed in pasture and barn should be consulted. One person may be so placed that the "Bates" breed of short-horns would be best; another where the Devon or Ayrshire would be the sort; another that the "Jersey" should be chosen; and yet another where the diminutive "Kerry cow" would be most profitable. One cannot go amiss in choosing from either of the breeds mentioned to cross upon native cows, if the *milking* characteristics are established in the "*regular succession.*"

Milk must first be put in the mouth before it can be found in the pail, let the breed be what it may. The feed and care requisite to the highest success has as much to do as breed or blood; a good feeder and careful handler will take the average native cow and do more with her than the opposite style of farmer will do with any breed known. "Blood will tell," but it must have a chance. The cow, the mother of the calf, should be *fed* with the express object of making the progeny a superior milker; the dam should rest from the pail at least four months, in order to properly develop the young. It is usual, to some extent, to feed coarse fodder, such as straw and poor hay during this period; a great mistake, if profit is an object. The calf is to be grown, and the cow to lay up a store of flesh and fat for the draft to be made upon her through the milking season; the idea that flesh is to be discarded in order to produce milk will be exploded whenever the theory is put to a practical test. Some cows will milk themselves away to an extent during summer, and the business of the feeder is to put it on during winter.

Food should be given in abundance and of a nature to furnish milk. To see how much the cow can digest, should be the aim of the farmer, not how little the cow will eat and live.

The calf on its appearance should remain with the dam only time enough to draw the first milk, and then be removed from sight and hearing if possible. It will learn to drink the sooner, and will worry less. Regularity in feeding, be it twice or thrice a day, is of the first importance; for the first month new milk is indispensible; after that time whey may be profitably fed with a pint of ground oats to a gallon of whey; the oats to be fed dry. Oil meal may be used with good effect, as we have tried; one half the quantity named above. Grass, all they desire, should be allowed them. At four or five months the whey should be taken off, and the best of aftermath given with all the pumpkins they can eat, until they come to the feeding yard or stables. From that time until grass comes in the spring give them the best of early cut hay with their allowance of oat or oil meal, and they will grow "like calves of the stall."

It is best to develop the milk-producing qualities as early as possible; for this purpose they should be allowed to give milk at two years of age. If they prove to be large milkers to the extent of reducing their muscular vigor, they should go farrow the third year. The best farmers practice this course with success. The first season should be a long one, milking at least nine months in order to establish this habit, which will be found very strong when once fixed.

What I have written is the result of my own experience—except where otherwise stated—and the experience as well, of those who have been most successful in the handling of the dairy. Born and reared among the hills of Herkimer county, New York, where dairying is the one specialty, having been witness and partner of the prosperity growing therefrom, I can but urge my fellow farmers to change their method somewhat from grain-raising entirely to the dairy in part, believing that greater prosperity will result from their manly toil, and that they will sooner reach the goal of INDEPENDENT FARMERS.

ON THE CULTIVATION OF THE CRANBERRY.

Prize Essay.

BY G. N. SMITH, BERLIN.

In preparing this article on Cranberry culture, for the consideration of the Wisconsin State Agricultural Society, my aim will be to make it practical—adapted to the wants of those engaged in the business of growing this valuable and popular fruit, for which many extensive marshes, lying within the limits of our state, are so naturally adapted.

VARIETIES.—There are two distinct species of the cranberry growing naturally in Wisconsin—the small *Vaccinium Oxycoccus*, the runners of which are very fine and thread-like, growing from six to ten inches long. There are several varieties of them, and various shapes, and usually known as the Tamarack berry, being in form mostly spherical or cherry shape, of light brown color with white spots; others, in form and color, resemble the large or American cranberry—in quality they are excellent, but the yield of fruit is so small that the cost of gathering almost equals their value in market. It flowers and ripens its fruit a few days earlier than the larger sorts.

The large, or American cranberry, *Vaccinium Macrocarpon*, sends out runners from two to four feet in a season, trailing close to the ground, and at intervals of a few inches it forms roots from which the uprights spring, being from six to twelve inches in height and are the fruit bearing branches. The leaves are oblong in shape and about half an inch in length, and on the under side are covered with a whitish bloom. It flowers from the 25th of June to the 10th of July, according to the season. The berries are from a quarter of an inch to an inch in diameter, of light green color until ripe, when they become a bright red, and if fully exposed to the sun, a very dark red or nearly black. It is the most valuable of all the cranberries, and is native to the open marshes adjoining the Tamarack swamps, where there is a considerable depth of partly decomposed vegetable matter in the form of muck or peat combined with a silicious sand, but is found in no other kind of soil. The leading and the most productive of all varieties of this species of cranberry appear to be four in number, viz., those known as Bell, Bugle, Egg and Cherry. Although not superior in quality, if equal to the smaller sorts, they bring the highest price in market on account of their large size and attractive appearance. There is no difference in the appearance of the vines of the different varieties, all being identical in every particular. Like other fruits, the size of the cranberry depends very much on the condition of the ground on which they grow; and herein is the great and important point in cranberry culture. A large sized berry, although not intrinsically more valuable, is more rapidly and consequently more cheaply gathered, and will bring from one to three dollars more in market than the smaller sized berries of the same varieties; therefore it will be readily seen that it is important, as regards profits, to have a large, deeply colored berry, well enameled, hard and firm and possessing long-keeping qualities.

LOCATION.—Any person who intends to commence the business of growing cranberries, should bear in mind the advantages to be gained in the selection of a site naturally adapted to the purpose If the vines are already growing naturally, it is sufficient evidence, that so far as the soil is concerned, it is all right; but there are other considerations besides adaptability of the soil. An extensive open marsh is greatly to be preferred to a small one surrounded with timber, as the frost will frequently injure the blossom or the fruit on the small one, while on the larger one no injury will occur in consequence of a free circulation of air.

It should also be kept in mind, that no other soil than the alluvium—that is, soil made by deposits from the overflow or wash of water, such soil being decomposed, (or partially so,) vegetable matter, combined with silex—will successfully produce the cranberry; and this matter has been so often tested at the east, it may be considered as an established fact. Therefore, all soils not of this nature are to be avoided. Clay and loam will prove fatal to the plant.

Another consideration, and it is an important one, is the facilities for drainage and flowing. For the latter purpose, it is desirable that a sufficient supply of water should be had at all seasons, especially during the fall and early winter, as flowage proves a great protection to vines against the extreme cold, destroys all insects and their germs and fertilizes the land. Thorough and rapid drainage is equally important; the best drained land produces the largest berries, and unless the water can be taken off rapidly, the vines are liable to serious damage in the warm season, by heavy rains.

The vines on our marshes, before they were improved by ditching, have been often injured in consequence of the water remaining on them during the warm weather, and it required one or more seasons for them to recuperate and come again into bearing.

DITCHES AND DAMS.—The first work to be done on a marsh for growing cranberries, whether stocked with vines or not, should be its drainage. The number of ditches, their width and depth will depend much on its condition and location, but thorough and rapid drainage is the object to be attained. If the land is quite level, the more numerous the lateral ditches should be. The main ditch should be at least thirty inches deep, and in width from six to ten feet, according to the area of the marsh to be drained. The lateral ditches should be not less than two feet wide, and if there is but little descent, not more than five rods apart, but if the water moves off quickly, twice that distance will answer. A good slope should be given to the ditches, as the sides will be less liable to cave than when cut perpendicular.

In building the dam, it would be well to keep in mind "that a thing that is worth doing is worth doing well," especially in a matter of this kind, and it is a good rule to make the base in width equal, or nearly so, to once and a half the height necessary to raise the water. There should be a space of at least two feet between the base of the dam and the ditches running parallel with the dam. If the material from these ditches is alone used for the construction of the dam, it cannot be depended on to hold the water unless allowed to settle one year before the water is raised against it; but if sand is used for filling the center, and the ditch below the dam is also filled with it, the water can be raised against it immediately if necessary. The width of the parallel ditches above and below the dam should be equal to the necessary height of the dam—the sods being cut in equal width and length and laid up on edge, breaking joints in laying up.

The width of the gate should be greater than that of the main ditch, as the parallel ditches are to discharge at the same time, and in case of heavy freshets in the spring and summer, the water cannot flow off too rapidly. In placing the sills to the gate the timbers should rest on the hard soil, if possible, but if too deep, after they are in position, fill in around them with sand freely, and after planking, it should be well filled and rammed down behind. Plank should be driven down in front of the gate, extending several feet beyond on each side, to prevent the water from working underneath. All the work must be thoroughly done to render it effectual and permanent.

Cultivation and Planting.—The cranberry growers of Wisconsin have had but few years' experience in growing the cranberry, and all the cultivation that has been bestowed on them has been in putting the marshes in good condition by draining and flowing; but good results have followed with the comparatively small amount of labor expended in this direction. Where the marshes were stocked with native vines, ditches have been made to take off the surplus water during the warm season and dams and gates erected for flooding them during the cold season, and it has been found that the more thoroughly the work has been done, larger fruit and a greater product have followed. With one or two exceptions this is the extent of the cultivation bestowed. As yet there seems to be no necessity for covering the land from four to eight inches with sand, as practised by eastern growers, as our lands combine the right proportion of silex with peat to produce the cranberry in perfection.

Planting the vines has been quite extensively tried in the open marshes in this vicinity, and in every instance they have grown vigorously, and promise to have full possession of the ground in a few years, and yield abundant crops. In a few instances they have been planted on land which had been under the plow for a number of years. The vines have flourished, but the expense of keeping the ground clear of weeds has been considerable. Messrs. Williams & Pier, of Pine River, commenced this operation three years ago, and have planted from year to year, until they have now about thirty-five acres on their upland, and about fifteen acres on the grass in the open marsh, where no cultivation has been given. The first planted vines have now full possession of the ground and are yielding good crops. All the others promise finely, yet Mr. Williams informed me lately that he gave the preference in planting to the native sod; the grass was no obstacle to the growth of the vines, but on the contrary it seemed a protection to them against the winds and extreme heat. Other parties, to a limited extent, have removed the sod and planted the vines on the clean soil, and they have grown well. Where the land is foul with fever few, laurel (known as wild sage) and other weeds, the operation of removing the sod will be necessary, and although the work will cost in the vicinity of fifty dollars per acre, it will no doubt be a paying operation, if the land is favorably located and right in every other respect.

The method of planting the vines is simply to puncture the sod, insert from two to four slips, and press them down with the foot, using a small line six or eight rods long as a guide—planting three feet apart each way. If planted nearer together the vines would sooner have the ground, but the expense would of course be greater.

ENEMIES.—The cranberry grower has more or less enemies to contend against, and unless they are overcome the loss of a whole or a part of the crop will be the consequence. The most formidable of these are the vine worm, the fruit worm and that pest of the marshes, the pale laurel, generally known as wild sage. The two former can be overcome comparatively easy, if the experience of the eastern and western growers is of any value, by early and late flooding of the vines; this remedy has been found in almost every case effectual. But the laurel cannot be so readily controlled, as flooding sufficiently long to destroy it would also destroy the vines. The only known ways to effect its destruction is to mow it for several years, as often as it attains sufficient size, or to remove the turf to the depth of three inches, putting it in piles and when dry burn it. In appearance it resembles an enlarged cranberry vine and belongs to the same family of plants—the Heath family. I think but few cranberry growers are fully aware of the formidable nature of the laurel when it once obtains a foothold among the vines, it being a third or half larger in size, is as vigorous and hardy in its habits, as persistent in its growth, and always takes full possession of the land to the exclusion of every thing else. It propogates itself by pushing its roots under ground and sending up its branches at intervals of a few inches, on which the seed is produced. When the marsh is flooded these seed are carried to every part of it, and wherever deposited are sure to produce new plants. The result is, that the land is readily stocked with it, and unless destroyed at sight, will soon have full possession.

I would especially call the attention of cranberry growers to the necessity of commencing a war of extermination on this plant, as it is the worst enemy with which they will have to contend; and commence at once, before it has destroyed their vines.

By referring to an article on the habits of the vine worm, in a report to the Cape Cod Grower's Association, in 1869, by Wm. C. Fish, Esq., we learn that "these worms hatch somewhere about the 20th of May, from eggs that have remained upon the vines all winter. These eggs are a flat, circular scale of a honey yellow color, and measure about three-tenths of an inch. Just before the time for the egg to hatch, the black head of the young worm can be seen through the skin with the naked eye. When hatched, the young worm immediately finds its way to the end of the young shoot and commences to feed on the tenderest leaves, drawing some of them together with its web for shelter. It is at this time of a pale, yellow color, with a black head. In this way they continue to work, drawing more leaves together, and feeding first on the tenderest parts and then upon the older leaves. When very numerous, they will eat most of the leaves and tender shoots, leaving very little except dry stems. They attain their full size in about two weeks after hatching, and are then about 0.45 of an inch in length, having become a dull yellow green, with a black head.

"It now prepares to pass from the larva to the pupa state, by spinning a slight cocoon among the dead leaves or among the litter at the surface of the ground, and within this the worm becomes a pupa or chrysalis, as it is sometimes called. This pupa is about 0.25 of an inch in length, and is light brown in color.

"Remaining quiet in this state for from ten to thirteen days, it then works its way partly out of the cocoon—the skin splits and the moth escapes.

* * * * "Water is, and probably always will be, the most effective agent in destroying this insect.

"Those that have this convenient will find it best, I think, to flow their bogs once or twice between the 10th of May and the 7th of June—that is, if they let off the water early in the spring. If they keep the water on until the first of June, it would be well to flow two or three times during the month."

The foregoing description of the vine worm and its habits, is probably the best yet given, and the grower will at once see the importance af flooding the marshes, for the destruction of this enemy.

IMPROVEMENTS.—Many of the marshes in this vicinity, but a few years ago in their natural state, were unproductive, but have recently become remunerative, yielding fair crops with but comparatively little expenditure. Yet they have not under the small improvement made on them produced scarcely a fraction of what they are capable of doing with a more thorough and systematic working. Some of the owners of cranberry lands have so fully realized this, that they have spared no expense necessary to fully develop their resources, for which they are receiving large returns.

Among the best improved lands, are those of Mason Ruddock & Co., J. D. Walter, J. D. Williams, and last but not least H. D. Sackett. The last named property, is the oldest improved marsh in the state, and has for many years yielded a large annual income, so large, that it would be deemed an exaggeration to name its real value. The present year's crop from it, has amounted to four thousand barrels, which at the market price here would reach the sum of $45.000; but "Sackett's Bell and Bugle Cranberries" are not sold at the current rates of other brands. They bring in Chicago, St. Louis, San Francisco and other markets from two to four dollars more per barrel. This extra price is obtained because Mr. Sackett does not allow the fruit to pass out of his hands without being assorted and well cured—being in condition to keep if necessary until another crop is ripened; and also because his marsh is so finely located and naturally adapted to the growth of the cranberry, that they are produced in perfection.

Mr. Sackett has the past season built a warehouse on his premises for the purpose of handling the berries, which is a model of its kind, and characteristic of a live western man. It was built under his personal supervision by day's work; and as many institutions of the kind of greater or less extent will soon be wanted, perhaps a brief description of it may be useful. Its dimensions are 144 feet in length and 48 feet in width—four stories high, resting on a stone foundation. Through the center of the upper story a track is laid, elevated a foot or more above the floor, and on each side of the track are bins for receiving the cranberries. The next two floors are divided into 16 feet bins, 26 to each floor, holding about fifty bushels each when six inches deep on the floor. The lower story has a capacity for storing from 4000 to 5000 barrels, for which purpose it is used, and also for cleaning and barreling the berries. On the east end of the building outside, under a roof, is one of Rudy's patent hoisting machines, with which one man power will raise a car load of berries to the top of the building. From the warehouse extending to the marsh, a track, made in sections of 16 feet, is laid down, constructed of 2x4 scantling for rails laid upon inch boards, which can be easily changed to any part of the marsh required. The car, which holds about fifty bushels, is run to the vicinity of the pickers—the berries measured into it, and when full is run to the warehouse, on to the platform to which the hoisting apparatus is attached. It is then hoisted to the third story and run to any part of the floor desired. The slides, one on each side, are opened and the berries are discharged into the bins. From these bins they are spouted to the floors below; when they reach the second floor they are dry, and there remain until they have undergone the sweating process; from thence they pass to the lower floor and are cleaned by running through a fanning mill and, if necessary, are then assorted by hand. The barrels hold just three bushels, and are thoroughly shaken down before heading up. It will be seen that Mr. Sackett has the means and appliances to put his fruit in perfect order before they go into market, and when they come into competition with eastern cranberries, as the saying is, the latter are nowhere.

PRICES, PRODUCTS, ETC.—As the business of cranberry-growing increases and thousands of bushels are added to the annual product, the question very naturally arises, will not the supply, before many years, exceed the demand, and the article become so low in price that it will not pay? I answer, that when the amount sold in our market was one thousand bushels or less, seventy-five cents per bushel was the going price, and it seldom exceeded one dollar; but as the quantity increased the price increased also, and for the past five years it has averaged at least ten dollars per barrel of three bushels. Yet it is not expected that the present prices will be obtained in the future; and it is not desirable that they should be, as this would make them an expensive luxury, instead of an article in common use, as they should be. Yet if the price should be reduced one half, the business would be largely remunerative, and the consumption would be increased immensely. It is quite certain that the future cranberry grower will have a more widely extended market than at the present. Considering the small amount of land on which the cranberry can be raised, compared with the Mississippi valley and the country west to the Pacific, it would seem that no fears can reasonably be entertained as to a demand in the years to come.

The last year's crop in this section, as near as can be estimated, will amount to nearly 15,000 barrels, against 11,000 barrels in 1870. The price has averaged about the same, notwithstanding the heaviest dealers in the article in Chicago were prevented by the great fire from distributing the usual annual supply to their customers. Everything considered, it is safe to say, that the cranberry business will prove profitable to the grower for many years to come.

PLANTING AND MANAGEMENT OF A VINEYARD, ADAPTED TO WISCONSIN.

Prize Essay.

BY C. H. GREENMAN, MILTON.

The practical cultivators of grapes in Wisconsin very soon found that the accepted mode of managing a vineyard in the southern and middle states was not adapted to general use here. This, in the main, is owing to the variableness of our climate. Our mean temperature, for the four months commencing with June and ending with September, corresponds with that of the latitude of Baltimore, and from this fact the uninitiated would readily suppose that grapes could be grown here the same as there; but on the other hand, the mean temperature of our winter months is nearly the same as that of Montreal, and in consequence the Baltimore system of culture will not answer for us. We must modify it so as to secure that protection to our vines which will enable them to endure a degree of cold equal to that of the latitude of Montreal. This necessitates more or less change in the whole system of culture; it makes it necessary to choose soil and location, to select varieties, to regulate the trimming and pruning, all with reference to the needed winter protection.

In locating the vineyard, the first thing to be considered is the character of the soil, for this has an important bearing upon the amount and efficiency of the protection needed and given. In sandy and gravelly loam, there is often a lack of moisture in the soil to supply the wants of the roots during the winter months. When in autumn the rainfall is much below the average, and the ground freezes up comparatively dry, the moisture in the roots is absorbed by the adjacent soil, and they are as effectually killed as though they had been on the surface, exposed to the open air. Hence gravelly and sandy soils ought, as far as possible, to be avoided, or if used, extra care and protection should be given to the vines during the whole season to secure and retain the requisite moisture. Clay loams are not subject to this objection, when thoroughly prepared; they usually hold moisture enough to carry the roots through the winter without injury. Eastern and southern exposures are generally preferred, but an elevated table land is equally good.

In preparing the ground for a vineyard, the soil should be thoroughly loosened to the depth of twenty inches. This is best done with a stubble plow, followed in the furrow with a subsoil lifter. A team of four horses will be needed for this work changing about each round. The importance of deep tillage is not generally appreciated. Not being aware of the benefits to be derived from it, the majority regard it as needless, a useless waste of labor, perhaps; but it has been the experience of those who have given it a fair trial, that it gives strength and vigor to the vines, secures a healthy, well ripened growth, which adds to their hardiness and productiveness.

In laying out the vineyard have the rows run north and south if possible. This is very desirable as it exposes all parts of the plant to the sunlight. Have the rows six or eight feet apart; if a space of eight feet is given a team may be used in covering the vines for winter protection. Divide off the rows into spaces of eight feet, and set a stake for each vine. Good two year old vines are the best for setting. At each stake dig a hole eight or ten inches deep, and large enough to receive the roots of the vine, allowing them to be spread out straight and even; cover them with fine soil to the depth of two or three inches, and then press the earth down firmly upon the roots; fill up the hole with loose and finely pulverized soil, and mulch liberally so as to protect them from the excessive heat and drought of summer. In autumn, after the leaves have fallen, prune each vine back to two buds, and before cold weather sets in cover for winter.

The second season the vines are to be tied securely to the stakes, allowing only one cane to grow. When the leaves have fallen, prune the canes back to four feet, and laying them down for winter, cover them with soil, and mulch liberally. In dry seasons this mulch, in winter, will be found to be of great service, as it prevents the roots from freezing dry.

A cheap and convenient trellis may be constructed by setting posts between each vine in the row, nailing a strip of lumber, one inch thick, sixteen feet long and two inches wide to the top of the posts, five feet from the ground, and a similar one four feet below, running the whole length of the row; to these nail lath in an upright position, one foot apart.

The vine we now have is called a cane; the branches that grow from it are termed shoots, and when pruned, the part of the shoot left is called a spur. With these explanations, the method of training and pruning will be readily understood.

When the danger from frosts in the spring is over, uncover the canes, and raising them to the trellis at an angle of about forty-five degrees fasten them to the lower bar, the ends all running in the same direction, to facilitate laying down for winter protection. Train a single shoot to each lath, removing all surplus buds. One or two bunches of fruit may be left to each shoot this season. During the summer keep the shoots tied up securely as they extend from time to time. At the fall pruning, all the shoots are to be cut down to two buds except the one at the end of the cane; this should be cut long enough to fill out the trellis to the next vine. The protection for the winter should be the same as heretofore.

The next season the vineyard will be in full bearing, or nearly so. Now two shoots may be trained to each lath, shortening the laterals from time to time. Each of these shoots will bear three clusters of fruit, or forty-eight to the vine. If more fruit is desired, leave a larger number of buds on each spur at the fall pruning. Keep the lowest shoot tied up the next season, and shorten in the balance to two leaves beyond the last cluster of fruit. By following this system of pruning and winter protection, uniform fruitfulness may be relied on.

In the selection of varieties that will mature their fruit, more will depend upon the location than upon the soil or the manner of training the vines, as the aggregate amount of heat differs materially in the same latitude. The adaptability of any variety for a given locality can only be determined by observing the conditions of heat necessary to bring it to perfection. The Delaware requires an average temperature of 59 degs. Fahrenheit for forty-five days from the starting of the leaf to the setting of the fruit. It will generally mature in one hundred and twenty days with an average of 68 degs., or an aggregate of 8000 degs. The Concord requires about 500 degs. more than the Delaware. The Isabella needs an aggregate of 10,000 degs.; and the Catawba will not ripen with less than 11,000 degs., or an average of 68 degs. for one hundred and sixty days from the starting of the leaf to the ripening of the fruit. The Hartford Prolific, Creveling and Janesville require an aggregate of 500 degs. less than the Delaware to reach perfect maturity.

The tabulated reports, made by the general government, give the mean summer temperature at Janesville, for the past six years, as 71 deg.; that at Prairie du Chien, as 72 deg., and at Green Bay, as 68 deg. Hence I conclude that those varieties, the Concord, Delaware, etc., that ripen with them, are adapted to general cultivation in all sections where the mean summer temperature does not fall below their limit. Near large bodies of water, where the September mean extends into October without intervening frosts, the Isabella and other late ripening varieties may be safely planted.

Where grapes are raised expressly for wine, no directions for harvesting are needed. When they are intended for market, the fruit should be picked with care when perfectly dry and fully ripe, and packed in boxes holding three or five pounds each; these boxes should be arranged in convenient cases holding from sixteen to twenty-four boxes each, and consigned to some reliable commission merchant. The knowledge and facilities possessed by these commission men will enable them to dispose of the fruit in less time and at better rates than can be done by the producer. Care should be used to have the boxes and cases well made, as the cash returns will depend much upon the neatness of the package.

To recapitulate in conclusion, we find that the requisites for a vineyard adapted to Wisconsin are; a soil retentive of moisture; thorough preparation of the same; winter protection for the vines, with a system of pruning and training calculated to facilitate said protection; the selection of varieties ripening their fruit early in autumn and a judicious system of marketing. Grape growing, conducted in accordance with this plan can be made both pleasant and profitable.

MAMMOTH CLUSTER RASPBERRY.

THE CULTIVATION OF SMALL FRUITS.

Prize Essay.

BY M. DE WOLF, DELAVAN.

THE CURRANT.

Its History.—The species of the currant from which our cultivated varieties originated is propably a native of northern Europe, as we find no mention of it by any of the old Greek or Roman writers, who were generally so particular to speak of the fruit known in their day.

Propagation by Cuttings.—Cuttings for propagating may be made at any time from the falling of the leaf in autumn until the plants commence growth in spring, but when the best possible results are desired, they should be taken off as soon as the wood is fully ripe. Good strong wood, of the present season's growth, should be selected. The cuttings, when prepared, may be planted in the same manner as other ripe wood cuttings. They should be covered with straw, or some similar material, sufficient to keep out the frost, or at least to prevent the ground from repeated freezing and thawing during the winter. Remove the covering at the return of warm weather, or enough of it to allow the young shoots to grow through without hindrance. Cuttings planted early in fall will usually become rooted by the time winter sets in, and this too without the buds pushing into leaf. The next season they will make a far better growth than where planting is deferred until spring.

Soil and Cultivation.—The currant is a plant that possesses great vitality, and will grow in almost any kind of soil or situation, but to bring it to perfection and make it profitable, it requires good culture, and a deep, rich soil. It succeeds better in a heavy loam, approaching to clay, than in a light sandy soil; but, whatever the character of the land, two things are important for producing the best results—a deep soil, and a rich one. It being what may be called a gross feeder, manure of almost any kind may be applied with impunity, and in almost any quantity. For field culture the plants should be set in rows four or five feet apart, and about four feet in the row. Clean cultivation is required as with other fruits, and if the whole surface of the soil is covered with mulch during summer, it will not only insure the maturing of the crop, but will materially increase the size of the fruit.

Training and Pruning.—The most common modes of training are what is termed the bush or stool form, and the tree shape. To grow the bushes in the stool form, it is only necessary to set out the plants singly, and allow them to throw up suckers from the main stem or roots, which all the varieties do quite readily. The young shoots may be shortened or entirely removed for the purpose of giving the bush a regular shape, and to make it open or compact, as desired. The fruit is mainly produced on the wood two or more years old; and when a branch has borne two or three crops it is best to remove it and allow a new one to take its place, as young wood generally produces larger fruit than that which is very old.

About all the pruning that is necessary, is to cut out, occasionally, the old wood, and shorten the most vigorous of the young growth. If too many young shoots or suckers appear, and the plant is likely to become crowded a portion of them should be cut out, so that the air and sun may have free access to those that remain. All dead or diseased stalks should be annually removed, and only the best and most luxuriant ones preserved. If the ends of the growing shoots are pinched off during the summer, it will cause them to become more stocky and fully ripe, while at the same time it will increase the size of the fruit which may be on the branches below.

The main object in pruning should be to properly develope every portion of the plant, and this cannot be done if it becomes crowded, either with old or new wood. A half dozen large, vigorous shoots will give more and larger fruit than double that number of weak and immature ones.

Profits of Culture, &c.—In planting the common red and white varieties four feet apart each way is sufficient, thus giving 2,722 plants per acre. If we estimate our crop at two pounds per plant, which is not one-half the amount they should produce when fully grown, we will get 5,444 pounds per acre, or over two tons and a half. At two hundred dollars per ton this will amount to over five hundred dollars; then we have the gathering, shipping, cultivation and other incidental expenses to deduct therefrom. But even then it may be seen that it will be a very profitable crop. In case of great abundance the prices may be somewhat reduced, but by good cultivation the crop may be double the estimate given above.

The currant possesses many good qualities to recommend it; among which are its perfect hardiness, easy culture, early fruiting, great productiveness, with almost the certainty of a full crop every year.

THE GOOSEBERRY.

Its History.—The gooseberry was not known as a cultivated fruit until within the last two or three hundred years. Parkinson, in 1640, mentions eight varieties, but these increased so rapidly in the next hundred years, that Miller, in 1731, said that it was needless to undertake to enumerate them.

Propagation.—The same methods recommended for the currant, with one or two exceptions, are equally applicable to the gooseberry. As a general thing, it does not ripen its wood so early in the season as the currant, and the planting of the cuttings may be deferred until spring. They are, however, more certain if made in the fall after the leaves have fallen, or when the young wood is fully matured.

Pruning and Training.—The single stem system is probably the best one for training. The head of the bush should be open more than the currant, because if the air does not have free access to every portion of the plant mildew is almost cer tain to destroy, not only the fruit, but the inside branches, if not the whole plant. The regular annual pruning may be performed at any time after the wood is fully matured in the fall until the buds swell in the spring.

Soil and Culture.—It likes a good, deep, moist soil, but one that is not very wet. A rich soil is also essential, because it is only by keeping up a vigorous growth that large fruit and abundant crops can be secured.

An open, airy situation is better than one that is confined, and in many sections of the country the north side of a hill would be far preferable to a southern exposure. The extreme heat of our summer has been the greatest impediment to the successful cultivation of the English gooseberries. To counteract this, the coolest, available situation should be selected. In enriching the ground, use no fermenting manure; apply only that which is old and well rotted. Cow manure is far better than that from the horse stable, particularly on light, warm soils. Mulching the plants in summer is very beneficial. Good culture is required to produce good crops, the same as with other fruits.

STRAWBERRIES.

Soil.—Strawberries may be grown upon a variety of soils, but, to secure an abundant yield of the first quality of fruit the best soil is probably a deep, heavy loam, with clay subsoil. The plant has such a mass of fibrous roots that it readily appropriates all the strength of the soil; hence good culture and a rich soil are requisite to the greatest success.

Manner of Cultivation depends somewhat upon the extent of your plantation. For garden culture the hill system is undoubtedly the easiest and most productive with certain varieties.

In preparing the ground, the soil should be well pulverized, and when manure is used it should be thoroughly mixed with the soil. Mark off the land with a small plow into rows

$2\frac{1}{2}$ feet apart, as fast as you need them. Let the plow run just deep enough to scrape off the dry earth. This gives moist soil to set the roots in.

In planting, use a dibble made of spring steel, beaten thin, three inches wide and tapering, the point rounded, the whole length, including handle, to be about eight or ten inches. This makes a broad opening, so that the roots may be spread out like a fan. Set the plants about $1\frac{1}{2}$ feet apart in the row, in a perpendicular position, just deep enough to admit the roots without covering the crown; start the dibble in again about one inch from the hole already made, in a slanting direction, so that the two will intersect at the bottom, then press the earth firmly against the plant, withdraw the dibble and fill up.

Winter Protection.—Late in the fall cover the vines with potato tops or cornstalks, which are the best; put on just enough to shade the ground from the rays of the sun. If straw is used for covering, the ground is apt to be filled more or less with foul seed. In the spring the covering should be removed in season so as not to retard the growth of the plants.

The Annual System of planting is one of the neatest in use, as weeds have no chance to get a foot-hold, unless the cultivator is negligent. Here the plants are set out in rows two or three feet apart, and about a foot apart in the row. They are carefully cultivated the first season, and as soon as the crop is picked the second year they are plowed under. To insure a full crop the soil must be made very rich, and the planting done in the most careful manner in the fall, or early in the spring.

GRAPES.

The grape is grown upon various soils, and may be raised by everyone who has a garden, yard, or wall. It may be tied to a stake, bound to a trellis, or trained over an arbor, tree or building; always yielding its luscious clusters. Under good management it is capable of extraordinary results. Without taxing your patience, I cannot go into details upon its culture, but will merely give a few directions upon the most essential points.

A sunny situation should be selected. A dry, well drained piece of land or hill side is best. The ground should be deeply trenched, and thoroughly mixed with well rotted manure and bones, if at hand. The roots of the young vine should be trimmed to about twelve or sixteen inches in length, and then set about the same depth as in the nursery. They may be planted eight feet apart and trained to a trellis, or six feet apart and tied to a stake. Cultivate and keep the ground clean. In the fall, before very cold weather sets in, they should be trimmed, laid down and covered with potato vines, corn stalks, or some coarse material, and left until there is no fear of frost in the spring; then uncover and tie to stake or trellis.

The vine is capable of bringing only a certain amount of fruit to perfection, proportioned to its size and strength. It usually sets more fruit than it can mature, and it is best to reduce the crop early in the season to a moderate number of clusters, cutting off all small inferior bunches. The remainder will be worth more than the whole if left. If trained to a trellis, trim to two canes or shoots; in February or March these canes are cut back to 4 or 5 feet each, and tied along the lower horizontal wire, or slat. There should be no upright cane or shoot left, as the upright shoot would rob the others on account of the tendency of the sap to the highest shoots or buds.

All bearing canes should be kept as near as possible upon the same level to secure uniformity in the crop. In spring the young shoots must be reduced by disbudding, so that they may stand about one foot apart on the cane, selecting strong healthy shoots. As these grow they are tied to the second, third and fourth wires and slats.

All laterals from these upright shoots are to be removed, but the fruit bearing shoots are allowed to grow until September, when they may be checked at the ends, to ripen the wood.

The regular annual pruning should be done in November or December, when all the young wood of the previous year's growth (except such shoots as may be required to extend the horizontal arms) should be cut back to within one or two good buds of the bearing canes on the lower slat. Each succeeding season the vines are to be treated in the same manner.

RASPBERRIES.

Soil.—The raspberry will succeed on a variety of soils, but does best in a deep, rich soil, which will retain the moisture well in a drought without being very wet. Any soil that will produce good corn will answer.

Preparation of Ground.—Choose a position shielded as much as possible from the force of heavy winds. Plow well and deep (if subsoiled all the better) and drag thoroughly; strike furrows three inches deep in the direction you wish the rows to run—north and south preferred—making the bottom of the furrow level. Cross mark with a corn marker, from 2½ to 5 feet apart. I usually plant four feet apart in the row. In a garden they may be set closer, but the rows should never be less than six feet apart and the plants nearer than two and a half feet in the row.

Planting.—It is important that this should be well done. At each crossing make a flat hill, nine to twelve inches across, and place the plant with the germ pointing up; spread the roots out properly. If the weather should be very dry, it is well to put a little water on each plant, then cover it about two inches deep *and no deeper*. Many persons lose their plants by neglecting this caution. With the hoe or foot press the earth firmly about the roots, being careful of the germ.

Cultivate with the hoe and cultivator, keeping the ground mellow and entirely free from grass and weeds. The first season, be careful not to hill up around the young plants, but keep the ground level; if hilled up much the canes will begin to turn black about the 1st of September, and this extending to the root destroys the plant.

Do not run the cultivator nearer than about eighteen inches to the hill, for fear of breaking or uncovering the roots. The second season, and each succeeding one, cultivate and hoe as early as the ground is fit. After the blossoms appear the soil should not be stirred deeper than is necessary to destroy the grass and weeds, to avoid injury to the fibrous roots that are supplying the forming berry with food. The fruit is produced on a small spur from four to eight inches long, of the same year's growth, thrown out from the last year's cane. In working among the bushes about the time of blossoming, be careful of these spurs, as they are tender and easily broken off and the fruit lost. After July never cut or break any of the growing branches, lest you induce the growth of laterals, which not ripening sufficiently, will be likely to winter kill and cause a blight to spread over the entire hill.

Trimming.—This is important, as much depends upon its being properly done. Fig 2 represents a plant at about the the middle of August. The upright was pinched off when from 16 to 20 inches high, and the growth thrown into the side branches. This pinching off is usually done about the last of July. No other trimmming is needed the first season.

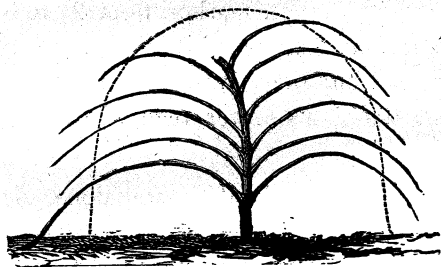


Fig. 2.

Mulching.—When but few plants are grown in a garden, they may be mulched or watered. Either will assist in developing the fruit; but in large plantations the most profitable mulch is loose earth, often stirred with hoe or cultivator.

SECOND SEASON.—Early in April, or before the leaves start, with a sharp knife cut back all the branches (with a quick downward stroke) to within eighteen or twenty inches of the center or main, upright cane, at about the point indicated by the dotted circle in Fig. 2. Cultivate and hoe the ground until the fruit is half grown. There will then spring up at the base of the hill, from three to five large upright canes. When they are from two to two and one-half feet high (which will be about the last of June) clip off the tips. It will be necessary to go through the field cutting back two or three times as the young canes will not all attain the same height at once. This checks the growth upward and throws it into the branches, as is indicated in Fig. 3; it also stiffens and nearly doubles the size of the main canes, and makes them self supporting, entirely obviating the necessity for stakes to hold up the canes or the next crop of fruit.

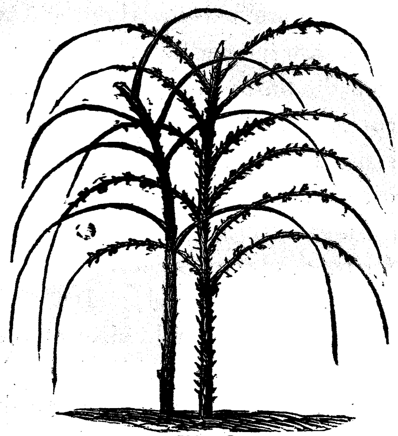


Fig. 3.

After the fruit has been gathered, cut out at once all of the old canes; and if there are more than five new canes in the hill, cut out the weakest, retaining only the strongest and most briery. Cultivate immediately, as the branches will soon be too long to work amongst without injury.

THIRD SEASON.—The third season, and each succeeding season (as long as the fruit is kept in bearing,) early in April, trim all the side branches to within one and a half or two feet from the upright canes, as represented in Fig. 4. Shallow cultivation is all that is required until after fruiting. Then at once cut away all the old canes that have fruited; cultivate well and keep the ground free from weeds. This leaves the hill open, admitting light and air freely, and the whole energies of the root are now turned to hardening and fully developing the new canes that are to produce the next crop of fruit.

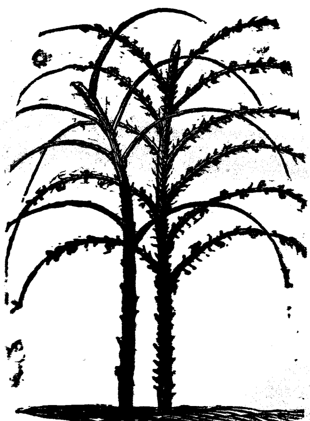


Fig. 4.

Picking.—Women and girls are the best help in gathering the fruit. They are more careful, more anxious to make it pay, and are better workers, and will generally pick from three to six quarts per hour. This, of course, depends upon how well the bushes are loaded. The price usually paid is from two and a half to four cents per quart. Most pickers require some training, and will need a careful person in the field to direct them.

In gathering, care should be taken to pick all the ripe fruit, for berries left a day or two after they are in proper condition will become over-ripe, and when packed will mould quickly and injure the sound ones. Green fruit will sour quicker than that which is thoroughly ripe. Avoid all bruising or pressing of the berries, or much loss will be incurred in transportation. Do not pick when the berries are wet with rain or dew.

Propagation.—When the extreme tips of the strongest canes or branches reach the ground and are free from leaves, and of a reddish color, they are ripe and fit to layer. To insure well-rooted plants, with a good germ or bud, this must be done properly. The time when it should be done varies, but is usually from the last of August to the 25th of September. The method we practice is to make a hole in the ground with a dibble or hoe, under or near the tip to be layered, at an angle of forty-five degrees; place the tip into the hole about two inches, as seen in Fig. 2, representing a branch laid down; press the earth down, leaving the ground level. If the weather is favorable they will root in three or four weeks. At the end of six weeks you will have a good plant ready to set, with plenty of fibrous roots, three to eight inches long. Plants may be set out in the fall by covering with a small forkful of manure or other litter, but I prefer spring planting.

Wrong Propagation.—It is a common practice to cover the end of the cane as it lays on the surface of the ground, the end passing on through the loose covering of earth. Instead of the germ forming where it should (at the end of the cane), fruit buds are forced into germs, and a few roots are scattered along for several inches under the cane and the plant proper is lost. The tendency of plants thus formed is to degenerate.

The Philadelphia propagates itself by suckers, but does so sparingly. If we wish to multiply them faster than nature produces them, late in autum or early in spring dig up the old plant or stool by cutting all the roots with a sharp spade about one foot from the base of the stem. Then level the ground where the hill was taken out, cultivate well, and the remaining roots in the ground will soon throw up an abundance of suckers or plants. In planting the Philadelphia, the canes should be cut close to the ground, as it requires nearly all the strength of the root to produce the canes for the next crop of fruit.

Digging Plants.—For this work a potato fork or hook is best. Strike under the plant and raise the earth with it; shake out the earth carefully so as not to break the germ, another person following with a basket and knife to cut off the canes close to the roots. Do not allow them to dry in the sun or wind. When you have fifty or one hundred plants dug, place them in the center of the row and cover with earth sufficiently to keep them in good order until you have the desired number. If for your own use, and the plat is near, they may be taken up without shaking out the earth and planted at once.

To Replace Missing Plants.—In September, at the time for layering, choose a neighboring cane that is long enough to layer where the missing plant stood. If this cannot be done, set plants in the spring with earth attached.

Plowing Up Old Plats.—When you propose to plow up an old plat at the end of the season (which I generally do the third or fourth year), in the spring after the young canes have grown a foot in height, break or tear them away from the base of the bearing canes; the operation will have to be repeated twice. The result will be larger and better berries, and from one-fourth to one-half more than if these canes were left to grow, for the whole force and vigor of the root is now turned to perfecting the fruit, instead of growing new canes.

BLACKBERRIES.

Soil.—In selecting the place for a blackberry patch, choose a rather dry and moderately rich soil, for a large and succulent growth of cane diminishes the productiveness and hardiness of this plant. The ground should be prepared in the same manner as for raspberries, only strike the furrows deeper.

Planting.—For fall planting, October and November are favorable, but early spring is much preferable; then the plants should be set as early as practicable after the frost leaves the ground. They require considerable room, as they branch more freely and make larger stools than the raspberry. The rows should be at least eight feet apart, and the hills four, five or six feet apart in the row. The cultivation should be the same as with the raspberry.

Trimming.—If new plants are not needed, cut away all sprouts or suckers that are not to be used for bearing fruit; about the last of August cut, or pinch, off the new upright canes to about three and one-half or four feet in height. This throws the growth into the branches, causing them to strengthen and ripen—more fully developes the fruit buds, and makes the cane self supporting. In the spring trim all the branches to within one and one-half feet of the main cane. After the crop has been gathered cut out the old canes.

CONCLUSION.

It is quite essential in the cultivation of small fruits that you start right, and that every thing be well done, and at the right time. It has been my endeavor in this essay to point out, in as brief a manner as possible, the way to do this; and the facts herein given are the results of actual experience and personal observation for a series of years.

PRACTICAL FARM MANAGEMENT.

BY HON. H. H. GRAY, DARLINGTON.

Up to the present time agricultural schools have accomplished but little in improving the knowledge of the farmer on the subject of husbandry. European nations, especially England, Germany and France, have their numerous seats for this branch of learning, established at different periods of intellectual development by noblemen owning large estates, but they have brought little practical learning to secure success either to the school or in experimental trials on their estates.

Most of the establishments for the pursuit of scientific knowledge applied to agriculture are the result of government aid. At the head of these institutions stand the German schools, for the number of professors and perfection in detail of the course of study adopted. They have divided the subjects for a course of lectures into numerous branches, such as the chemistry of agriculture, the geology of agriculture, the botany of agriculture, the physics of agriculture, the mechanics, the economics, the stock and finally the general management of land.

In this country the states, and latterly, the general government have made liberal endowments for the encouragement and establishment of educational colleges. State and county agricultural societies, after their manner, (which embraces by far the most successful method of instruction,) are doing much to direct the attention of the farmer to his calling. Governors of states, generals of the army and politicians, all play farmer on occasions of annual meetings for exhibition of the products of the farm. But the whole combined effort of the scholars of both continents, the victorious generals and state executives has not been able to make two blades grow anywhere, or produce a single text book upon mixed agriculture.

The farmer who plods along with his improved machinery, owes science nothing for the plans he adopts for next year's management of the soil. Science may not be to blame for not accomplishing what we wish, still the farmer would like to be under obligations to it for more facts. He procures a chemical analysis of his soil, he learns the components of the cereals he raises and supplies the missing constituent to his land, but for want of proper heat or moisture his plan does not succeed, and "apples of the desert" are produced where he expected thirty bushels of wheat to the acre; he closes his book, and ever after plants his potatoes in the old of the moon, and manages his stock when the *sign* is right. Should he be a man of sufficient strength of mind to guide him into paying back to the soil, by way of manure, a portion of what he has borrowed by way of grain taken to market, we present to you the average Wisconsin farmer.

To preserve the fertility of the soil, to cultivate it to the greatest advantage, to raise its products at the least expense, to procure the best implements of husbandry, to select the best stock, to feed them in the most judicious manner, and preserve the respect of all classes of men, should be the end and aim sought by a system of mixed husbandry; and a thorough education to ensure the attainment of these objects is what the people of the state demand of those entrusted with the management of the agricultural schools and societies of the state.

We have no one staple product in this state to which the farmer can give his undivided attention, and we have not been induced to make a specialty of any one thing, except to a limited extent during the hop fever. Farming cannot be profitable or complete without pursuing it in all its branches, and hence mixed husbandry is essential to success in Wisconsin.

To farmers just beginning, or those who have pursued farming without results satisfactory to themselves, we would make a few suggestions.

To be successful in any enterprise or pursuit there must be a plan, and system in executing it. The farmer should decide upon a course of management extending over a period of at least ten years' time.

There ought to be a proportionate division of the farm into grain, grass and live stock, depending somewhat upon the nature of the farm. Assuming that a commencement is made in 1873 with a well considered plan, in most cases the land will require different management to adapt it to the plan; old lands will have to be rid of weeds; deep trenches plowed in the fall; sown to clover with grain in the spring; streams of water straightened; vegetable deposits on the margin of water-courses spread over the upland requiring vegetable mould to enrich it, and a black surface to draw the rays of the sun, and to pump up the moisture from below.

Clay soil should have long manure, straw and leaves plowed in; but in most parts of the state the soil is light and porous, requiring well rotted manure. This should be applied to the surface after plowing in the spring, and dragged in when covering the grain, thus placing it where it will feed the grain fibres and be retained to enrich and equalize the moisture, instead of wasting its ammonia by its being blown away, or exhaled by the dews and change of temperature between night and day.

A farm of one hundred acres we would not subdivide smaller than forty acre tracts, exclusive of necessary yards for cattle and hogs; and we are clearly of the opinion that the best plan would be to have no subdivisions. This, if adopted by all farmers, would do away with outside fences, the interest on the cost of which would be equal to the best crop that could be raised on the farm.

After getting the farm prepared for carrying out a plan the farmer should always note down in his farm book the conditions under which each crop was raised; what time he plowed each plat of ground; moist or dry; what time he sowed, and under what conditions it was harvested; the area of land appropriated to each variety. Observations extending over a limited number of years, would be of more avail to him than all the traditions of Deacon Hayseedinhishair from antiquity to date.

Transportation to market, enters largely into the economy of farming, and should be regarded in making plans. Aside from market, and the disturbances caused by war at home and abroad, almost any decade in the past will demonstrate the uniformity that can be relied upon in adopting a plan extending over a period of ten years in the future. There are always a few sharp men who claim that they keep an eye open, which can penetrate the future, and can adapt themselves to coming changes; yet in most cases they are successful after the fact oftener than before. The rule that the more days the farmer works on his farm the larger his bank account will be, meets with fewer exceptions than the fulfillment of prophesy in farming. Should the result of the first and second year disappoint expectations, while the adjoining neighbor is successful, taking his chances without a plan, you will then require pluck to continue to the end; a quality in character which cannot be grown from the soil, or imported from any county known to produce a surplus.

The extent of land set apart to grain must be with a view to securing only sufficient for the raising and fattening the animals on the farm. The area of corn must be consistent with the demands for fattening purposes. Oats, wheat and barley ought to be raised least of all, as they consume largely the phosphates which it is so difficult to supply. Under a system of grain raising with but few animals, it is very doubtful whether you can supply the necessary mineral elements, by the best possible management, from the same farm. Clover and herdsgrass must occupy the ground in turn with other crops, clover as the great fertilizer drawing from the extreme depths of the soil, and crevices in the clay and rocks where no other root or fiber penetrates. Owing to improved facilities for threshing and cleaning, clover, with its known value as a fertilizer, has already assumed a prominent place in agriculture. A crop of it plowed under, after the seed has ripened, reproduces itself the next season or furnishes the proper condition of soil for winter wheat.

A farm prepared for mixed husbandry, on the plan of keeping all the animals it will support, can be carried on with less expense, than a grain farm with but sufficient cattle for the wants of the farmer. The labor on a farm of this kind is more invigorating to the mind and less wearing to the body; the land can be made to retain its original fertility, and there will be a large annual saving of money expended in machinery.

When the systematic farmer is fully prepared to commence his cattle division of the ten year plan, he will have abundant authority upon the rearing of horned cattle, but on comparing the authors of different countries he will find little or no variation from old writers, which would seem to indicate that this was not one of the progressive sciences, or that a satisfactory routine had been established.

There has, as yet, been but little written on the question in the west, and what discussion there has been has applied to blooded stock. There are many new conditions attending stock-raising with us—such as climate, water and food. From the time when stock had no market value, and was raised upon the range pasture, to the present, there has been new changes yearly arising—such as the introduction of new breeds, confining them to smaller enclosures, feeding grain, marketing by cars instead of driving, butter making, cheese making, and recently another, in the introduction of Texas cattle. During all this time some have stoutly maintained that cattle could not be raised with any profit, while others have insisted that farming could not be carried on successfully without them. Both were right. From earliest history man has intuitively tended flocks upon the plains, and whole families have lived with their herds, upon mountains and in valleys. Our first civilization, recognized the necessity of cattle in mixed husbandry, although at times falling in profit below any other department; and could steam perform all the labor on a farm and beef-steak and butter spring spontaneous out of the soil still they would have a place and mission. Their history has been connected with that of the human race. The advancement of civilization has caused a corresponding change in their condition, so that it may be truly said that the development of the stock marks a people's progress as sure as the school house does. Whether the school-house is the result of an improved breed of cattle, or the cattle the result of the school-house, may admit of the same argument as Buckle's theory of religion and civilization.

Almost every farm in Wisconsin is adapted to stock raising as a part of mixed husbandry, but to be profitable, cattle raising must be pursued in all its adaptations to agriculture.

In the purchase of cattle for stock raising, we can have no better guide than the well recognized law of selection furnished us by nature. Select always the largest, with straight backs, broad, high quarters, short legs, medium sized head, bright eye, and above all, kind-tempered animals, and what is of equal importance, buy of a kind, even-tempered farmer, who is habitually a good feeder. The disposition of the breeder has everything to do in fixing the tractability of an animal raised under his care. A quiet, careful farmer will, by his example, allay the fear of timid animals, and draw the temper from high-spirited ones. The practice of kindness for a series of years establishes a trait or disposition, and the breed will transmit the development acquired by the care thus bestowed.

This practice of careful and judicious selection should be thoroughly understood without going into the refinements of Darwin. By relying upon the experience of any observing farmer, sufficient information can be obtained to guide one in carrying out a plan based on proper selection. Small herds of cattle, small flocks of sheep and even the dooryard pig exhibit a superiority as the result of greater care bestowed on them. If another principle is admitted, *i. e.*, that the development can be carried on and continued in the progeny, getting a better class each generation to a limited extent, then we have made progress in cattle raising.

In the droves of wild cattle there is but an imperfect natural selection, yet this prevents the rapid deterioration which would follow from an equal distribution of the progeny. The selection of the farmer in newly settled countries—keeping the best developed and best colored bull—is a still further improvement. The next advance in selection is the introduction of the full blooded bull to mix with the common cattle. It is at this stage of progress—before we reach the breeding of blooded cattle—that the Wisconsin farmer should commence by selecting the best native cattle and crossing in the manner above referred to. A bull of the purest stock, with known antecedents and living progeny for witnesses, should be chosen and kept with the herd for at least three years, then to be exchanged for one of the same general characteristics, possessing the prominent points in build and color. This plan continued will ensure a herd of cattle in ten years that will rank with any herd of blooded cattle in the world, in all things except in transmitting qualities.

In all parts of the state, where breeding may be undertaken in the manner above indicated, cattle will be raised principally for the dairy and beef. There is with some a lingering belief that working oxen can be used upon the farm with profit; but as all kinds of improved machinery require rapid motion, and farm laborers receive high wages, time becomes material, and we hurry the three year old steer off to the market. The grown ox requires much room in the yard, a large volume of food, and is frequently a terror to young cattle and poor fences. Economy in keeping can no longer be urged in his behalf, as the four year old horse is raised just as cheap and maintained with the same food.

Cattle raising can be made profitable notwithstanding the influx of Texas stock. There is a minimum below which Texan cattle cannot be raised; and to this is to be added the cost of transportation to the western prairies, of feeding with grass or grain, of long herding and interest on money invested before the inferior animal of lighter weight and less value can come in competition with Wisconsin cattle. The one is forced upon the market at a particular season; the other can be held or sent forward any time after three years old, taking advantage of the market. Still the southwestern stock will for a long time govern prices, as we may look for a more perfect developement of that business as railroads extend their lines south and west. This fact should stimulate the Wisconsin farmer to the use of all means to successfully compete with this new feature of the market.

The butter and cheese market is more uniform—especially cheese—than any product of the farm. The cry of those who are engaged in speculating on the market has been and is, that the supply will soon exceed the demand, but from a careful survey of the field we think no fear ought to be entertained by the Wisconsin farmer for the future cheese market. The increased quantity consumed does not seem to bear any relation to the increase of population in the districts where consumed but has resulted from a change in the habits of the people. Economic considerations govern to some extent—but the uniform quality and a wider distribution seems to have opened new markets in this country and in Europe. In 1863 our writers on mixed husbandry, thought we were going too fast into the manufacture of cheese; in 1868 we had the same prophecy in the agricultural reports, and the farmer is admonished in 1872 that Norway, Sweden and Germany are turning their attention more to cheese, and that we have good reason to apprehend that prices cannot be maintained. It is proved that it costs twice as much to produce a pound of beef as it does a pound of cheese, and that a pound of cheese contains twice the nutrition that a pound of beef does. If this is well established, it having also been shown by statistics that the increase of the consumption is four times in excess of increase of population, we may for some time at least rely on this improvement in demand.

We notice in the department report reference to an old saw that shrewd men will change their plan of production as circumstances require. This fallacy it is well to dismiss at once, or shrewd men may endanger their own safety by a change.

This advice partakes too much of the natuie of the counsel that bankrupts are able to give business men.

One agriculturist, writing from New England to the department, assumes with boldness that the west cannot make butter or cheese; that the grasses and climate are both unfavorable. We have conceded for some time that this was to some extent true, but careful farming has demonstrated that every variety of tame grass succeeds well here; that cattle are free from all splenic diseases, and under like treatment excel the eastern cattle. All that we now require to take the first position in cheese-making, is a few eastern, pains-taking, careful, intelligent farmers, to adapt this branch of agriculture to the different conditions found at the west.

There is one trouble that it seems difficult to dispose of in cattle raising connected with a dairy farm, if we desire to obtain the full benefit of our plans for bringing out an improved grade of cattle from the selection of best animals, and caring for their progeny, and that is raising the calves.

The raising of calves the first year is a delicate proceeding without plenty of milk. To supply the proper elements requires a critical chemical knowledge. To use hay, water, oat and corn meal does not always bring the same result; there is a want of starch saccharine matter, alkali or acid, or they are in improper chemical proportions to assimilate, no one has yet determined which. There is a difficulty somewhere that makes the calve's bones very sharp, and like Victor Hugo's gamin, their bellies very large, in which condition they ever after remain. We think the trouble is in forcing the animal to take too large a quantity of highly nutritious food to start with; as we have noticed that calves that eat but little at first, soon come into a thriving condition, and can in a short time be taken from the cow.

A herd of sixty head of cattle is the number we would undertake to keep on a 160 acre farm. The increase of fifteen head of cows would soon secure this number, with a small outlay, and the time that would elapse from the commencement of farming until the maximum number was reached, would enable the farmer to exercise care in perfecting arrangements for keeping the increase and adapting his fields to receive them, getting his crops in a perfect routine of succession and providing well turfed pastures and hay fields.

Next to horned cattle, sheep must ever occupy a place upon the farm. A flock of fifty head is the outside limit for profit, with other stock. During the high price of wool large flocks were kept by farmers, but did not do well, while small flocks produced double the clip of wool per head. With sheep, more than with any other animal, the profit depends upon the care. The Cotswold, and crosses with other large breeds, will be the most profitable. The greatest success is obtained by farmers, who raise both mutton and wool. The extended work of Randall on sheep, and the many subdivisions under which their management is treated may intimidate many from keeping them, but small flocks, well cared for, summer and winter, are as little trouble as any animal on the farm.

Hogs, in mixed husbandry, may be regarded as an adjunct of the corn crop. There is no society about this animal that makes him a favorite; he is the most satisfactory when the greatest hog. Where the milk is taken to the cheese factory, the hog must be kept on grass during the warm weather and allowed cooked or fermented corn meal. The farmer should under rather than over-estimate the number he thinks he can keep, as they are an expensive animal when not constantly improving, and without a reasonably fair market; the rapidity of their increase is very apt to induce him to keep more than can be made profitable. The same taming process should be applied to hogs as to cattle and sheep. They should be educated never to squeal around the yard. This can be accomplished by leaving nothing for them to desire, then they will never worry themselves out of propriety.

The raising of horses has been marked by more blunders and greater stupidity than any other branch of mixed husbandry. In older countries the family of the horse has been watched with as much jealousy and protected with greater certainty from impurity of blood than the families of the rulers of the kingdoms to whom their owners owed allegiance. Let us compare the English plan of breeding with our own. In England, since the 11th century, care for the purity of blood has been regarded as essential to the production of the cavalry horse; hence it has had the encouragement of government. The warlike barons, in imitation of royalty, gave much personal attention to the breeding of saddle horses for war and the chase. In the 14th century we find the stud book, recording the pedigree and performances of noted animals.

In the books kept by the stewards of estates, we find for generations the record of births of every foal on the place, with its pedigree. Should the foal be a "skip," or without pedigree, it is reported as "Didos Skip," and ever after dropped from the record. The same rules for breeding in and in, and crossing with the same strain for purity of blood, were adopted by the farmer at a later day; and we now have the distinct types of horses with pedigrees established by the best of legal evidence.

But with the American farmer how different. He regards only the appearance of an animal in selecting a dam or sire. The dam is however never selected for breeding purposes, but bred because it is convenient. The pedigree of the sire is made up by the groom from the names of known popular horses—some of whom may be without any blood whatever—and will contain the most absurd incongruities possible. The dam, in all cases, on a country horse bill is not mentioned, and horses which may have been raised in one state with one pedigree, are often taken to another and advertised as "Imported." These instances are the rule and not the exception.

The farmer feels that he is not able, and that it will not be profitable as a part of mixed husbandry, to attempt the raising of the blooded horse. In this he is clearly right, as he cannot with any certainty procure the right stock to begin with. But he can exercise his judgment in selecting large, well built mares (not roomy as the old books say,) and by breeding to large horses whose stock has been tested, he can raise such animals as will be of use to himself and bring a fair price in market. This is the only safe rule for the farmer. The management of the horse, in the stable and at work, is well understood in this country; and as the horse has fewer diseases in this state than anywhere in the union, we can rely on his being a favorite in the market.

The subject upon which the farmer has much to learn is, how to feed the grain and hay he has raised with most profit to himself. Economy in fuel is rigidly practiced in warming houses, in generating steam for the locomotive, and in sheltering the millions of the temperate zone from the changes in temperature. The same economy should extend to supplying animal waste, to keeping the proper temperature for the comfort of the animal in accumulating fat for the market. Food is to be expended in quantities best suited to accomplish the desired result. After taking pains to select the proper animals, to apply manures and change crops to keep up the fertility of the soil, we cannot afford to permit the product of this labor to be squandered by injudicious feeding, or by permitting the animal heat to be wasted by exposure to the inclemencies of our winters. There should be no animal without shelter on the farm during the night time. An animal sheltered from currents of air during the night will sleep and rest with comfort, and will be fortified to stand exposure to the cold during the day. Young animals need grain in the winter with their hay and straw to promote growth as well as those full grown.

The health and comfort of the stock depends much upon the location of the barn; this should be on the hill and not in it; or rather above ground on the east side of the hill. No underground room should be permitted in a barn—not even a vegetable cellar—but the air should have free circulation under it, and ample provision should be made for light and the introduction of the direct rays of the sun on the bodies of the animals. Ventilation should be from all sides instead of one. A vegetable cellar of large capacity and well filled in its season should adjoin it.

Feeding upon scientific principle should have more attention, but like other branches of husbandry, habit generally determines this matter rather than any knowledge of the laws of nature. Without discussing the difference in the stomach and digestive organs of different animals there are certain facts that apply to all; they must have a sufficient quantity, at regular intervals, and frequent changes in variety. Along with hay, straw, stalks and grain, roots should be given. The carrot and beet produce more valuable food to the acre than anything else. Exact experiments have been made in Illinois with herdsgrass and carrots, by which it was proved that one acre of carrots is equal to five acres of herdsgrass in the support of animal life. An acre of corn, with the stalks, will keep a horse a year. One acre of corn, sown broadcast in June, will produce more green food in July, August and September, than ten acres of herdsgrass.

Horses require food as often as four times in twenty-four hours, but the amount given should be less than it is the custom to feed them. A larger amount than nature requires is forced through the animal by the muscular action of the stomach and bowels, and does no good, but is an injury. Horned cattle should have their food from good, rich pastures and well supplied mangers. Sheep should have as great a variety of food as any animal, and should never be permitted to run down in flesh, as this condition is destructive to the growth of the wool. Experience is everywhere teaching that most of the diseases of swine are the result of confining the animal to one kind of food; on farms with a wooded pasture they suffer but little. Where there is no timber on the farm, good sized pastures are absolutely essential to the health of the hog.

The farmer, who has derived any profit over and above his neighbors as the result of his ten years' trial of a plan, can, of course, improve upon it during a lifetime. Should he be dissatisfied with, and want to exchange his vocation or his business, the education is not lost for future usefulness in any pursuit, and he has the satisfaction of knowing just what he has been doing.

PRACTICAL MANAGEMENT OF SANDY LAND.

BY J. W. WOOD, BARABOO.

The importance of this question to the industrial interests of Wisconsin can be best seen by examining a geological map of the state. The observer will be struck by the great development of the Lower Silurian rocks, and especially of that member of the series known as the Potsdam Sandstone. The disintegration of this rock gives character to the soil over a large area in the northern part of the state.

Tracing this rock westward from the locality in the state of New York which gives it its name, we find it extending through Canada; making a great bend to the north it crosses over into Michigan at Sault St. Marie, then passing along the sand dunes and pictured rocks of the south shore of Lake Superior it widens rapidly, and covers nearly the whole of the upper peninsula of Michigan. Entering Wisconsin, its northern border is coincident almost with the northern line of the state, being broken only by limited areas of primitive rocks and upheavals of trap, while its southern border, forming an obtuse V, receives the first outliers of the lower Magnesian limestone south of the Baraboo river in Sauk county; thus covering, no doubt, one-third or more of the surface of the state. The drift forms a wide belt on the eastern wing of the V, greatly benefiting the soil, but the disintegrated rock enters largely into its composition.

The surface of this vast area is generally level, but through its eastern and southern parts it is sufficiently broken to secure good drainage. It is generally well watered, and furnishes sufficient timber to supply the necessities of a population, and lies so near to the great pineries of the north that building material is easily obtained. In the central part are situated the great cranberry marshes of the state.

It is well known that a sandy soil is the easiest of all soils to cultivate, and if it can be kept up to a proper state of fertility, offers many inducements to the farmer. Its organic matter is held in the most accessible shape for plant-food. It does not bake; is warm and friable; tools easily keep bright in it, and if the crops are not so heavy, a larger area can be cultivated with the same labor, so that settlers are quite content with lighter yields.

The new land when first broken up was rich with the accumulated fertility of centuries, and the early settlers were delighted with its fertility and easy cultivation. The sandy region received its full share of attention; the first crops were abundant, and the idea prevailed that our lands were inexhaustible in their fertility. But farmers have since found to their sorrow, that a system of farming, which has no higher aim than to pocket all that is possible of the wealth which mother earth has been ages in collecting, is a system which leads to ruin.

The first settlers were often men with means sufficient to enable them to start out with comfortable improvements. The small timber growths, which it was necessary to remove, furnished an abundance of fencing, and the country at once assumed an air of comfort and prosperity, but the rapid exhaustion of the soil which followed, led to discouragement, and often to the entire abandonment of the improvements, so that a traveler to-day in passing through the sand district is struck with the appearance of discouragement which prevails on every side.

The question before us is—might this result have been avoided, or is there now any remedy for the existing state of things?

In considering this question, I shall confine myself strictly to the use of means available to the actual settler. We know that with the expenditure of money, "the desert may be made to blossom as the rose;" and we know, too, that there is not sufficient inducement to lead to its expenditure in improving our sandy lands at the present time. A man with means is likely to go elsewhere, and leave the lands in question in the hands of those who occupy them. Present cheapness is the greatest inducement it offers to new settlers.

We will now look at the soil and see what we have, before we consider the question of what we need in order to render it more fertile.

In chemistry this sand is known as silex, which is one of the most refractory substances met with in the laboratory. It is totally insoluble in water and in most of the acids. It enters slightly into the composition of the straw of plants, but is hardly found at all in grain. Time does not crumble or dissolve it into any form of plant food. It only fulfils the office of a sponge to hold the water and the plant food accumulated in it, in a form accessible to the rootlets of the plants; so we must look elsewhere for any increase in the fertility of the soil. If the soil were pure sand it would be worthless, but the term "sandy" is applied to soils in which the sand predominates. It is in all cases largely mixed with earths, which to a great extent causes it to resemble other soils, and gives to it its value.

The question of artificial manures, such as guano, superphosphates, etc., may be dismissed at once, for though none can doubt their value, yet they cannot be used economically at present. Lime and plaster depend for their value on the presence of organic matter in the soil, as they do not directly help to maintain plant life. So that the great question for us to consider is, how to provide and keep up a supply of organic matter in the soil.

There are often marshy tracts of land from which the settlers cut their annual supply of hay, interspersed through the sand region, which are underlaid by heavy deposits of muck or peaty substance. This might be profitably hauled on to the adjoining fields and make an excellent base for the action of lime or plaster—and it would likewise be invaluable in the compost heap or barn yard—yet even this requires an amount of labor and capital, and a foresight which do not at present abound in our sandy region. Therefore we must look still further for effectual help, if we find it.

The space allowed will not permit me to go into minute details of the experiments which have been tried in investigating the sources of plant life; I can only state the results. The most important one of all in our case is, the fact that the great supply of carbon necessary to plant life is found floating in the atmosphere which surrounds us.

It is estimated that there are seven tons of available carbon suspended over every acre of the earth's surface, rich and poor alike. This cannot be exhausted for "the wind bloweth where it listeth," and if any man could secure that portion which is present at any time, the next moment will give a new supply. The general supply is probably on the increase in our generation, for while the portions we are able to condense and use are soon afloat again through the processes of combustion and decay, we are busy in digging from our coal mines annually, millions of tons condensed at some previous portions of the earth's history and setting it afloat again, that it may travel its ceaseless round of usefulness.

Boussingault took a portion of pure sand, burnt it until all traces of organic matter were expelled, then took up some growing clover plants, washed them clean, removed the external moisture with blotting paper, weighed them and set them in the sand. He then watered them with distilled water, placed them in the air, and in two months time found that they had tripled their amount of organic matter, thus proving that air, pure water and sand have all the elements necessary to sustain the growth of clover. In rich soil the results would doubtless have been increased, but we see in this little experiment the element of all successful agriculture. Had he buried the perfected plant in his sand, and planted again and continued the process, it is evident that there would be no end to the amount of fertility which might be accumulated. And this would not be in an arithmetical but in a geometrical ratio, for the presence of a portion of manure in the soil would make it easier to accumulate still more from the atmosphere. This experiment gives us the key note to the successful management of our sandy land.

We see that it is far easier to keep up the original fertility of the soil, than it is to restore it when once exhausted. As yet the processes have all been exhaustive—nothing has been restored. The great law requiring compensation, which God so implicitly obeys in the management of the universe, has been utterly neglected. Much has been lost, but still much can be done, not only to restore, but even to exceed the original fertility of the soil.

Boussingault tried the same experiments with other plants with similar results, but the leguminous plants, to which clover belongs, have so far proved the most satisfactory.

Other plants of heavy annual growth might be profitably sown and plowed under to restore the worn out lands, but clover properly handled is sufficient to accomplish it all. It can be sown with other crops; it affords both pasture and hay, and is hardy in our climate.

The proper rotation of crops to adopt in view of the necessities of the case will be clover, corn and small grain; the ground when sown to small grain of any kind, to be always seeded with clover. I would divide the farm as nearly as possible into three equal parts. This rotation, if clean work is made with each part, will give uniform annual products, varied only by the accidents of the season. As the harvest of each field is secured, the lot can be pastured, if desirable, without interfering with the other crops.

I would sow the medium clover, which, in favorable seasons, will give a crop of hay followed by a growth which can be cut for seed, or used as pasture, as the farmer pleases. If it is well filled, it should be cut for seed, as a man must raise his own; when the seed is once secured the farm must not be sold short. One or even two year's supply should be kept on hand. If the second growth is not heavy enough to meet the expense of cutting for seed it will still mature enough to re-seed the land. If allowed to get a good start, it may be moderately pastured without detriment, as cattle will avoid the ripened heads and feed on the tender grass below, unless pastured short.

This clover sod should be turned under in the fall and the following summer cultivated in corn. When replowed and sowed to small grain it will be found to be abundantly seeded to clover. The farmer will secure the most successful results in this way.

If it was not that clover was liable to winter kill after the second winter, it would be desirable to interpose a year of pasturage upon the clover sod before turning over for corn; but it has this liability on any soil, and more especially on light soils. It is a biennial plant, and after reaching its matured growth the liability to winter kill is greatly increased, hence it will be safer to follow the three years' course.

If more pasture is needed, a portion of the clover must be devoted to it. In our sandy regions there is usually a wide range for stock, which furnishes excellent feed in the spring and early summer, but the farm must provide fall feed. This can be obtained by turning into the wheat and clover stubble.

It is a serious disappointment in farm management to fail in getting a good stand of clover. To increase the probabilities of success, the ground must be plowed in the fall, in order to sow at the earliest practical moment in the spring. This is very essential to success. It is of but little use to sow small grains late, for they must get a good start before the heat and drouths of summer come on, and before their insect foes commence their depredations. Insect life rejoices in heat and dryness. Spring plowing leaves the earth mellow and chintz-bugs will breed in it without let or hindrance, but if the clover seed catches, the earth will be shaded by the branching leaves of the young plants, and the bugs will be held decidedly in check.

It will be found easier to get a stand of clover on land where it has lately been grown, and the certainty will increase from year to year under the system proposed, as the ground will become filled with seed in a condition to grow.

It is well known that clover sown in March on wheat or rye seldom fails to catch. The seed becomes swollen and ready to germinate at the earliest moment, and when the rootlets are well fastened in the earth they make a vigorous effort to stand their ground, and will generally succeed.

The clover sod—turned over in the fall if possible—is to be thoroughly prepared in the spring and planted to corn. This will give a third of the farm in corn, which is none too much. Corn is the sheet anchor of our western agriculture. Prosperity hovers around a full crib. It is food for man and beast alike, and blesses everything; it is not exhaustive to the soil; it can be worked at seasons when wages are moderate; it affords winter fodder of the best quality, if properly secured—an acre of stalks being equal to a ton or more of hay for feeding purposes—it is the most profitable crop we raise. Not an ear of it must be sold from the farm—unless to supply some unfortunate neighbor with seed—but all must be fed out where it is grown, and sold in the form of beef, pork or mutton, and the manure made, sacredly returned to the land which produced it.

The corn stubble should be plowed in the fall and prepared for small grain. Preference must be given to the kinds most favorable to clover. Wheat and barley are better in this respect than oats; and fall rye is preferable to either. I have sown clover in the fall with winter wheat and had it in bloom at harvest, yielding a far better crop than that portion of the same field sown in March. I would recommend a trial of this method, for if it succeeds, a better crop will be secured; if it fails the ground can be resown in March. Its success will probably depend much upon the accidents of the season.

The management of the manure is an important matter on any farm. It must be carefully husbanded and great pains taken to increase the amount and quality.

It may be applied as a top dressing to the clover or used on the corn ground, but in no case should it be buried at the bottom of a deep furrow. If used on the corn ground it should be harrowed or cultivated in, so as to be available to the roots nearest the surface, as they are the most active feeders of the plant. The greatest benefit would probably be derived from applying the manure to the clover, as this is getting the lever under the very center of gravity of the farm. If this point be lifted, the whole farm comes up with it. The practice of hauling manure directly from the stable as often as a load is made, and spreading it upon the land, is growing in favor among agriculturists. If left in the yard without being well cared for it suffers great loss—more than can come from spreading it even upon the snow. If left in the yard to rot, a year's use of it is lost.

It is essential to success, not only in our sandy lands but in all western farming, that sufficient stock be kept to consume all the coarse products of the farm. Whether hogs, sheep, horses or dairy should be kept, must be decided by the tastes and experience of the farmer. In many cases the farmer will not have the capital necessary to start successfully in that which would suit him best, but he must have his plans thoroughly mapped out in his mind and work them out as time progresses. In this article I have been careful to recommend no processes which are expensive or extra laborious, but such as are within the means of ordinary farming; and if the cultivation of our sandy lands is made profitable, it will be by such means; for laborious and expensive systems will not be adopted.

INSECTS INJURIOUS TO AGRICULTURE.

Aphides (Plant Lice.)

BY P. R. HOY, M. D.

From advance sheets of the Transactions of the Academy of Arts, Sciences and Letters.

Entomology, the history of insects, their metamorphoses, habits, relation to plants, etc., is a branch of natural history which has peculiar claims on the agriculturist. In view of the millions of dollars annually lost to the state by the depredations of insects, it becomes an interesting problem how to distinguish, in all stages of growth, our insect friends from our insect foes, that we may be the better fitted to cherish the one and destroy the other.

When will the representatives of the people understand that Wisconsin can ill afford to dispense with the invaluable services of a state entomologist? We have a host of insects, peculiarly destructive, waiting for careful study, the better to enable us to counteract their evil work. Not the least of the advantages to be derived from the labors of an active, enthusiastic state entomologist, is the education of the farmers by personal contact; thus teaching them how to distinguish the various insects by which they are surrounded, in their different stages, so that this practical knowledge may be of value to themselves and to their neighbors.

PLANT LICE.—Small, green, brown, black or white, soft, bodied insects, with or without wings; crowding together on leaves, stems, bark or roots of various trees and herbs. Many species are covered with a white cottony substance, hence called Woolly Aphides. The number of species is very large, not a germ of plants that has not its peculiar species; many, more than one. The apple alone, according to Fitch, has not less than five species of plant lice. One of the most common species infest the tender leaves of the apple, the *Aphis Mali*, Fab.

This species is green, egg-shaped, one-tenth of an inch in length; it is either with or without wings. They are provided with two spurs, or nectaries, which originate near the center of the body. These nectaries secrete a fluid as sweet as honey. So astonishingly prolific is this insect, that the increase of one single egg, it has been estimated, in seven generations, would be 729 *millions!* If it were not for the good offices of those animals which prey upon plant lice, every thing green on the face of the globe, would, in a short time, be covered with these voracious insects. They crowd as thick as they can stand, their long suckers inserted into the succulent young shoots and leaves, pumping up the juice. If disturbed, they jerk up their bodies in a comical way and emit, from their nectaries, a shower of honey, apparently to bribe the intruder with this sweet fluid. Not unfrequently they kick up their hind feet in unison, impelled by an excess of animal spirits, from very joy of existence.

The history of this species is extremely interesting. In the spring, as soon as the young leaves appear, the eggs, hid away in the crevices of the bark, hatch. The young creep to the extremity of the branch and fasten to the young shoots. In a few days the louse is fully grown. All the eggs laid in autumn produce wingless females, and these females do not lay eggs, but bring forth *living* young which are also females.

The young when first born are milk white, but change in a few hours to the color of the parent. In a very few days these young lice produce living progeny also. And so on for from fifteen to twenty generations, each individual louse producing from five to ten each day, all without the presence of a single male; for in fact there is not a male in existence! A few winged females appear occasionally, which take wing and plant new colonies. Thus goes on this remarkable form of reproduction till fall, when there appears a brood of winged males and females which pair, in the usual manner. The result of this union is not living aphides, but eggs, which in the month of October the females deposit in the crevices and cracks on the bark of apple trees. Soon after this the lice all perish. The eggs remain securely hid away during winter, to be called, by the warm days of another spring, into life, again to repeat this wonderful phenomenon.

APHIS PROTECTORS.—Ants are almost always seen busily running up and down trees and plants infested by the aphis. These ants take charge of the lice, guard them from harm with zealous care; for which good services they are amply paid in honey, by the plant lice. The ants approach the lice, and if there is not an accumulated supply, they touch them with their antennæ by way of reminding them of their wants; at once the lice respond with a drop of their sweet fluid. For this reason plant lice are humorously called *Ant Cows.* It is a well known fact, that colonies of apides attended by ants thrive better and are more prolific than those which the ants have not found.

APHIS ENEMIES.—Now for the Aphis foes, and consequently our friends. We place first on the roll of honor, the larvæ of the Lace-wing flies, which are called Plant Lice Lions, a name well deserved. Lace-wings belong to the family *Hemerobdia*, order *Neuroptera.* There are many species of Lace-wings; they are mostly not over half an inch in length; color, pale green, or yellowish brown, with conspicuously prominent golden eyes, for which reason they are sometimes called golden eyes. They are provided with four large wings, which expand a little over one inch. These wings are netted in a beautiful manner, resembling the finest lace, hence the name. These flies may be met with during the entire summer, in the vicinity of trees infested with lice. They are nocturnal in their habits.

The manner in which the female Lace-wing deposits her eggs challenges our admiration at the beautiful adaptation of means to the accomplishment of important ends. Nature has furnished this insect with a fluid analogous to that of the spider, for spinning her web. When ready to deposit an egg, this insect touches the end of her body to a branch or leaf, and then elevates the abdomen, drawing out a pure white thread, half an inch in length, which hardened instantly, on the summit of which she fixes an egg. This being repeated, from 10 20 eggs are thus placed on slender threads. The eggs when first deposited are pale green, becoming opaque before hatching. Now the object of thus placing the eggs on these hairs is evident. Were they placed in reach the first larva that escaped from an egg would devour the remainder. So nature has well guarded the continuance of the species.

The larvæ of the various species of lace wings differ considerably in color. They are mostly of a reddish brown, lighter on the sides, with a dark line down the back. The body is long, wrinkled, short hairs projecting from each segment; has six legs, and is armed with a pair of formidable, sickle shaped jaws, which project conspicuously in front. Thus armed these lions hurry about in one continual state of activity day and night in quest of plant-lice, their legitimate prey. They seize the lice with their tongs, and elevate them, till they have sucked every particle of substance from the bodies, then giving the skins a toss, resume their search for more victims. It is astonishing how many lice are destroyed by a single aphis-lion.

Having attained its growth, the lion makes the last meal an excessive one, remains torpid for a day or two, then spins a circular cocoon in which the insect is entombed during the winter. The first warm day of spring calls them out. So opening a small door, in this temporary grave, emerges a beautiful Lady Lace-wing, dressed up in the most extravagant finery.

LADY BIRDS.—Family *Coccinellidæ*, order *Coleoptera*, small, nearly round beetles, ornamented mostly with spots of various colors on the elytra.

There are about one hundred species described as belonging to the United States. In my collection alone there are no less than twenty species, obtained near Racine. So Wisconsin is not deficient in these valuable insects. These beetles deposit their eggs in clusters on the under side of leaves on various plants. Their eggs are of a shining, golden yellow, resembling those of the Colorado potato beetle. In a few days they hatch out six legged, dark colored, long bodied larvæ. Their jaws are short, but sufficiently long, however, to be of good service in killing aphides.

These larvæ are nearly, if not quite equal to the *aphis lions* in destroying plant lice. Dr. Fitch, New York state entomologist, so faithfully describes the habits of this *plant wolf*, as it might appropriately be named, that I adopt his language. When first hatched, "it walks about with much animation, and coming to a plant louse, much larger than itself it may be, the little hero, though only a few minutes old, boldly seizes the louse, which, like a cowardly poltroon, makes no resistance except trying to pull himself away. But the little assailant hangs lustily to him, preventing his advancing a single step further, and using his anterior legs as arms, he commonly raises the louse off from the leaf and leisurely devours his body, leaving only the empty skin remaining. As he grows, the sides, and in some species the whole surface, becomes diversified with bright red and yellow spots and rows of tubercles or elevated points. He is a most active voracious little creature, running briskly over the limbs and leaves in search of his prey, and consuming hundreds of aphides. He grows to about a quarter of an inch in length in the course of two or three weeks; he then fixes himself by his tail to a leaf, or the limb or trunk of a tree, and hanging with his head downwards the skin cracks open along the middle of his back, and the smooth back of the pupa protrudes partly out of the prickly skin of the larva, and thus remains, the old larva skin continuing to cover the pupa on each side and beneath. The insect remains dormant in its pupa state about a fortnight, when its hard exterior shell cracks open, and from it crawls a small shining beetle nearly the shape of a half pea, though often much smaller than this."

THE AGENTS WITHIN OUR CONTROL FOR DESTROYING PLANT LICE.—The smoke of tobacco, when it is possible to confine it for a time, is undoubtedly one of the most efficient remedies for exterminating these pests. In green houses, graperies, conservatories, etc., the smoke is always potent. Small out-door plants can be covered with boxes, barrels, or even umbrellas, or any thing that will form a temporary cover, will answer, and insure the destruction of the aphides with tobacco smoke. But on large trees, and vines, smoking is not practicable. The next best thing is a thorough drenching with strong tobacco water; say one-fourth of a pound of tobacco to one gallon of boiling water. Soap suds has been used with good results. A strong decoction of quassia root has also been attended with some benefit. But of all remedies for out door trees and vines, I prefer collecting, with a net, by sweeping bushes and coarse weeds, the several larvæ described in this article—*aphis-lions* and *aphis-wolves.*

Several years ago a fine balsam fir, fifteen feet in height, standing in my grounds, became overrun with a species of woolly aphis, which deformed the leaves, and there was danger of the tree being destroyed by them. With a net I collected a brave lot of the larvæ of ladybirds, and placed them on the lousy tree; at the same time I noticed several packets of lacewing eggs. The combined labors of these soon destroyed every single louse. The tree, now sixty feet in height, has never, to my knowledge, had an aphis on it since.

Last year my outdoor grapes became badly infested with lice; I secured many aphis wolves and aphis lions, which I transferred to the vines; in less than two weeks the grapes were entirely free of these pests, without resorting to other means.

I know of many incidents illustrating the woful ignorance of persons otherwise intelligent, who were waging an exterminating war against insects and birds, at the very time they were engaged in the good work of devouring noxious insects.

FAILURE IN WHEAT CULTURE.

BY PROF. EDWARD SEARING, MILTON COLLEGE.

The value of an essay on "Wheat Culture," presented by one who never grew a stalk of wheat in his life, and whose entire practical experience in agriculture has been confined to the cultivation during three years of a garden of one or two acres, may appear to some very problematic. Yet it should be remembered that for the successful calculation of an eclipse neither is a personal visit to the sun and moon necessary, nor need a man have constructed with his own hands the telescope with which he scans the celestial spaces. Other men may have made his instruments and his tables, yet if his theoretical knowledge is not deficient, he, in the quiet of his study, works out the problem, the accuracy of whose results, to a minute of time, a future day verifies.

So, possibly, in agriculture important problems can be solved by those not actually treading the furrow. Indeed, if the truth were known, it would be found that many of the best agricultural editors and writers of the country have done the larger part, if not the whole of their farming with the pen, rather than with the plow or hoe.

Patience in examining and sifting the reports of other men's labor, skill in classifying such reports, and wisdom in drawing therefrom conclusions of value to all—these are in agriculture, as in other departments of science and industry, qualities of the highest possible utility. Shall there be less honor to the man at the head of the weather bureau in Washington, who examines the multitudinous reports of local observers, and then publishes the history or prophecy of a storm, than to the observers themselves?

A little reflection will convince any one that no special, technical acquaintance with agriculture is *necessary* for the preparation of a useful article on the conditions of success or failure in wheat growing, when almost everything of value pertaining to the subject can be found, and be found only in the recorded experiments of practical wheat growers. These records are of course numerous, and they embody the experience of a multitude of practical farmers of many states and countries. They are also the result of many years' observation. On diligently searching these records, and faithfully and accurately comparing and condensing the reports, I have found, contrary to my expectation, the evidences so numerous and so positive in one direction, that what I had supposed, and what is so generally supposed to be a mystery, seems no mystery at all.

The very uniform failure of the wheat crop in the longer settled portions of our country, and the constant westward progress of its successful cultivation, can be satisfactorily explained. It is the object of the present paper to give this explanation—an explanation based upon the solid facts of experience, and commending itself to the reason and common sense of all intelligent minds. The only wonder is, that the truth is not generally known and admitted by farmers, whom, as a class, it most intimately concerns.

Failure of wheat is not due to climatic changes. Before proceeding to state the real causes of the failure in wheat growing, I must allude to this very generally supposed cause which there is good reason to think has little, and probably nothing, to do with the problem.* It is a quite generally received opinion that the occupation and cultivation of a new

* Evidently our author in coming to this conclusion has overlooked certain important facts which have a bearing on the question. A careful examination of the statistics given in connection with the results of experiments, to which he alludes farther on, will prove conclusively that the character of the season has much to do both with the amount of the yield and the quality of the crop; and again, with us, the seed, soil and culture being the same, in exceptional years (as 1853 and 1860) when the distribution of heat and moisture was favorable, the yield, in quantity and quality, has been equal to that of the best former years. It has also been our own experience (which is confirmed by observation) that with new soil and the same conditions of tillage we cannot now get near as large a yield, or as good a berry as when the country was first settled. This must, in some measure, be attributed to less favorable conditions of climate. That there has been a marked change in this respect every old settler, who has closely observed these things, will admit; and that this must be the case, will be evident to those acquainted with the effect upon the climate of a country of a heavy natural growth of grass, brush and timber, in connection with a large area of surface covered with water. There has been a great change in these conditions, and it has wrought its natural effect on our climate.—EDITOR.

country cause such climatic changes as tend to forbid the successful production of wheat.

In the first place, this is inherently improbable. It is directly contrary to the wise provisions of nature, that a grain ranking higher than any other as a source of food to man, should find its deadliest foe in climatic changes which civilized man's very presence necessarily engenders. This idea is absurd upon its very face. Nature is not thus malicious. She does not war upon man in this pitiless and remediless way. She hides her bounties that she may call forth man's ingenuity, industry and energy to secure them, but she has attached no such penalty to the culture of the soil as this theory would imply.

In the second place, this notion is not only not supported by facts, but is entirely contrary to facts. The removal of the forests from a well timbered country unquestionably produces marked climatic changes; but failure in wheat culture is by no means confined to such localities, nor is it any more marked in such localities. On the great prairies of the west no such climatic changes have or could have occurred; and yet their diminished crops testify no less emphatically of some potent deranging cause. The same is true of California, where the diminished yield has been striking, while no one pretends there has been any change in its peculiar and remarkable climate. It is true also of France where the annual yield has been diminishing; while in England, a country whose civilization is of nearly the same age, the yield is now larger than ever before,—having steadily increased more than five bushels per acre during the last one hundred years. In Egypt, again, the yield has continued large and steady for centuries. Egypt and England are perhaps the only countries that form exceptions to the general rule of diminished yield.

Again, there have constantly been isolated instances of a large yield in the midst of districts where the general failure has been marked. These instances have not been confined to particular localities or countries. They have occurred in New York, in the western and southern states, in France, and elsewhere. The known conditions of these exceptional results, together with like results of recent special experiments, particularly in England, conclusively show the causes of the diminished yield of this great cereal crop.

These causes I shall now proceed to set forth, as briefly and clearly as possible, and to support them by proofs from various sources.

Wheat is a peculiar plant and requires peculiar conditions of soil and care. As in its fruit it is superior to all other grains, so in its habits it is more particular and exacting than others. It cannot endure conditions in which corn or oats would flourish. It requires a rich, mellow, and clean soil. The richness, too, must be a refined one. Rank manures upon which corn would luxuriate are distasteful to this grain. It flourishes upon new land, richly endowed with the organic matter which nature has furnished from annual generations of decayed leaves and grass. When such virgin soil is given, it yields a return of from 30 to 100 bushels per acre, with very little care on the part of the farmer; and it will for several years yield bountiful but slowly decreasing crops, while it is thus feeding upon and exhausting the food which centuries have accumulated in the soil. This explains the once abundant yield in New York, in Ohio, in Illinois, in Wisconsin, in California. This explains the present abundant yield in the newer portions of the west—in Minnesota, in Nebraska, in Oregon, and in Washington Territory.

Wheat most easily affords the new settler the money he immediately needs. It gives large returns for his labor, and is more easily transported and sold than any thing else he can raise. So he continues to grow wheat year after year, on the same ground, because it pays immediately and largely, and he looks not to, or cares not for, the fûture. He thus perhaps obtains from every crop the original cost of his entire farm, and when at last the impoverished, foul, and ill-used land can no longer return him much for nothing, he pockets $20 an acre for what cost him one-tenth the amount, and joyfully departs for pastures—or rather wheat fields—new, to repeat on a still larger scale the same money-making but land-killing process.

The plowing of this new land is always shallow. Every successive crop diminishes the supply of organic matter; and from the careless culture, every successive year increases the stock of weeds. When the yield of the first year—perhaps 30 or 40 bushels—has diminished to 12, and 10, or 8, then the Agricultural Bohemian, who has been guilty of this agricide, resorts to the neighboring store, or grocery, where with his neighbors he despondently discusses the dismal prospect. It is unanimously agreed that the failure is "mysterious"—that "the climate has changed"—that anything and everything is the trouble, except utter ignorance of nature's laws and violation of her fundamental rules on the part of her slanderers and persecutors.

If this constant cropping with wheat were accompanied with the very best system of culture, so that the ground should be mechanically in a proper condition, and weeds be kept out, good crops of wheat could be grown much longer without manuring the soil, and a tolerable crop could perhaps be grown indefinitely, by proper *cultivation*, simply. The experiments of Mr. Lawes, of England, seem to indicate this. He raised twenty-seven successive crops of wheat from one plat of land, without any manure. The crop of 1844 was fifteen bushels per acre, and that of 1870 exactly fifteen bushels; this amount also being the average yield during the entire time. It should be understood that the ground was kept absolutely free from weeds, the wheat being in drills and the soil cultivated between them. The experiments made by this gentleman are probably the longest and most valuable on record, and I shall have occasion to refer to them again.

I have thus indicated the two leading, and probably almost the only causes of the generally diminished yield of wheat in the older settled portions of the country. They are seen to be, first, continued cropping without manuring; and second, a poor cultivation, that neither stirs the soil to a proper depth, nor secures sufficient fineness and lightness of it, nor destroys weeds. I am inclined to think that ranking second to no other cause of failure in wheat-growing is that of the foulness of the land with weeds. No good crop of anything can be grown in partnership with weeds, and especially is it difficult thus to obtain wheat. When the new soil is first turned over it is comparatively free from these pests. Under the common mode of cultivation their numbers increase every year.

As a specimen of the kind of culture under which wheat-growing ceases to be profitable after a few years, take this from Mr. Harris' "Walks and Talks on the Farm," in the *American Agriculturist* for July, 1870. A friend visiting California writes him that he was told "110 bushels of wheat had been raised there on one acre of land." "Another gentleman of unquestionable veracity," he writes, "told me that he had harvested from three acres of wheat 308 bushels. But," he adds:

"You never saw such farming. They plow only two or three inches deep, and crop the land with wheat year after year, for from ten to twenty years. The consequence is their land has become foul, and now they do not average more than twenty bushels per acre. What is needed to renovate their land is a rotation of crops and deeper plowing."

The department report for 1866, says of wheat culture in the same state:

"The majority of cultivators throughout the state have pursued the following plan, which not only gives a very small return for the land cropped, but also exhausts it of its fertility at a rapid rate."

Then follows a description of what is termed the "volunteer" process of crops, by which a second, and sometimes even a third crop is obtained without plowing or sowing, and from seed scattered from the first crop. The report continues:

"As a general rule, grain lands receive neither manure nor rest, the same ground being cropped with wheat for seven or more years continuously. A better system of cultivation is being inaugurated in some portions of the state, by cropping one year, and summer-fallowing the next. By this plan, land that did not produce over twenty bushels per acre, when cropped continuously, has yielded over forty bushels, of a much improved quality."

This California method of wheat growing is an illustration—a somewhat extreme one, but nevertheless a good illustration—of that seeking for the largest immediate returns, and disregard of future consequences, so largely characteristic thus far of American farming, and so fatal in its results to continued success in raising the cereal under consideration.

I shall now proceed to give some proofs of the entire possibility of producing large crops of wheat, in localities where the general failure has been marked, by simply restoring and following those conditions which rendered wheat culture so easy and so profitable in the beginning. These conditions, be it remembered, are mainly a properly enriched soil, and a cultivation that shall forbid the growth of weeds,—in a word, a *rich* soil and a *clean* soil. One fact alone, to which I have already referred, might be considered as proving conclusively that the yield of wheat in a given locality can be kept up to a high standard indefinitely,—the fact that in England under a system of superior culture there has been a considerable increase in the annual average during the last century—nearly twenty-two per cent., it is estimated. This is not at all due to superior climate. The climate of no wheat growing region in the world is better adapted to secure large crops and superior quality, than that of California. The department report for 1866 says that:

"In the earlier years of grain-growing the average product of wheat in that state was between sixty and seventy bushels to the acre, in favorable seasons. Instances were common where large fields of from sixty to one hundred acres, averaged ninety to one hundred bushels, and selected acres as high as one hundred and twenty bushels."

The climate of France is as well adapted to wheat as is that of England, and yet France has reduced her average yield to fifteen bushels, while England has increased hers to twenty-eight bushels. The cause of this difference is thus explained by Commissioner Capron in his report for 1867:

"Deep cultivation is a primary necessity to root-culture, which forms the basis of English agriculture, and enables the English farmer to pay annual rents equivalent to the fee-simple value of our farms. The growing of these 'green crops' results in a more thorough admixture of the food-producing elements of the soil and its prompt permeation by water and the gasses, which are so necessary to plant-growth. France following in our footsteps, or we in hers, in at least one particular—the want of a proper rotation system—has reduced the average yield of wheat to fifteen bushels. The single fact that, while England has two acres in 'green crops' for every acre in wheat, France has three acres in wheat for every acre in green crops, explains the cause of the great discrepancy in the yield of that valuable cereal in these countries."

Mr. Capron ascribes the difference to the more extensive cultivation of the root crops in England, and to a deeper culture of the soil, but he omits all mention of the fact that in English agriculture natural and artificial fertilizers are much more extensively used than in French.

This one fact, I repeat, so forcibly expressed by the statistics of English agriculture, ought to be considered sufficient proof in itself that the yield of wheat in a given locality can be kept up to a high standard indefinitely by means entirely within the province of human effort. But there is other proof.

Mr. J. B. Lawes, of Rothampstead, England, conducted a series of experiments in wheat-culture, extending over many years, to which allusion has already been made as probably the most extensive and thorough on record. Mr. Lawes had several plats of land under constant culture in wheat for a series of years: one plat unmanured, one manured with farmyard manure each year, and the others annually manured with various kinds of artificial fertilizers. The result is thus summed up in the department report for 1868:

"This average result of sixteen annual experiments, is interesting and instructive, tending to show—indeed actually showing—that English soil unmanured, though thoroughly tilled, yields little more than the average product of unmanured American soil indifferently tilled. It also teaches the necessity, as well as profit, of liberal manuring. The increase effected by barn-yard manure was 138 per cent., and by the application of various fertilizers, 148 per cent.,—in bushels respectively, 20⅜ and 21⅞, worth, at average rates for the period, at least $25 and $27. This is far more than the cost of the fertilizers, leaving a rent-paying profit. Our own wheat-growers should ponder these results and profit by them."

These experiments, though made in England, are, from their nature, alike valuable to the agriculturists of all countries.

On looking over the reports of large individual crops in different portions of our own country, as published in various department reports, in reports of the New York State Agricultural Society, and in several volumes of the *American Agriculturist*, I have been very forcibly impressed by the uniform conditions of extra mechanical culture, or liberal manuring, or both. I had marked a number of these reports for quotation, but my limits forbid the use of more than two or three, which may serve as samples of a vast multitude that could be presented, and that have come under my observation.

In an editorial article in the *American Agriculturist* for Sept., 1868, is the following emphatic testimony:

"We know two farmers, in one of the best wheat-growing counties of western New York, who have just harvested and sold their wheat. One had 13 bushels of wheat per acre, that weighed 54 lbs. per bushel; the other had 37 bushels, that weighed 62½ lbs. per bushel. The former was glad to get $1.80 per bushel for his crop, and the other sold his at the same time for $2.60 per bushel. One crop brought $21.16 per acre, the other brought $100.50 per acre. The farmer who got one hundred dollars an acre for his wheat has no better land naturally than the one who got twenty-two dollars an acre. The climate is the same, and there is no other difference except in the management. One cultivates thoroughly and manures highly. * * * His land is clean and rich, and no matter what the season is, he has almost invariably excellent crops. We have heard him say that he believed he could make a good crop of corn if not a drop of rain fell from the time it was planted till it was harvested. He would depend on frequent cultivation, keeping the ground mellow and not suffering a weed to grow. His land is as rich as when it was first cleared, and he can raise just as good wheat. It is not owing to the variety, for the kind he raises is the good, old-fashioned Soules, that so often fails of late with ordinary treatment."

In the number of the same journal for February, 1869, is the following item:

"J. B. E., of Monticello, Indiana, writes: 'Neighbor Keener had a piece of wheat sown on summer-fallowed land, one-half of which was plowed the second time. The six acres plowed but once yielded but twenty-six bushels per acre. The six acres plowed twice yielded thirty-eight bushels per acre. He sold the wheat for $2 per bushel, and thus received $180 for about three days work with a man and team.'"

Such illustrative facts, I repeat, might be presented almost indefinitely. I will say that, so far as I have been able to observe, it is the uniform testimony of all articles upon the subject, in the books and periodicals I have consulted—and I do not think that any one has escaped my notice—that the widespread deterioration in the yield and quality of wheat is due, and due alone, to imperfect methods of culture. Indeed, I am astonished, both at this unanimity of testimony, and at the fact that there is still doubt in the minds of any, when the proofs are so numerous and so conspicuous.

I will close this already too lengthy article by presenting the opinions of our recent, and of our new Commissioner of Agriculture. Commissioner Watts, in his monthly report for November and December last, says:

> "We must resolutely face the fact that the the cause of the failure is to be found in the farmer's want of skill, and inquire how this skill may be improved."

Commissioner Capron, in the report for 1868, says:

> "If wheat plantations may still predominate, beyond the Mississippi and Missouri, there is no excuse for failing to inaugurate a complete system of American agriculture in Illinois and the more eastern states, which shall be self-sustaining and tending constantly to increase of production and profit. The evil tendency of slip-shod culture and neglect, has often been shown in the rapid decrease of yield and reduction in quality. * * * * The fault is not inherent either in soil or climate. It is fully accounted for by the deficient preparation of the seed bed, rank growth of grass or weeds, and neglect of that systematic variety in cropping necessary for the preservation of a proper equilibrium in the elements entering into the production of wheat."

I will simply add that, the causes of failure being recognized, the conditions of success become obvious. They have already been discovered. When these conditions shall be so fully established here as they already are in England, there cannot be the slightest doubt that, so far as the yield is concerned, the success of former days will return.

CULTIVATION OF INDIAN CORN.

BY LEWIS CLARK, BELOIT.

The value of this production is too well known to require much time or space in referring to it. No other production equals it for the use of man and beast, and for general purposes. All will be convinced of this when they consider that should other grain and vegetables fail, this alone would feed our families comfortably, and not only that, but it would enable our work-teams, our cows, beef cattle, swine and sheep to fill the place designed for them, provided the stalks are saved with the ears.

However barren and rugged the New England hills, a place must be fitted for corn if it takes all the manure that can be made on a large farm, or bought, to prepare two or three acres. In addition to two or three plowings there must be a heavy covering of manure broadcast, a shovel full from the compost heap to each hill, and three or more hoeings by hand to secure a crop.

From New England we turn our attention to Illinois where "corn is king"; the vast fields that stretch for miles are raised with so little cultivation that it seems to be almost native to the soil. In our own state as the smaller grains fail, the corn crop increases, and in connection with grass it is the main crop to depend upon for successful stock farming.

KIND OF SEED USED.—Probably fifty or more kinds could be found in our country; but which is best for general use would be hard to tell, as much depends upon location and quality of soil. Rich dry soil, well mixed with sand, will usually mature the mammoth kind; less dry and less sandy lands are better adapted to a medium dent, and so on from early dent to plain Yankee, as we reach the colder land and higher latitude. In this vicinity, on good corn land, what is termed early dent in central Illinois produces the best. Get a variety with long kernel and small cob. My test is this; wrap a paper around an ear and tie it fast, pull out the ear and shell off the corn, if it fills the paper it will do. With most farmers the stalks are an object. In that case the Sanford can be used profitably for a portion of the crop. An acre or more should be planted to early Yankee to cut up for work teams and to commence the fattening of hogs.

SAVING OF THE SEED.—It is probably safe to say that millions of dollars are lost annually in the United States by planting poor seed. Not so with the smaller grains. During forty-four years of farming I have only once sown wheat that did not germinate; and never failed on other kinds of small grain. Seemingly they can be wet and grown at harvesting, stacked wet and poorly threshed and put into bins wet, and still grow. Save corn ever so well, and hang it over a bin of grain or haymow, and it will spoil. A slight freeze will destroy it unless thoroughly dried, and it seldom dries so well in the field that freezing does not kill the germ. Early in September, before the frosts come or the husks grow yellow, take the team, men and boys, if you wish, and drive on one side of the field. Let each have a basket, go to the opposite side of the field from the wagon and pick toward it, each taking two rows, picking the largest and best looking ears without stopping to examine them, filling the baskets if you please by the time they get to the wagon. That evening truss it up. It should be hung up at once, not lie around to mould and heat. The object is to dry the cob as speedily as possible, as the moisture in that is what does the mischief. I think a back kitchen where the cook-stove stands is the best place. An empty corn house or other out-building will do. Save enough for two years, and some for your neighbors who plant from the crib, to plant over with. Corn kept in this way will be good for years, and though it may be too cold and rainy to germinate for two or three weeks, it will come up if it does not lie in the water, when other corn which might grow under favorable circumstances would not. Shell a few weeks before planting; thoroughly mix, and always try the seed by putting it between grass sods wet with warm water, and kept under the stove. The result will be seen in a few days. I consider it necessary to renew seed quite often from several hundred miles south, for the main crop, as dent corn soon degenerates. If selected right, one and a half bushel will make one bushel shelled corn.

PREPARATION OF THE GROUND.—Under this head there are a great many points, many of which I will omit, or only refer to slightly. When to plow, and how deep to plant must be found out by experiment, taking into consideration the quality of the soil, how it is to be planted and tilled. For clay land planted by hoe, without brushing or harrowing, I prefer fall plowing; on land which does not *bake*, spring plowing.

MANURING—While a little is better than none, it is difficult to get on too much, unless it be on the site of an old barnyard, sheep fold, or something of the kind. I would haul out any kind, through the winter and spring, and plow in. If the land is far from the barn, take out a load morning and noon when going to work. Upon all good corn land free from obstructions, I would proceed to fit and plant as follows: For timothy and clover sod use a double plow, that is, two plows on one beam; a small plow with cutter, cutting about eight inches wide and four deep, attached to the beam in front of a large one in the rear, cutting more than twice as wide, going eight, ten or more inches deep, according to strength of team. In this way the earth is thrown over free from sod, and no place is left for grass to come through.

One great error in our corn raising is in not having the ground thoroughly prepared before planting, by harrowing, rolling and bushing, and that too, right up to the time of marking, so that there will not be a young weed or blade of grass, or green thing growing before the corn is up. All practical farmers know the value of the roller when land is lumpy. Right here I will introduce the brush (as I consider it indispensable upon the kind of land under consideration), and will tell how to make and use one. Get eleven saplings, straight, uniform, and with a bushy top—black oak is the best—bore as many holes in a straight stick, one foot apart, beginning with the center, and slanting the others a little outwardly, so that when put together it will work the ground well, twelve feet wide; the brush should be ten or twelve feet long, and not too heavy. An ordinary team will go over twenty-five acres in a day. The ground having just been thoroughly harrowed, have the brush go over it the day before marking. This method will put a quietus on the young weeds, will smooth and pulverize the ground, and leave the surface so that the marks will show more plainly.

The marker should be so constructed as to make not less than four marks at a time. Three feet eight inches and four feet are the usual spaces for rows in this vicinity. For looks and convenience in cultivating, rows should be straight; yet there are but few farm laborers who can do the work properly. I think the best way is to put a shoe, or short runner, on one end of a sixteen foot fence board; put a bolt through the other, and through the marker at the right place to have the shoe end make a traceable mark where the center of the marker will be on returning, or directly under the tongue. This plan is for smooth land, and rows both ways. For rough, stony, lumpy or stumpy land, or where rows can be made only one way on account of narrow strips in orchards, etc., I would mark one row at a time with a shovel plow.

Planting and Planters.—The time to plant in this vicinity is from April 20th to May 20th. The earliest date for early varieties; about the 1st of May for large dent; 10th of May for early dent; and common Yankee will do well from that time till the 20th. The earlier the planting is done the better; weather and soil being favorable.

On clay soil that is very lumpy I would plant with a hoe, but on all smooth, mellow land, whether rows are to be made one way or both, I prefer a double hand-planter. A man who understands them, will put in ten acres per day. Jones' planters are generally used here. They plant even and are durable. Myself and neighbor used one jointly for twelve years, besides being borrowed and used by others. The horse planter does good work, but does not make the rows perfect both ways. The question naturally arises, Why is machine planting preferable to hand? On land which needs under-draining, hand planting—and shallow at that—would be much the best; but upon all good, dry, natural corn land, the reasons in favor of the planter are, that it takes only one-fourth the labor, plants deeper, and more evenly. The advantages of deep planting are, that the corn is more out of the way of gophers, never fails to come up however dry the weather may be, and if the seed is such as I have recommended, it will come up as soon as it becomes warm, however wet and cold it may have been previously, and it does not pull up in tilling and harrowing. Some years ago when planters were not as plenty as now, I was in a hurry to finish a lot and put in some of the field with the hoe, mixed along with the machine work. It came on very dry, and I estimate that I lost 200 bushels on account of the hoe planting failing to come up.

However large the field, I would try by changing work or otherwise, to plant it all in one day, that it may come up evenly. The importance of its all coming up at the same time will more readily appear when we come to tilling.

The brush is now to put on the finishing touch. It can be driven by a boy. It kills weeds and prevents gophers from digging up hundreds of hills. In the absence of a brush, a harrow may do to follow after the planting.

TILLING.—One great error in cultivating is in not working the ground soon enough after planting, and another in not working near enough to the hill the first time over. In my opinion the great secret of successful cultivation is in taking the weeds out of the hill—which otherwise would take up and absorb the nourishment of the corn—without using hoe and fingers. My plan is to go over it with a harrow, four or five days after planting, and if the weather is cold, so that it is long in coming up, go over it twice. This uses up one or two crops of weeds that would be in the hills. Any harrow will do, but a Scotch one, of seventy or more fine teeth, with light wooding, is preferable. As soon as the rows can be seen, so as to keep horses from stepping on the hills, put on the brush. It must be watched on the start, to see that it does not scrape too hard on the rows. If there is any trouble it is easily remedied by cutting off the large or crooked limbs, or raising up and working under fine brush. This will clean out of the hills any young weeds that may have started, leaving the earth loose and lively—equal to the old New England way of hoeing all the earth away from the hill, then cleaning out the cluster of weeds with hands, and hauling back fresh dirt—and at the rate of twenty-five acres a day, instead of an half acre, as in the latter case.

The harrow must follow the brush when the corn is four or five inches high; but it will not do to use it at the same time, as it would cover up the small corn. This is the time when the timid and inexperienced will think the crop will be ruined, and set the harrow up by the fence. To be sure two or three teeth will go through each hill, knocking over some, partially covering up some and occasionally pulling up a spear, but soon the spears will rise and grow rapidly; if a few are destroyed it is no matter, they can be spared.

In a week or ten days more, the corn will be eight or ten inches high, and weeds, if any, small. Now is the time for the cultivator. Before proceeding with this, review what has been done, partially to see how much the land has been worked since planting and at what cost.

Suppose the piece twenty-five acres. First, bushed after planting; second, harrowed before coming up; third, bushed as soon as corn seen; fourth, harrowed. The ground has all been worked over four times, in the hill as well as outside, with four day's work, which a twelve or fourteen year old boy—if he is a good one—could do as well as a man. A number of things are readily seen. It has not cost much, and there has been a very poor chance for weeds and gophers to work their mischief. I have been little troubled with the latter since pursuing this mode of deep planting and continuous cultivation.

It is not necessary to discuss the merits of cultivators. There are many of them, and scores of proprietors and agents to do the puffing. Whether you use single, double or sulky, work close up to the hill, and set the teeth so as to throw enough soil around the corn to cover up all weeds too deep to be resurrected. Then go through the other way in the same manner. As rains sometimes prevent following out the prescribed course, it is best to commence the work early. Corn now being free from weeds and a foot or more high, ordinary skill will keep it in good order. Keep as far from the hills as possible at each subsequent working, throwing a little fresh soil up to the corn to cover weeds and prevent the evaporation of moisture. In chintz-bug times I concluded to go over my ground again, and procured all the help possible, scattering men and boys about—the corn being in a number of different fields and on different farms. When partly worked, so many neighbors said weeds should be left to feed the bugs, that I did leave a portion of each field, and found afterward, by comparison, that the weeds did more harm than the bugs.

A few years ago, a relative, directly from one of the eastern states, who had not been into our fields, remarked that we might have very good, natural corn land, but he did not believe in any such slovenly way of farming. On enquiry, he said: "I understand many never put a hoe into their fields; we go over ours three or more times." I replied, "I will show you forty acres tilled in that way, cleaner from weeds than any one acre you can find in your state." On examination, he owned up beaten. No hand cultivation can do the work as thorough as the horse, for with the hoe, weeds are cut up near the surface and sprout again.

HARVESTING.—I will not occupy much space in speaking on this point. Having raised a good crop, each farmer will be governed more or less by circumstances as to how and when he shall secure it.

From the early maturing of the Yankee variety till heavy frosts, more or less should be cut to feed teams, cattle and hogs designed for fattening, and to keep up a flow of milk from the cows, if the weather is dry.

On farms that are fully stocked, or when the owners can do it, I would advise cutting it all up, putting from sixty-four to one hundred hills in a shock, well bound at the top with flail-threshed, wet, rye straw, care being taken to have it so made as to stand erect all winter if necessary. The cutting should all be done before frost. Thus secured, I calculate an acre of the stalks to be equal on an average to an acre of grass for feeding purposes. It can be hauled, husked and fed in winter. Sheep can be well grained by feeding on the ground, thus saving husking. If desirable to clear the field, in early winter the stalks and ears will all be well cured and can be handled readily as they are only about half as heavy as when first cut, and can be bound with rye straw, and hauled and put into a stack or barn, to be fed and husked as required.

HEMP CULTURE IN WISCONSIN.

BY HON. J. G. KNAPP, MADISON.

This plant, called by the botanists *cannabis*, its ancient Greek name, is a sub-order in the large family of nettles, and was first noticed by historians as coming from Persia. The fibre, the principal element of the bark, makes it eminently useful to man. It is a diœcious, herbaceous annual known to all, as it has been acclimated in all parts of Europe and America; scattered from fields and bird cages it grows wild almost wherever civilized man has lived.

Can it be Grown in Wisconsin?—Many, who know its market value, are at a loss about its growth here. Such have formed their opinions from the fact that it is grown in Kentucky. Hemp is a coarse plant, grows rapidly to the height of from five to eight feet, and needs for the greatest production a strong, loamy soil. Being an annual it requires but a short period for its maturity—less days than flint corn—but the period of its growth should consist of hot, sunny days. The brief hot summer of northern Russia give it ample time to mature, and the Russian hemp is as noted in the markets of the world as the flax of Ireland. The young plants are not liable to be killed by the frosts which destroy flax and many other plants; and from the fact that its seeds lie over winter in the ground in a wild state, it is inferred that they might be sown in the fall. However that may be, it will mature its lint is less time than corn requires to ripen.

In the minds of those who understand the nature and habits of the hemp plant and the climate of Wisconsin, not a shadow of doubt exists but that we can produce better lint than any of the states farther south; and time will demonstrate that

Northern Illinois, Iowa, Wisconsin and Minnesota, where the dent corn grows, will become renowned as the true hemp region of the American continent.

PREPARATION OF THE SOIL.—On this head nothing more need be said, except that the ground should be prepared as for oats, the soil being thoroughly mellowed, so that the plants may grow as evenly as possible. Unless the weeds start first and become considerably advanced the hemp will rise above them, maintain its ascendency, and kill out all other growth. Some agriculturists have proposed to use hemp as a crop in the rotation to clean foul land of its weeds, and as a preparation for other crops. Land can scarcely be too rich for hemp, and yet a profitable crop may be grown on poor soil.

SEEDING.—Some sow from two, to two and a half bushels of good, fresh seed to the acre; but L. I. Bradford, President State Agricultural Society, Kentucky, in 1863, says "broad-cast your seed evenly, at the rate of fifty pounds of seed per acre minimum, or even up to seventy pounds as the maximum quantity, varying with the strength of the land; the object being to produce as thick a growth of plants as the land will sustain. If the plants set too thin, on rich soil the stalks will grow too coarse, producing a coarse and inferior lint; on the contrary, if seeded too thick, the growth will prove so short as to materially affect the value of the crop." After the seeds are sown, by hand or the broadcast seeder, the roller should follow to make the surface as even as possible for the hemp-hook, cradle or reaper in gathering the crop. The plants should stand so thick, that all may run up their entire length without branches. Such plants give long, straight rods, with even, undivided fibre; but when they have abundant room they branch at almost every leaf, and the fibre is short and broken, or injured at each joint.

RAISING SEED.—The plants for this purpose should be grown on rich land, in drills two and a half or three feet apart, and tended as a hoed crop; they should be thinned out in the rows so that all may have ample room for development. One-half the plants will bear only staminate flowers, and are called male plants. These can be distinguished when half grown, and may be removed, leaving one to three or four female plants. All the male plants may be cut or pulled out as soon as they have shed their pollen and begun to turn yellow: their fibre, which is nearly as valuable as that on plants grown exclusively for the lint, can be saved. The female plants continue green, and require about three weeks more to perfect their seeds, when they must be carefully cut or pulled, and set in shocks to dry. The seeds scatter easily, and it must be carefully handled, especially when dry. The seed crop could also be saved by cutting off the seed branches with a knife, and conveying them to the drying house in large tight boxes or baskets, as hops are gathered. The stalks could then be cut, cured and rotted as the other plants are for the fibre on them, which is worth about three-fourths as much as that upon the fibre-grown plants.

The seeds contain as large a proportion of oil as flax seeds, and the oil is expressed in the same manner, and used for the same purposes. The oil cake is equally good food for cattle with the linseed cake. Hemp has been known to yield as high as forty-five bushels of seed to the acre, and has been recommended as a profitable crop, when grown for the seed alone.

HARVESTING THE CROP.—Hemp was formerly pulled by hand, but this was a slow and laborious task, and there was danger that the different parts of the field would damage during the period occupied in the harvest. Recourse has since been had to cutting it at or near the ground with heavy knives, reaping hooks or scythes. This mode greatly expedites the harvest. Of late years, a cradle with a short scythe and stout fingers so spread as to gather and hold the tall hemp has been used. Cutting the hemp, though a great improvement on pulling, is heavy and hard work and requires great care, especially when the cradle is used, as it is necessary to cut all close to the ground, otherwise some of the best fibre will be lost. It is to be hoped that some of the reaper men will construct machines that will cut hemp as low as grass is now cut, and yet lay the green stalks in a continuous swathe or in even bunches, and thus substitute horse for human muscle in harvesting this crop.

The proper period to harvest for fibre may be known by the male plants. When they have shed their pollen and commence to turn yellow, the crop is then ready for cutting. The female plants will remain green some three weeks longer in maturing their seeds, but their fibre would decrease in value, and that of the male plants would become almost worthless.

Curing the Crop.—If the crop is cut with the hemp hook or cradle, the width of each swathe must be sufficient to allow the plants to be spread in a continuous line on the ground where they grew; if cut with a machine and cast off like grain, the bunches should be gathered by hand, made even at the butts, and spread in straight lines across the field, covering the ground as much as possible. As soon as the leaves are dried so that they will shell off in handling, the hemp must be gathered, either with a rake or fork, agitating the stalks sufficiently to break off all the leaves, keeping the butts even. Bundles of convenient size for handling are bound with cords, or with hemp stalks. If rains have beaten down the plants, so that the underside lies on the ground with wet stalks and leaves, the swaths may be turned over with a slim pole, ten feet long, slightly bowed, and the point so trimmed that it can be easily pushed under the swathes; then, if the pole be lifted, the butts will form a focus on which to turn the swathe. It will then lie up loose, and will dry in a few hours. The hemp can be bound and shocked or stooked, and afterwards placed in the rick or shed if need be, more compactly without than with the leaves. No time should be lost after the stalks are cured in getting them into the stooks, as every day's exposure to the sun and dew afterwards deteriorates the quantity and quality of the lint. The brighter the stalks can be secured, the better; the same rule applying here as in hay.

ROTTING AND PREPARATION FOR DRESSING.—Rotting is done by steeping in water, and by what is called dew rotting, the same as flax. The water rotted is far stronger in the fibre, separates into finer filaments, and commands a much higher price than dew rotted. But water rotting requires much more handling, and the cost of the extra labor is, perhaps, more than an offset to the increased value of the lint over dew rotted. Several patents have been secured in Europe and America for using chemicals and other processes for rapid rotting of hemp and flax, which if valuable and cheaper than dew rotting will come into use.

Dew rotting is very simple. When the heats of summer have passed away, and the frosty nights set in, the proper time has come for spreading the hemp. If it has been carefully secured and kept dry, a smart boy will unbind and place the bundles at proper distances on the ground as fast as a man can spread them in swathes. If the stooks have been removed to ricks or sheds for better preservation, or to clear the land and plow in the leaves and stubble, or if it is deemed advisable to rot the hemp on the meadow or pasture land, the bundles must be scattered over the ground within easy reach of the distributor. Care must be taken to spread the swathes thin and even, so that all may rot alike. These swathes remain without turning till rotted. That stage is indicated by the fibre parting freely from the stalks. When rotted, the turning pole may be again brought into requisition, and the swathes turned, to dry out any dampness remaining in them. The rake or fork again gathers the stalks, which are bound or not at the will of the handlers, and they are stooked, until all dampness has evaporated. The hemp will now have lost much of its weight, and must be transferred to barns or sheds, where it can be kept perfectly dry. Too much care cannot be had in keeping the butts even, and straw straight and untangled.

DRESSING.—The last and crowning work is breaking and dressing the lint, and fitting it for the market. This work is done in the winter. In this state a warm barn or shed will be required, as it cannot be exposed to heat. The clearest and driest weather is best for this operation; damp days will suspend the work, by reason of the clinging of the lint to the shives.

Hand breaks for hemp, in Kentucky, are manufactured for about five dollars each; brakes worked by horse or steam power, which will dress 500 pounds of lint—about three-fourths of an acre of hemp straw—in a day, can be had for $250. Such a machine and its horse power could dress all the hemp grown in a neighborhood, perhaps in a town, being moved from place to place, like a threshing machine. Larger machines, which are stationary, and will rough dress five tons of lint in a day, working up the produce of 3,000 acres in a year, cost about $4,500. The process of breaking by hand, or otherwise is laborious, yet more depends on the skill, than the strength of the laborer.

THE VALUE OF THE CROP.—Rough dressed lint as it comes from the break has sold at St. Louis during the spring of 1872, at $70 common; $80 good; $90 prime; $92 to $100 strictly prime to choice; $175 to $180 dressed; good hackled tow at $80 per bail of 500 pounds. These prices make the lint worth 14, 16, 18 and 35 cents per pound, respectively. New York quotations are still higher.

Land which will yield fifty bushels of corn, or twelve of wheat, will produce a thousand pounds of undressed lint per acre. The average crop in Kentucky and Missouri has been from 800 to 1,000 pounds of dew rotted lint per acre. Wisconsin ought to give as large a yield. Raised for seed, its yield is from thirty to forty-five bushels per acre, worth $1.50 per bushel or more; and the coarse lint from the seed straw is worth $60 a bale, which will more than pay the cost of cultivation. From these figures some estimate of the value of the crop can be formed, and it will be readily seen that few crops will surpass it in profit. Last year a farmer near Kankakee, Illinois, was paid $100 for the hemp straw, which grew on an acre of land, after it had been rotted on the ground where it grew.

WILL THERE BE A MARKET FOR HEMP.—The high prices which hemp commands now, is one answer to this question, but another is found in its consumption in the country. The last report of the Secretary of the Treasury, informs us, that there was consumed in the United States, during the year ending June 30th, 1871, foreign imports of hemp, manilla, jute, grass, sisal, hemp tow, and other fibres and their manufactures, to the amount of $8,034,071.83 custom-house value; on which duties were collected amounting to $1,742,786.87. Nearly one-half this amount was for raw material, and gunny cloth. This is in addition to the importations of flax and flax manufactures, and to American grown hemp and flax. This amount is no more than the average for the past seven years. The United States have never produced one-half enough to supply their own market and consumption.

HEMP DOES NOT EXHAUST THE SOIL.—Fortunately for our unphilosophical and wasteful system of agriculture, hemp, when grown, returns to the soil its leaves, stubble and deeply penetrating roots; and when these are buried by the plow the land is in the finest possible condition for another crop. Nearly all the valuable, inorganic substances taken from the ground is in the waste material of the leaves, seed stems and shives, which can and ought to be returned. The carbonaceous nature of these and the stubble, acting both chemically and mechanically upon the soil, and yielding humus, must more than compensate for the one-fourth of one per cent. of mineral ash in the lint; which amount is absolutely all that need be taken from the land. The hemp raisers of Kentucky and Missouri have had no apprehension of hemp exhausting the soil; on the contrary they rank this crop as an improver of the land, like clover. They claim, with reason, that the deep tap roots descend into the lower strata of the soil in search of nourishment, and thence bring valuable elements to the surface; which with the large amount of carbonaceous matter in the leaves, stubble and shives, gathered mostly from the atmosphere, greatly increase the fertility of the soil. Many fields in those states have been planted with hemp for twenty and thirty years, without any apparent diminution of the amount of yield.

When the hemp is water rotted, or spread on the grass land to rot, the stubble and leaves may be turned under by the plow so early in the fall, that all will be well decomposed at the time of the next spring sowing; and the land will receive as much benefit as by turning under a green crop. The shives, divested of the attached lint, may be spread over the land in winter, while frozen, and will act as a valuable mulch for the new crop, sown on fall plowed land, like spring wheat, and then be turned under the next fall. The seed crop alone will require manure to keep up the soil.

Why Hemp has Been Neglected.—An idea has prevailed, because hemp has been grown in the slave states, that, like cotton, it could only be grown by slave labor. Another equally prevalent idea is, that it requires the long, hot summers of Kentucky, Southern Illinois and Missouri to perfect it. Nothing can be farther from the truth. That region is too hot during the summer and fall. The true home of hemp, where the brightest, finest, and strongest lint can be produced is beyond the home of the negro. Countries with cold, snowy winters universally produce the improved qualities. In India the plant exudes the gum *haschich*, which destroys the lint. In the cool climates of northern Europe and Russia, on the contrary, no gum exudes. Some gum exudes in the hottest and dryest seasons in Missouri. Wisconsin will be free from this evil. The plants are not subject to attacks of rust, or insects.

France and Germany grow more pounds of hemp than flax for their linen manufactories of cloth, fine grades of cordage and twines. Hemp fibre is more tenacious than that of flax, and when water rotted is nearly as fine. Dr. Ure, in comparing the tenacity or strength of threads of a certain diameter, gives the following results: flax, 1,000; hemp, 1,390, silk, 2,894. By Dr. Roxburgh's comparison hemp is 105 and flax but 39.

The American hemp grown in Kentucky and Missouri, is usually dew rotted, and owing to the warm climate of the fall the lint is so deteriorated by that process as to be of the lowest grades, unfit for anything except the commonest kind of cordage and bagging. The superiority of the Russian and French lint to the American is due to the lower temperature of the latter regions, and the further fact that it is water rotted. The use of certain chemicals and steam expedites the process, and also increases the quantity, quality and strength of the fibre over that soaked in cold water.

Wisconsin has all the advantages of climate, soil, pure water for steeping, suitable autumns for dew rotting, and enterprize for the construction of machinery for dressing and working up this crop; and there is no reason why her people should not reach forth and seize this prize. Why should not this source of wealth be added to her other resources?

THE RELATIONS OF LABOR AND CAPITAL.

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From advanced sheets of the Transactions of the Academy of Sciences, Arts and Letters.

The problems respecting the relation of labor and capital, which are now engaging the attention of all sorts of people in all parts of the civilized world, may be greatly simplified by a clear apprehension of a few elementary facts and principles. The presentation of these facts and principles is the object of this paper. I attempt nothing more than a brief digest of some matters familiar to all who are acquainted with the science of political economy. In this I follow mainly Mr. Mill's line of thought and adopt often his own forms of expression, claiming no merit for the paper except for the putting of things together with a bearing.

We start with the simple fact that *all wealth is produced by the application of labor to natural objects.* In the case even of those objects which nature brings forth spontaneously in a form to gratify desire, some labor is necessary to find and appropriate them. In most cases some further labor is requisite to bring natural objects into a condition fit for use. Fig leaves must be sewed together before they can serve for clothing. The fish and the deer after being caught must be divided, cleansed and cooked before they are fit for food. The dirty ore taken from the bog or mountain must pass through a succession of varied processes of labor before it takes the form of a knife, convenient for a thousand purposes. So it is with every thing which contributes to man's necessities, comfort or enjoyment. "All things are full of labor." In each we find a natural gift from God, with an added gift from man's labor. So long as there is found a desire of man ungratified, or an object of nature unappropriated or unexhausted of its capacity to gratify desire, there will be place for human labor to be applied to natural objects for the increase of wealth.

We advance a step and come upon another obvious fact. It is that in civilized society, *all the processes of industry require some accumulation of the products of former labor to begin with.* The blacksmith cannot begin his work without iron to work upon, and a forge and its fuel and hammer and anvil to work with. And moreover if he is to spend the day in his shop, the food which supports him must be provided beforehand. In other words he must have materials, tools and sustenance. But these all come as the results of previous labor, his own or another's. So it is in every branch of civilized industry. To this necessary accumulation of the products of former labor the name capital is given. This is the radical idea of capital.

Now putting these two facts together we have the universal fundamental principle that *the union of these two elements, labor and capital, is essential to the production and to the very existence of wealth.* Hence comes the obvious inference that the true relation of capital and labor is that of *partners—co-adjutors* for a common end—*sharers* in a joint result. Each is indispensable to the other. Abstractly considered, they meet on an equality. Antagonism between them is ruinous to the interests of both. This view of the subject is fundamental to all sound political economy. It is so plain as to seem a truism which hardly needs a formal statement. Sound philosophy and common sense both sustain this view. Yet in practice it is very generally ignored, and in the sharp discussions of our times it seems almost lost sight of on both sides. Amid the din of the workshop, and above the din of wordy contention this simple truth needs to be continually affirmed, elucidated and reiterated. No labor reform movement can avail anything which does not start with the proposition that labor and capital are partners, not rivals, and write upon its banner, "What God hath joined together let not man put asunder."

For the better apprehension of the principle in all its bearings let us linger a little on the questions, what is labor?

what is capital? and what conditions most favor the harmonious and profitable union of these two forces of industry:

1. Labor is fitly defined to be "the voluntary efforts of human beings to produce objects of desire." Since the human being is made up of body and mind we must distinguish two kinds of labor, viz.: Physical labor in which muscular exertion is the chief thing, and mental labor which engages chiefly the faculties of the mind. I say *chief* and *chiefly* because in reality all human exertion contains some physical and some mental effort. The dullest laborer must think some about the work of his hands; and the pofoundest thinker must task his muscles *some* to present to the world the products of his brain-work.

Recognizing this distinction, let us note what each kind of labor achieves. Mere physical labor only puts things in motion. The muscles of the body are made capable of contraction. This creates a pressure which when applied to a piece of matter, tends to put it in motion, or if it be already moving, to change or stop its motion. This is all that mere muscular exertion can do. But, through this power of putting things into contact and relations with each other, man is able to command the hidden forces of nature to an unlimited extent. Man stirs the earth and drops a seed into it, then the forces of vegetation hid in the seed and in the soil multiply the seed a hundred fold. Man brings coal, places it in a furnace, sets fire to it, and at once a force of nature in the process of combustion turns the carbon into heat. He may add to the pile ore taken from the earth, and another force of nature by the action of heat makes the iron flow. Man's muscles grasp and wield the hammer only to enable nature's forces, gravitation and density on the one hand, and tenacity and malleability on the other, to make the blow effective to shape the iron as he will. Man sets his poles and strings his wires and adjusts the components of his battery and arranges his machine, so that by touching a key he can command that subtle force of nature, electricity, and make it the bearer of his thoughts to the ends of the earth. Yet in all this, physical labor only moves things; the forces of nature do the rest.

But how does the man know what things to move, what kind of motion to give and how to produce that motion so as to accomplish his purpose? Not every putting forth of muscular exertion is effective in producing desired results. Action must be suited to the nature of things and guided by methodical rule. Hence the constant necessity of *mental labor* to precede and attend the operations of all physical labor. The faculties of the human mind must be tasked in investigating the properties and laws of nature, in studying the philosophy of motion itself to find the mechanical powers, in contriving in detail the means or instruments through which the force of nature may be made available, and various motions may be combined on philosophical principles for certain results, and in watching over the actual operations, of both the human laborers and the natural agents in the complex combination of productive industry. It is plain on the bare statement of it that the mind-work of *discovery*, *invention* and *superintendence* is indispensable, an essential part of all productive labor, and that its importance and value, though often overlooked, cannot be over estimated. We say therefore of mental labor in this form that it is *directly* concerned with all productive industry. We recognize also another kind of labor, chiefly mental, which is employed to develope and improve the physical, intellectual, moral and social condition of human beings themselves. The results of this kind of labor affect men individually and collectively, and determine very much their qualities as laborers and the circumstances and associations in which they live and work. It is thus *indirectly* concerned with all departments of productive industry. Under this head, may be set down the mother's nursing and training of her child, the teacher's efforts, the services of the physician, the lawyer, the minister of religion, the author, the editor and the greater part of the labor involved in the administration of government—all that is commonly called professional and official service.

This distinction of labor as directly or indirectly concerned in production, is much more simple and better every way than the old distinction much insisted on by some writers on political economy, and so strongly contested by others, of labor as *productive* or *unproductive*. The term unproductive can properly be applied to labor only when it is labor wasted through indiscretion, as when a wag paid a man ten cents an hour to bail out the river, as its waters set up between two boats, or as a luckless inventor may spend years of brain work and manual toil on a machine which has no practical use. Certainly we may not say of Morse's years of study and work in devising the electric telegraph, or of Webster's labor to bring under sentence of the law the murderers of White; or of Coan's preaching the Gospel in the Sandwich Islands, it was *unproductive* labor.

Much exertion is put forth for mere recreation, as in hunting, boating, ball-playing, etc. If this really recruits mind and body it puts the laborer in better condition for productive toil and so indirectly aids it.

There are professions, such as those of the musician and the actor, in which labor is put forth only to furnish a passing entertainment—a moment's pleasure. Though, after the entertainment is over, nothing is left which can be laid up and counted as wealth, yet it is for the time a real gratification, and the sweet memory of it will abide. The true end of labor is accomplished immediately. The satisfaction follows the effort instantaneously. The hearer of Nilsson has his *quid pro quo* in the ecstacy of the hour. Why then is not this *productive* labor just as truly as if it had produced a ribbon for ornament, or a shoe for protection, or bread for food. Proper gratification of this kind cheers the spirits of men, and so increases their productive energy. If the recreation is, in kind or degree, exhausting, if the amusement is in its influence demoralizing, or if the taste be so fostered that amusement itself is made an end, then the economist and the moralist may fitly enter their joint protest against a waste and a wrong. But that labor which brings refreshing relief to wearied body and mind, or ministers a gratification to a pure and healthy taste, cannot be fitly called unproductive.

Still less properly can the term be applied to professional labor generally. It is a very common notion which has been encouraged by some who would be esteemed philosophical writers on the subject, that the manual labor of the farmer, the carpenter, the cotton manufacturer, &c., is productive; but some are disposed to set down the mental labor of the doctor, the lawyer, the editor, the teacher, the legislator, &c., as unproductive. But the real difference is only that the labor of the latter class is directed in a general way to favor the essential conditions of effective labor universally. It is expended on the human beings individually and their social state to fit them for labor, to protect them in their labor and to gratify and expand the wants which are to be satisfied, by the fruits of labor. So long as physical health, intelligence, morality, security under good government and just laws, justly administered, and social refinement and good feeling are essential conditions of successful industry, all labor of the kind referred to must be set down as *indirectly* productive, nor is labor in this form further removed from, or less essential to the ultimate result than is the labor of the miner in the ore-bed, with reference to the needle and the comfort of the coat made by its use. I have seen a pictorial sheet, the prominent object in which is a farmer, standing in the center, while around him in the margin, appear representatives of half a dozen different professions. The lawyer says, "I plead for all," the merchant, "I trade for all," the clergyman, "I pray for all," the soldier, "I fight for all," the railway manager "I carry for all," and the physician, "I prescribe for all." But in letters of double size, the farmer is made to say with emphasis, "I *pay* for all."

Now I suppose this picture fitly represents the current popular notion on the subject. But according to the views just expressed, the notion is false. None can deny that agricultural labor lies at the foundation of human society, at the beginning of human industry, because it is busy producing the necessaries of life. For that very reason it is sustained, stimulated, and *paid by all.* It gives no more than it receives. Its interests are all identified with the growth of diversified society, organized, protected, enlightened, refined. In well ordered society each branch of honest industry is tributary to every other, and all are mutually dependent. For, to quote the words of holy writ: "the body is not one member but many, and the eye cannot say to the hand, I have no need of thee, nor again the head to the feet, I have no need of you. Nay much more those members of the body which seem to be more feeble are necessary and those members of the body which we think to be less honorable, upon these we bestow more abundant honor; and our uncomely parts have more abundant comeliness." There is necessity fixed in the nature of things that the greater part of men must be occupied with agricultural labor, or other forms of manual labor. Let the intrinsic worthiness and dignity of all such labor be recognized and honored; but, at the same time, let it be understood that with this labor is closely interwoven all the busy brain-work of the minority who, though they seem to stand aloof, are efficient partners in both the toil and its results. The correction of the false and substitution of true views respecting labor itself, is the first step in every wise and sincere movement for labor reform.

2. Next we have to study capital. It will serve for a general definition to say, *capital is that part of wealth which is actually employed in production.* Wealth is a broader term. Capital is a part of wealth. It is not synonymous with *money*, for money itself does not go into production. More specifically, *capital is the sum total of the products of former labor employed to provide shelter, protection, tools and materials for the processes of production and to feed and otherwise to maintain the laborers during the process.* This three fold classification of capital should be particularly noticed. There are the *instruments* of production—as land, buildings, tools and machinery—the *materials* on which labor is expended—such as wheat, iron, leather, etc., and also *houses, food* and *clothing* for the safety and support of the laborers while engaged in productive operations. The items last named are usually provided for by the

laborers themselves out of the wages paid them. *Wages* therefore represent this form of capital, whether paid in money or in rent and groceries and dry goods.

Capital is not *money* but *things* in one or other of these forms. What a manufacturer wants is not money but a steam engine and gearing and spindles and looms and cotton. Laborers look at their money wages only as means for procuring food and raiment and the protection of a home. Money is but the convenient instrument of exchange. The same money may go out of a bank in the morning, run around a busy circuit and get back in the afternoon. In its circuit perhaps, it sent a machine to the shop, and a load of wool to the mill, and a load of potatoes to the laborer's home, but it comes back just what it went out; money is nothing else, though its value is represented three-fold in as many forms of capital. So far as money has in itself real value it is a part of the products of former labor saved and set apart for this specific service in the exchange of products. So it is capital in the form of an instrument which aids production. Banking capital is thus a portion of the wealth of a community appropriated to this object. It renders a very important service. Yet the benefit it confers may all be resolved into the greater facility it furnishes for the transfer of values in the form of tools and machinery—materials and the means of sustenance—into one or other of which all capital must be brought in order to be made productive. The proper and legitimate business of a bank is to furnish just these facilities for the productive industry of the community in which it is located. When the banks of New York permit their funds to be absorbed in the gambling speculations of Wall street, they work mischief rather than benefit to productive industry. The wealth represented by their capital-stock is withdrawn from production. It forms no part of *capital* in the true sense of the term. They are for the time, so far, turned into nothing better than faro-banks, mere reservoirs of wealth to be played with and shifted from hand to hand at the turning of cards. Wealth so absorbed can by no possibility come into union with labor. It is of the highest consequence to the clear understanding of our subject that the term *capital* be held strictly to its technical meaning and that it be conceived of as existing mainly in the instruments, the materials, the wages directly or indirectly provided for the employment of labor. Apprehending thus the nature of capital, I must content myself with the bare statement of a few fundamental propositions laid down and illustrated at length by Mr. Mill.

1. *Industry is limited by capital.* Every increase of capital may give additional employment to industry. Industry cannot go beyond the limit of capital: it may not through lack of laborers come up to it. This recognizes the material dependence of these two elements, labor and capital. It says simply that the most stalwart or skilled laborer can do nothing till he has tools and materials and something to live on while he is working, i. e. capital. If he has acquired these by former labor, then is he owner of the needed capital, and in a sense independent. If he has not these he must wait the will and pleasure of some one who can come into partnership with him by finding these things for him to begin with.

2. *Capital is the result of saving.* To consume less than is produced is saving. Saving is simply laying up the difference between what one spends and what one earns—between wealth produced and wealth consumed. The amount saved and so added to capital may be increased by either consuming less or producing more, or both. There is no other source of capital.

3. *Yet capital, though the result of saving, is actually consumed in the very process of production.* The wealth saved goes at once into implements, materials and provisions for the daily wants of laborers, and there is subjected to consumption quick or gradual. It is withdrawn from all other possible uses. Investment for production and spending for enjoyment coincide in the first stages of their operations. Both begin with destruction of a portion of wealth. But in the spending the first is the final stage. In the productive investment a second stage is reached, when an equivalent of what has been consumed is returned with increase. Thus capital is kept in existence from age to age, not by preservation, but by perpetual repro-

duction. The greater part of the present capital of England was produced within the last twelvemonth. The growth of capital is like the growth of population. Every individual who is born dies, but in each year the number born exceeds the number who die. The population increases while the individuals pass away. So with capital; out of the productive consumption of one year comes a greater product available for the next.

4. *What supports and employs labor is the capital which sets it at work, not the demand for the completed product.* The *demand* for commodities determines the *direction* of labor, but not the amount of labor itself. That depends upon the amount of the capital devoted to the sustenance and remuneration of labor. One does good to laborers not by what he consumes on himself, but by what he does not so consume. This corrects the very common error that the lavish expenditure of the rich is a benefit to laborers. The destruction of wealth is in itself an injury or loss. The only qualification of this view needed is in the case of a class of rich persons, who have no disposition themselves to turn their wealth into capital. Their lavish expenditure may bring their wealth into other hands so that it may be used productively. The whole community, laborers most of all, are interested in the accumulation of wealth as capital. Saved and so employed, it is multiplying ever the the sum of comforts in the world.

It is very obvious that the principles stated confirm the general view with which we started, that the true relation of labor and capital is that of partners. We are prepared now in a few words to define the conditions most favorable to their harmonious union. They meet most advantageously in the same person, i. e. when the laborer is owner of capital enough to employ his labor. This brings both elements under the control of one and the same will, to be governed by one self-interest. All rivalry and antagonism is excluded, and according to the measure of his capital and his capacity, the man will multiply products.

But this adjustment cannot be made universal, because—

1. Such is the tendency of capital to increase, that the man will soon find in his hands a surplus, to employ which, he must either bring in another who has only labor to work under him, or lend it as capital to another independent worker, and so a distinction between capitalist and laborer is sure to begin.

2. But a great difficulty comes from the fact that the capacities and tastes of men differ greatly. Some efficient laborers lack managing skill and tact in saving so as keep and accumulate capital independently. Others peculiarly endowed in these respects, lack physical strength for labor. To some, manual labor is irksome, and they will seek exemption from it as soon as their increase of capital enables them to do so. Others find the care of managing business no less distasteful, and so put their accumulating capital into other hands. Then—

3. Many forms of production most essential to a state of highest civilization, must be carried on in large establishments which shall combine great capital, and great numbers and divers grades of laborers. The most economical division of labor can be secured only through such establishments.

Hence there is a strong tendency to a separation of the two elements, so that the capital will be the chief concern with some, and the labor with others. This disturbs the abstract equality and mutual dependence just spoken of. Perhaps with respect to actual increase, capital alone is most helpless; but in the meeting of persons to enter into contract, the capitalist has the advantage, because *he can live* on his capital without labor, but the laborer cannot live except he earns his necessary food by working with somebody's capital. Under the sway of short-sighted self-interest therefore, capitalists are inclined to use this advantage to domineer and oppress laborers I say short-sighted self-interest; for in the long run and in the broad view, such oppression reacts upon the oppressor. When laborers are held down to starvation wages, capital must be heavily taxed for the support of paupers, and in time there must come an insurrection which will make capital insecure. On the other hand the consciousness of dependence, tends to make laborers sensitive to the least real wrong and suspicious of wrong where none exists. Against their own true interests on both sides, the parties are thus led into a partial antagonism. The fact of these tendencies must be recognized. They are not so strong in our country as in England. Yet enough is apparent here to awaken thoughtful consideration. The problem is to guard the rights of both parties, so that they shall be bound by their natural common interest, in harmonious union with each other.

It is a hopeful sign that the minds of philosophers and philanthropists and practical working men and capitalists are just now intently engaged upon this problem. The surest way to reach the true solution of the problem is to enlighten the people generally respecting the elementary principles involved. By these both rights and interests are to be defined and when they are distinctly apprehended, both parties will be drawn by natural affinity into harmonious union.

We may deduce from the principles already stated three leading circumstances which favor the most profitable union of labor and capital.

1. First to be named is *the general distribution of capital.* I mean such a condition of things that the capital of a country shall be in many hands rather than few—that laborers themselves shall have some capital. Whatever in the social organization creates or sustains privileged claims is opposed to this and needs to be removed. Whatever in legislation or usage by the easy allowance of public opinion tends to create or maintain monopolies, is opposed to this and needs to be especially guarded against; if no hindrances are in the way on the one side and no special protection accorded on the other, the natural working of things on the principle of self-interest will secure a pretty general distribution of capital. The end will be promoted by all measures which encourage saving on the part especially of laborers. Savings banks such as New England has had and profited by for a century, or perhaps better yet, a government savings bank through a modification of the Postal Order system, on the plan now in use in England, will

be of great service in this matter. In large manufacturing establishments the stock may be divided into small shares and brought within the reach of the employes so as to induce them by their savings to become owners in part of the capital, and so entitled to dividends from the profits in addition to their wages. Such measures elevate labor and give it independence and also increase capital by devoting much wealth that would be spent to production. And capital thus distributed stimulates energy, developes talent, comes closer to labor, better defends itself and superintends operations by having in each operative an interested observer of both his own and others work.

2. A second circumstance to be considered is *the ratio of the whole amount of capital to the whole number of laborers, and the ratio of the increase of capital to the increase of labor.* This only recognizes the principle before stated, that industry is limited by capital, and every increase of capital demands increase of labor. No universal rule can be given for this proposition. It will vary somewhat, according to the circumstances of each country, and the spirit of its people. Here the age of a country must be taken into account,—its natural advantages—the general occupation of its people. In a new country, occupied by a thrifty people, capital increases faster than labor, and there we see always the highest stimulus to production. For all countries and all people, the general principle is that there should be labor enough to employ the capital, and capital enough to employ the labor. A perfect balance is perhaps nowhere realized. Yet if labor and capital are free, the flow of each under the law of competition towards an equilibrium is as natural as that of the waters of the ocean under the action of gravitation. In the order of nature undisturbed, there is provision for the steady increase of both capital and labor, in something like a defined proportion. There is no danger of a surplus of either for the whole world, nor for any one country, if only the passage is open for the outflow and inflow of either.

3. The third circumstance to be named is *the certainty that*

labor and capital shall each be made sure of a just reward. The partners join hands each for an expected reward. Men will not labor for nothing, nor will capital be put out in uncertain risks. To ensure this certainty of reward to each there must be—

1. Division of property, personal ownership in everything that can by labor be made an object of value and appropriated. Without this capital cannot be. On common property men will not labor except on the compulsion of force or stern necessity.

2. There must be also, security to all property rights by both prevalent moral sentiment and just laws, equitably applied and faithfully executed. Where governments invade or are weak to defend property rights, capital withdraws itself into secret places as hoarded wealth, and labor is stinted and reduced to the lowest degradation. It is a terrible mistake to suppose that existing wrongs under which labor suffers can be relieved by that greatest of all wrongs the invasion or subversion of the rights of property.

3. And once more, there must be for both capital and labor, perfect freedom, unrestricted by monopolies or special legislation of any kind. A special favor in these relations of labor and capital involves an infringement of freedom on one side or the other, and that is an interference with natural law—a hindrance to the best results. The world is opening its eyes after centuries of wrong and mischief, to the fact that the business of governments respecting these relations of capital and labor is simply to protect the rights of each and hold other things in even balance for the free working of natural law—to let both alone, giving neither any advantage—but both the utmost freedom. They are natural partners, and if not interfered with, will spontanesously seek each other as birds mate in the spring, for a happy, fruitful union.

There is not time, nor is this the place to discuss in detail, *measures* for the better harmonizing of labor and capital. I will, however, as we leave the subject, suggest a few thoughts which come as corollaries from our main proposition. It must be acknowledged that through greater facility for organization, through false views which have gained acceptance in the current usage of business, and through mistaken legislation in some things, capital has been unduly favored; it has the advantage and inclines to oppress labor. Laborers have some reason to complain and ask for relief. Justice and philanthropy require that every man who fears God and loves his fellow-man should consider the rights involved and lend a helping hand to the weak. But, admitting this, it is obvious from the views we have considered that any measures which directly increase the antagonism between the parties, any organizations which contemplate open war between labor and capital will only aggravate the evil and work damage to both sides—combinations of employers on the one hand, to set the prices they will pay—or of laborers, on the other, to agree upon what they will demand—and, in general, strikes and trades' unions are, in this light, positively mischievous. The great interests of both are common and the true relief must come from the better understanding of these common interests.

On the other hand, all measures which tend to increase the intelligence and promote the thrift and independence of laborers, and so inspire them with self-respect and confidence as they come into contact and union with capitalists, are helpful. Co-operative associations, which gather up the scattered capital of many laborers, to be used in the employment of their own industry, under their own management, may fitly be commended and encouraged. If capital has gained an advantage by special legislation, this is to be counter-balanced, not by special legislation to favor the other side, by attempts to fix the hours and the wages of labor, but by earnest united protests against all special legislation, by insisting on *freedom* as the fundamental law of productive industry. From the study of principles and the observation of facts within the range of my opportunities, I am convinced that prominent among the sources of wrong to labor, is the use of an unreal, ever fluctuating currency. The control of that whole matter has been in the hands of capitalists. They profit by it, not through its relations to legitimate productive industry, but through the chances and stimulus such a currency gives to speculation. Capital invested in real production, and labor, both suffer from it, but labor most of all, for in the ever recurring fluctuations, wages are slowest to rise and quickest to fall, and all the mischief of deranged industry touch the very seat of life with laborers. Honest capitalists and laborers are alike interested in urging by all practicable measures the connection of this crying evil. Freedom to work, and honest pay for honest work well done, is the universal maxim of wisdom for genuine thrift. The mischief is that thousands are studying and struggling all the time to thrive by the opposite rule, reaching on the one hand after the fruits of honest work, without rendering honest pay, and on the other, reaching after dishonest pay for dishonest work. The grand correction for this condition of things, is a more sacred regard on all hands to that great command uttered by Jehovah at Sinai, some four thousand years ago—"*Thou shalt not steal.*"

POULTRY RAISING—DIFFERENT VARIETIES.

BY S. H. SEAMANS, WAUWATOSA.

The rearing of poultry is of greater importance than people generally imagine, and should receive the care and attention it deserves, from every one undertaking this branch of domestic industry. The amount of eggs and poultry produced in this country is a matter of estimate only, as statistics in regard to it are very rare; but so far as we are able to give them they will astonish all who have given the subject but little consideration.

The *American Poultry Gazette* gives the following report of the quantity of eggs received in New York city for the year 1871:

Eggs received in New York City for the year 1871.

MONTH.	No. of Barrels,	No. of Dozens.	Average wholesale price.	Total value for the month.
January..........	11,709	761,085	24c.	$182,660 40
February.........	17,108	1,112,020	23	255,764 60
March	63,737	4,143,035	18	745,746 30
April	70,654	4 592,510	16	734,801 60
May	47,829	3,108,885	17	528,510 45
June.............	51,766	3,370,640	18	606,715 20
July	22,967	1,492,855	22	328,428 10
August	30,152	1,959,880	21	411,574 80
September	23,704	1,540,760	28	431,412 80
October	27,450	1,784,250	28	499,590 00
November........	29,264	1,902,160	30	570,648 00
December........	17,602	1,144,130	32	366,121 00
Total	414,034	25,912,210	....	$5,661,973 85

This does not include smaller packages and those brought in by marketmen and others residing in the vicinity of New York, which would undoubtedly swell the amount to over eight (8) million dollars in value. We may safely put down the live and dressed poultry at one-half of this amount, which would give us over twelve millions of dollars as the receipts of poultry and eggs for the city of New York alone.

A recent issue of the Chicago *Times* has an interesting collection of facts in relation to this important subject, from which we quote:

"In Paris, during the year 1853, it was estimated that 175,000,000 eggs were consumed, being 175 to each person, while the people in the provinces ate 350 eggs per head, during the same time."

A list of fifty-seven dealers in South Water and Kinzie streets is then given, with the actual number of eggs received by them during the year ending July 31, 1871, amounting in the aggregate to 4,662,500 dozen; to which the estimated receipts of all the other dealers—4,000,000 dozen—is added, making a very safe estimate of 8,662,500 dozen as the receipts of Chicago alone for twelve months.

The Hon. J. Stanton Gould, professor of agriculture at Cornell University, in an address before the New York State Poultry Society, February 7, 1872, says:

"We shall not go far wrong if we assume that the total value of eggs and chickens annually produced in this state (New York) is at least $4,000,000. But this does not supply one-half the consumption of New York city alone, which consumes $8,750,000 worth of eggs annually; the remainder being supplied from the western states. It is also estimated that the value of the poultry kept in the United States is $20,000,000; and that the value of eggs and chickens annually produced, and consumed in the United States, amounts to $100,000,000, or five times the capital invested."

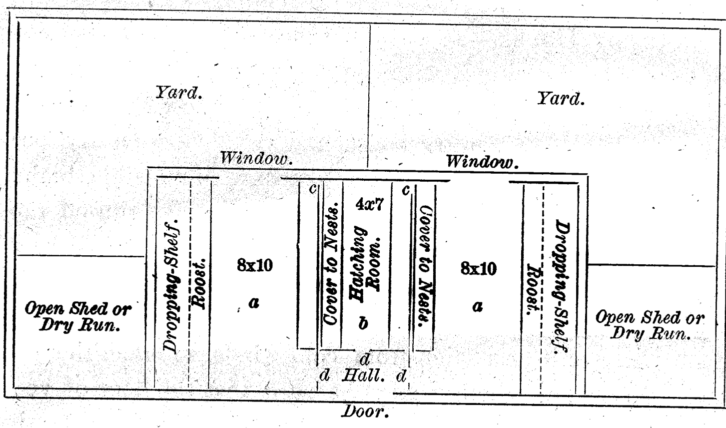
Large as these figures are, and wonderful as they may appear to us, they are doubtless below rather than above the actual amount.

Judging from what we see, in whatever direction we may go, a large portion of this enormous amount of human food is produced under adverse circumstances; Not one farmer in ten, on the average, having suitable accomodations for his poultry. Horses, cattle, sheep and hogs have comfortable and clean quarters, but poultry—when properly cared for, the most profitable of them all, for the amount of capital invested—are allowed to shirk for themselves, and in reality are considered a questionable source of profit, probably a nuisance. It is under such treatment, that the question "does is pay to keep fowls" is generally answered in the negative, and for the reason, that those who keep them in this way are entirely unacquainted with the proper care and management of them and only look upon them as a necessary evil to be endured, because the "women folks want them." Now my experience satisfies me that there is nothing in the shape of live stock reared on the farm, considering the outlay, that compares with them for profit.

In order to reap the greatest profit, they must be provided with the necessary accommodations for their health and comfort. The first requisite is a warm, dry, well lighted and thoroughly ventilated,

POULTRY HOUSE.—It need not necessarily be expensive, but should be arranged with special reference to convenience in caring for the comfort and health of the fowls. In selecting a site for your poultry house and yard, choose a dry location with a southern or eastern exposure if possible, higher than the surrounding ground, that the water may run off rapidly. A damp location will never do. The soil should be of a porous nature, either sand or gravel predominating. If the right location can be had at the south side of some building that will give it protection from cold winds, so much the better. Be the site where it may, be sure that the floor of your house is higher than the ground outside. Do not make the mistake frequently seen of digging down a foot or so in order to make it warmer. Better by far bank it up when the weather requires it. The floor of your house may be dry earth or gravel, or, if economy is not to be studied, concrete is still better. Of whatever material it may be made, the floor should be kept covered with dry earth, renewed weekly, or oftener, as strict cleanliness is absolutely necessary for profit and the well being of the fowls.

A house to accommodate, say fifty fowls—which is about the average usually kept by farmers—should contain at least 150 square feet, or three square feet to each fowl. It has been the experience of every one that has entered into the raising of poultry extensively, that fowls will do much better if in small flocks. Two flocks of twenty-five fowls each will prove more profitable than when allowed to mingle as one. The plan given below will be found very convenient, economical and every way desirable—susceptable of various modifications to suit location and requirements. The apartments *a a*, in the plan, will accommodate 25 to 30 fowls each. The smaller one, *b*, is designed for a hatching room, the nests being so arranged, that when a hen becomes "broody," the nest box can be turned to open into the hatching apartment, shutting her out entirely from the laying hens, without disturbing her.



Plan of a Poultry House.

The nest boxes should be twelve or fourteen inches square, and ten or twelve inches deep; they should be open at the top, and at one end, excepting a strip three inches high across the bottom end, to keep the eggs from rolling out. A shelf is placed in the petitions *c c*, near the floor, upon which the nest boxes are placed; a corresponding shelf is placed above to serve as a cover for the boxes. By this arrangement, they can be removed and scalded or lime washed whenever desired.

The roosting bars should be movable; placed fifteen inches or more from the wall, and ought to be at least four inches in diameter. Large bars add much to the comfort of fowls while at rest, and prevent in a great measure crooked breasts and frozen toes. Under all roosting bars place a movable shelf of sufficient width, and keep it constantly covered with dry earth, muck or plaster. The droppings should be removed every week, at least, and stored under cover outside of the hen house. Be sure and save them all, as there is money in them. The amount of the accumulation during the year, if properly saved, will astonish you, and in value is nearly equal to the best imported guano. When composted with muck and ashes, and applied to the corn hill at planting time, the increase of the crop will go far toward supplying your fowls with the corn they will require to carry them through the winter.

Thorough cleanliness must be insisted upon. The inside of the house should be lime-washed spring and fall. I have found a wash made from freshly burned lime, with one quart fine salt, one pint coal tar to the pailful, applied hot and well brushed into the cracks, very effectual as a disinfectant and destroyer of vermin. The yards and runs to each apartment must, in size and shape conform to the "lay of the land," and the ideas of the owner; but of course the more ground they can be allowed to occupy the better for the fowls. Fifty fowls should have not less than half an acre, unless the land is valuable and limited in quantity. The land may, however, be made to pay a good return by planting to plum trees, as the chickens will make short work of the curculio, thereby ensuring generally a full crop of excellent fruit.

A seven-foot fence will confine most varieties; the lower three feet should be tight boarded, this will prevent cocks fighting each other through the fence, and also protect the fowls in a great measure from the high winds.

An open shed adjoining each apartment, under which the fowls can run and be protected, and at the same time have plenty of fresh air during stormy days, will be found a great acquisition, and will add much to their comfort. Under this shed may be placed the dust bath, which all fowls delight in; a heap of ashes and road dust, with an occasional sprinkling of sulphur, answers the purpose well.

FOOD.—Fowls like a change of food. The greater the variety the better they seem to thrive. With variety, should be system in feeding. In the feeding of grain, I approve the use of a feeding hopper, and keeping the grain constantly before them. I am aware this is contrary to the advice of most writers on poultry, but after several years' trial I am convinced it is the better way, being more economical, by saving waste of grain. It is better for the fowls, as they will never gorge themselves, as is frequently the case when they are fed from the hand; and it is particularly convenient for feeding mixed grain, as it allows them to select that which suits them best, and to eat at their leisure. The feeding hopper is also a good arrangement for fowls running at large—if kept supplied with a variety of grains, and placed where they can have access to it at all times. Even with a supply of grain, fowls relish a change to soft food, and this should be fed to them every morning; middlings and bran, mixed in equal portions, to be fed when eggs are in demand, and corn and oats for fattening and for growing chickens. All soft food should be mixed up thick or "crumbling" as it can be conveniently with water. It may be improved, particularly for growing chickens, by mixing with milk—sour or sweet. In cold weather mix and feed it warm; and an addition of mangolds or potatoes, boiled and mixed with middlings or ground feed, is highly relished, particularly during the winter. In the spring add a quarter of a pound of sulphur to a pail of soft feed; giving this to the fowls once each week is very beneficial and does much to ward off disease. Give sour milk to drink, when it can be had, winter or summer.

Fowls that are confined to their yards should be allowed their liberty towards evening, to range for choice morsels that cannot be found in their pens. This can be done without any detriment to the growing crops, as they will confine themselves to picking up the stray grubs and insects, that the crops can spare as well as not, while "biddy" is made happy. Gravel *must*, at all times, be accessable; fowls must have it, in the shape of sharp stones, broken crockery, shells, or something of this nature, as upon it they must depend exclusively for the proper grinding of their food.

A supply of dried grass, or rowen, should be provided in the fall for fowls to pick at during the winter. They like it exceedingly, and will eat a good deal of it. This is a cheap method of supplying them with green food during a season of comparative scarcity. It may be fed from a rack made for the purpose, or tied into a snug bundle and hung within their reach.

Whatever the feed of fowls may consist of, let it always be sound in quality, if you would keep them in good health, and have good flavored eggs. Better bury your musty or spoiled grain, than force fowls to eat such trash; remember, that when you are cheating or neglecting your fowls, the loss is yours. It is equally necessary that they should have pure water to drink within their reach at all times.

How can my present stock of common fowls be improved? This is an important question. The answer is, by always saving those for breeders that combine the desired characteristics in the greatest degree, and keep up this selection from year to year, rearing chickens from the best only. To hasten the improvement, procure a cock from some strain of pure bred fowls, that possess in the greatest degree the qualifications you aim to secure. It is always desirable to use only pure bred cocks, if improvement is to be attained speedily. A cross of the large breeds upon common stock will produce chickens at the first cross, attaining nearly the size of the pure breed; also in the increase of the production of eggs, by crossing with a breed of good layers, the improvement is visible in a marked degree at the first cross. Right at this point is where many meet with failure in not continuing to breed to pure bred males, thinking that a fine looking half blood, possessing all the outward indications of a pure-bred, will answer every purpose; whereas the half blood pullets should be mated to a pure bred cock of a different strain from the first one, or the improvement will soon be lost.

One of the best varieties to cross with for increasing the production of eggs is the White Leghorn, and particularly so if your flock of hens have size. The Houdan also makes a desirable cross, both as regards the production of eggs and flesh. But be the cross ever so good, one essential point will still be lacking that will take away a large amount of interest that would otherwise be taken in them, which is uniformity. While a flock of cross-bred fowls would hardly be noticed by any one not directly interested in the profit and loss account therewith, the flock that is pure-bred, uniform in size and markings, bred to a standard, will always attract attention; the owner will take pleasure in "showing them up," give them better care, and as a natural consequence, find them more profitable, even though it be a variety possessing naturally only ordinary merit.

We have not deemed it advisable to go into statistics to show the profit in keeping and rearing poultry, as it varies largely under different circumstances. It may however be put down as a safe rule that a hen that will not afford a net profit of one dollar per year is either not worth keeping or is poorly cared for; while we may note fifty to one hundred per cent. more than this as a fair average profit. That the improved breeds are more desirable as well as profitable to keep than ordinary mongrels there can be no question. Among the common "dunghill" there can be found individual hens possessing merit, but they are not plenty, and will not compare favorably with the improved breeds, either in the number of eggs or quality of flesh produced, while the pure bred fowl will average equal to the best selected mongrel, and have the additional value of uniformity in quality and appearance.

WHAT BREED IS THE MOST PROFITABLE?—This question, often raised, is still unanswered, and probably never will be, to the satisfaction of all, as no one variety possesses all the requisites of a perfect fowl. Much will also depend upon the accommodations provided; whether the range is limited or wide; whether eggs or birds for the table, or both, are wanted.

Poultry men all have their favorite varieties, and vary as much in their opinions as do those engaged in any other branch of business. In giving a brief description of the varieties that have come under my observation during the past ten years, I will enumerate their qualifications, based upon experience, and if it is at variance with the experience of others equally or better versed than myself—as will undoubtedly be the case in some instances—they will bear in mind that results in poultry breeding vary under different circumstances.

Leghorns.—We place this breed at the head of the list. There are several sub-varieties varying from each other little, except in color—but our preference is for the white variety, as more attention has been given to their perfect breeding than the others, the Dominique, Blue, Red and mixed or splashed. They are a good table fowl, medium size, very hardy, in fact will endure as much hardship as any fowl we have. They are great layers of medium sized eggs, equalling in number any other variety, not excepting the famed Hamburghs, while their eggs are larger than those of the Hamburgh. Their characteristics are pure white plumage, yellow legs; face, wattles and comb, bright red; ear lobes, pure opaque white; the comb of the cock standing perfectly erect, while that of the hen falls over, sometimes covering one side of the face. They are known as a non-setting variety, but occasionally one shows a desire to set, but can be easily broken up; if allowed to set, however, will generally do well, and take excellent care of her brood. Chickens are very hardy and will feather quicker than any other variety; mature early; cockrels will crow under six weeks from the shell; pullets with good care will lay at four months of age. I consider them one of the very best varieties ever introduced. Though originally an imported fowl, the care with which they have been bred in this country for several years past, has given our present strains the distinction of being an American breed, and they have become so popular that several exportations have been made to England.

Dominiques are another "Yankee production" and are deservedly a very popular variety, and becoming more so every year, as their good qualities are better known. Their plumage is a light ground, shaded to a soft, slaty blue; legs yellow or dusky yellow; combs are either double or single, though the preference is generally given by fanciers to the rose comb. They are decidedly a farmers' fowl, being good layers, setters and mothers; above the medium size; very plump, full breasted; easy keepers, good foragers, and very hardy. Chickens mature early, and are always in good condition to kill. Taken all in all, they come as near being a perfect fowl as any we have, and are fast coming into general favor.

Black Spanish.—This variety is too well known to need any comments. As layers of large, white shelled eggs, they are not excelled; comparatively hardy; of beautiful metallic, green-black plumage, and stately carriage. They are favorites with many, but we consider them much inferior to White Leghorns.

Hamburghs.—Where eggs are desired, without regard to size, Hamburghs will fill the bill. Their eggs are small, requiring nine or ten of them and sometimes more to weigh a pound. They are very ornamental, under medium size, non-setters; chickens tender and rather difficult to rear, but when grown, very hardy. There are several sub-varieties, known as Silver-spangled, Silver-penciled, Golden-spangled and Penciled and Black. The Silver-spangled are generally considered the most beautiful, while the Black are the largest, and laying the largest eggs, are by many considered the most desirable.

Polands may be classed as an ornamental as well as useful fowl. There are also several sub-varieties of this breed, known as the White, White-crested, Black, Silver-spangled and Silver-penciled—all of which are beautiful birds, and first-class layers, but seldom desiring to set. The preference is generally accorded to the White-crested Black variety.

Dorkings are the fowl of all England, and with Englishmen are a great favorite. There is no question, but they are a fowl of great merit, being among the best of table fowls; of large size; maturing young; easy keepers; good layers of fair sized eggs, and first class as setters and mothers. The principal sub-varieties are the White, Gray, Silver-Gray and Speckled; the Grays and Speckled are the largest, and rather more hardy than the Whites. They should all have white legs and feet with five well formed toes on each foot; may have either single or rose combs, though preference is generally given to Grays with single, and Whites with rose combs. We do not hesitate to recommend them as a valuable farm variety where they can have plenty of range.

Game Fowls—No variety of the poultry kind, has been bred with more enthusiasm than Game fowls. They are supposed to be the most ancient of all domestic fowls, and of all breeds, are considered the most perfect and beautiful. As a table fowl they stand at the head of the list; are only ordinary layers, but the best of setters and nurses, and will defend their brood against all intruders. They are not, however, a desirable fowl for general use, owing to their pugnacious disposition; the young cocks keep up a continual warfare with each other in preference to preparing for the gridiron. The most popular varieties, are the Black Breasted Red, Brown Breasted Red, Duckwings and Pyles; these are generally the "Cup-birds" at the English exhibitions. There are also sub-varieties of the above, too numerous to mention in this article. All however possessing very similar characteristics.

Houdans are without doubt the best of all the French varieties introduced into this country, and are certainly a great acquisition. In an experience of five years with them, have never known one to show any sign of a desire to incubate. As to their good qualities, I cannot do better than copy from the description of Lewis Wight, in his valuable work on poultry; a book which should be in the hands of every breeder and lover of fine fowls. "This fowl, in many respects, resembles the Dorking, and the Dorking blood has evidently assisted in its formation. We believe that a cross between the latter and the White Poland would not be wide of the mark. Houdans have the size, deep, compact body, short legs and fifth toe of the Dorking, which in form they closely resemble, but with much less offal and smaller bones. * * * * In weight, the Houdan is pre-eminent among the French breeds. We feel certain that by breeding for this most useful quality, the fowl may be reared to a greater weight than even the colored Dorking. Imported (from France), Houdans frequently want the fifth toe, evidently derived from the Dorking; and it might at this early period be easily bred out. * * * We have in this breed the size, form and quality of the Dorking, with earlier maturity. The hen is a most prolific layer of good-sized eggs, which will almost invariably be found fertile. The chickens feather rapidly, but are nevertheless exceedingly hardy, perhaps more so than any except Cochins or Brahmas (and White Leghorns), and therefore are easily raised with little loss. They are emphatically the fowl for a farmer, and will yield an ample profit on good feeding, both in eggs and flesh." I will only add, to cross with common fowls, the cocks cannot be surpassed, and particularly the cross with Brahma hens, which will result in a fowl of rare excellence.

Brahmas—Light and dark varieties are the most desirable of the Asiatics, as well as the most valuable of the many varieties yet introduced. Except in marking they are very similar in their characteristics. While, as a mere matter of fancy, we prefer the *dark* variety, others, for a similar reason, prefer the light. They will bear neglect, confinement, and being heavily feathered can stand the cold better than any other fowl. Early hatched pullets, with good care, will furnish a bountiful supply of eggs through the winter; in fact, as winter layers, no breed equals them. As a table fowl we prefer them to the Cochin, but they are not equal to the Dorking, Houdan Dominique and some other varieties. For early market chickens they are unequaled by any for profit.

Cochins—May be called the originators of the mania, or "hen fever" that raged from 1847 to 1850 and '51, when fortunes, almost, were spent in procuring them. Even within the past two or three years, larger prices have been paid for birds of this, than any other variety—over three hundred dollars has been paid for a single trio, consisting of a cock and two hens—and yet the introduction of this class of fowls has been of immense value to the poultry stock of the country, for wherever there has been an infusion of this blood a great increase in the size of the progeny has been the result. The mania, absurd as it undoubtedly was, has done good service by awakening a more general interest in the whole subject of poultry.

That Cochins have real merits does not admit of a question. They are hardy; chickens easily reared, though slow in coming to maturity. There are four varieties of them, partridge, buff, white and black—all having the same general characteristics, varying only in color. Our preference, however, is for the partridge color, owing to having had better success with them, and their plumage not fading like the buffs. Cochins are, however, inveterate setters, it being very difficult to break them up when once they get fairly "stuck" to the nest.

Bantams are the most beautiful of the poultry kind, and are an admirable acquisition to the list of pets. Though their eggs are small, they lay a large number. We look upon the game varieties of Bantams with the most favor, as embodying the largest amount of impudence in the least compass, which seems to be the great aim of their existence. The varieties are the same as of the larger game. Of all varieties of Bantams the productions of Sir John Seabright stand first; showing what may be accomplished by close and prudent application to the principles of "breeding for a purpose."

Ducks.—Few farmers realize the value of a good variety of ducks upon the farm. With a good range, and a running brook ducks can be reared cheaper, pound for pound, than any other meat. We would select either the Rouen—a gray duck of French origin, or White Aylesbury—a white duck of English origin. Birds of these varieties weigh eighteen to nineteen pounds per pair at maturity. Our preference is the

Rouen, as they are more hardy and mature with me sooner than the Aylesbury. Under different circumstances the case might be reversed. In plumage, the Aylesbury certainly has the advantage. Ducks should never be allowed to lodge in the same house with the chickens, but should have a separate apartment with a stone, brick or cement floor if possible, which should be frequently washed "down." Ducks should always be shut in their house at night during the laying season, as they lay their eggs in the morning, and frequently drop them in the water while swimming, if this precaution is not taken.

The Black Cayuga duck is considered by many equal to the above named varieties, but such has not been our experience.

TRANSPORTATION OF EGGS FOR HATCHING is now attended with good success when properly packed, affording a cheap and convenient method for disseminating pure-bred and choice fowls to any part of the country. We have known hundreds of instances where eggs have been sent over a thousand miles by railroad, and hatched a large percentage. In fact, some of the best breeders of this country take this method to procure the best blood to be found in England, to improve their stock; eggs frequently hatching as high as seventy-five per cent. after crossing the ocean. Of course there is risk in it; so there is in hatching eggs procured on a farm; failures are of frequent occurrence there also. The outlay is however not a large one, and if you get eggs from a reliable breeder and from the same stock he breeds from himself, you stand an equal chance of getting the best birds.

We look upon the improvement of our poultry stock as yet in its infancy, and hope to see an increase of interest in this department at the fairs of our agricultural societies. Whatever variety you breed, keep it pure and strive to excel; exhibit your birds, and compare notes with other breeders, thereby getting "posted" upon the points and requirements for a first class fowl. We trust too, our State Agricultural Society will give this department better accommodation in the way of a building in which to exhibit the stock, and also in the selection of judges. There is little encouragement, for exhibitors, if judges are selected who know nothing of the points of a pure bred fowl and the requirements of the standard, or are forced for want of time, to judge hastily, and often incorrectly.

PLANTING AND MANAGEMENT OF AN ORCHARD.

Lists and Description of Varieties adapted to Wisconsin.

BY G. P. PEFFER, PEWAUKEE.

In selecting the site for an orchard the first and most important things to be considered are the *character of the soil, exposure and shelter.* Much of the success of the investment depends upon these points.

The soil best adapted for the purpose is what is called a vegetable mould, composed largely of decayed vegetable matter mixed with sand or gravel and some clay. Good depth of soil is also necessary. The subsoil may be either of sand, gravel or clay, or a mixture of these, but should be naturally porous or made so by subsoiling and under-draining. To get healthy, productive trees we must secure a thorough ripening of the wood before the heavy frosts of fall come on, and on this account we should avoid a retentive subsoil. Where the subsoil of the whole farm is composed largely of clay, select the highest and dryest land, where the surface may be the most thorough drained, either by ridging up, subsoiling or a system of under-drains, or by all these methods combined. On our prairies, as a rule, the dryest and poorest soil is the most suitable for an orchard, while in the "openings," the dryest and richest should be selected. Where the lay of the farm and the make of the soil is such as not to admit of either surface or under-draining, the land wet, with a stiff clay underneath, subsoil as deeply as possible—at least sixteen or eighteen inches—and by repeated plowings throw the surface up into narrow ridges, so that descending each way from the rows of trees the surface water will run off readily.

EXPOSURE—The general rolling character of the surface of our land will in many instances enable us to secure a variety of exposures. The experience and observation of the writer have convinced him that the north, northeastern and eastern slopes are the best for the apple orchard; the next best a west, northwestern; The third best a perfect level, and poorest of all a southern or southwestern one. In the timber the orchard is best located where the land has been cleared and opened to the east or north. When the site is protected by timber or natural shelter, it should be on the south, or still better, on the southwest side. As our timber and groves are fast disappearing the only safe way is to locate, whether in timber, prairie or openings as has been mentioned above, choosing the slope that under the circumstances is the best suited to our trees.

SHELTER—If there is no natural wind-break or protection one should be supplied. A double row of evergreens or a triple row of forest trees,—those best adapted to the locality—may be used to good advantage. These will usualy prove sufficient. It is also a good plan to put an occasional row of evergreens—or to scatter them promiscuously—through the orchard.

VARIETIES ADAPTED TO OUR CLIMATE.—As Wisconsin is situated between the 42d and 47th parallels of latitude varieties for the northern portions of the state must be limited to the very hardiest sorts of Siberian Crabs and their crosses, Russian apples and a few sorts that resemble them in hardiness; but as that part of the state is not yet well settled and much of it will remain undeveloped for many years to come I will only recommend the varieties that have proved desirable as far as tested in the southern part of the state. Of these I can speak from personal experience, having been for over thirty years an experimenter and close observer in all things pertaining to fruit and horticultural interests in this state.

The climate with us is extremely changeable, and once in about seven years we are visited by a Siberian winter, when the mercury ranges for days, and sometimes for weeks together, from twenty to thirty degrees below zero. In some parts of the state these sudden and extreme changes occur much more frequently than in others. Apple trees that have become thoroughly acclimated where the new wood has fully matured, will pass through these changes with little or no injury; but when brought from a warmer locality, or when the variety is tender, or if hardy, and the new wood has not ripened thoroughly, they will be more or less affected, and often killed by them. Varieties originated and matured in a cold climate will be naturally more hardy and will withstand the extremes of heat and cold better than those raised farther south. If the tree is out of its latitude, and not perfectly hardy, its wood will be affected by severe freezing and sudden changes in proportion to the hardiness or softness of its wood growth. This will be readily seen by the color of the wood on cutting off a limb; when fully acclimated all the wood will be white; but when tender or half hardy the growth of the season when it was injured will be discolored. In this way we can easily ascertain what varieties have been injured, and in what years it was done.

In the following lists the varieties are classified in accordance with this rule. They are arranged in three classes: the *Iron Clads*, or those not affected by the severe winters of 1856–7 and 1864–5; the *Hardy* where the wood growth of those years is colored, but covered with healthy, new wood and fully recovered from injury; and the *Half-Hardy*, those affected and not fully recovered, as is indicated by their still bleeding from the old wood where a limb is cut off, even though paint or wax is applied.

Iron Clads.—Tetofsky, ripening in July; Red Astrachan, July–September; Duchess of Oldenburg, August and September; Alexander, September–December; Transcendent, Allen and other crabs, September and October; Fameuse, October–December; Smith's Cider, November–January; Pewaukee and Golden Russet, December and January.

Hardy.—Early Joe and Fourth of July, season July; Sour-Bough, Early Strawberry, Sops of Wine and Fall Cranberry, season August; St. Lawrence, Fall Stripe and Summer Pennock—September; Fall Orange, Fall Wine, Bailey Sweet and Perry Russet—October; Blue Pearmain, Willow, Utter's Red and Tallman Sweet—November; Westfield Seek-no-further, Northern Spy, Ben Davis, Yellow Bellflower and Sweet Winter Wine—December; Rawle's Jennet, Romanite, Winter Wine Sap, Green Everlasting and Walbridge—January.

Half Hardy.—Carolina Red June, Early Harvest and Summer Rose, season, July; Golden Sweet, Sweet Bough, Summer Queen and Jersey Sweet, August; Hawley, Lowell, Fall Strawberry, Porter and Maiden Blush, September; Cayuga Red Streak, Fall Greening, Colvert, Gravenstein and Twenty-Ounce Pippin, October; Rambo, Milam, Newtown Spitzenburg, Dominie, Rome Beauty and Pryor's Red, November; Baltimore, Bethlemite, Jonathan, Red Winter, Pennock and Wagner, December; Green Newtown Pippin, Black Gillflower and Grimes' Golden Pippin, January.

Nearly all apples ripening in January will, with proper care, keep until June, and those ripening in December will keep into February and March.

If varieties in the hardy list are desired, they should be double-worked on iron clad varieties; in this way they will become a No. 1 stock, which will stand all the freezing in this latitude. The varieties in the half hardy list will do well where top worked on iron-clad and hardy trees.

In favorable locations, some of the old, eastern favorites, hitherto regarded as too tender for our climate, will do well if top worked on our iron clads. Of these I will mention the following: Baldwin, Esopus Spitzenburg, Rhode Island Greening, Roxbury Russet, King of Tompkins County and Ortly.

Selecting Trees.—Great pains should be taken in selecting the trees, as success in a great degree depends upon getting those of the first quality. For this reason we would advise those wishing to buy trees, to go to the nearest nursery, or to send to a reliable dealer who raises his own stock and is located in a climate corresponding with that in which the trees are to grow; make out an order specifying the age, size and varieties desired, instructing them to give as many roots on the trees as possible, and to take special care to prevent them from getting dry or broken. The best way is to go yourself and select the thriftiest, best formed, two or three year old trees, as they will suffer less from digging and handling, and will bear the change from the nursery to the orchard better than larger and older trees. They can be dug more easily and will have a larger proportion of roots taken up with them than where they have stood longer in the nursery row. These trees should be stocky, well branched, with low heads—say two feet trunk for the prairie, three to four for the openings, and three to six for the timber.

For the timber and openings, good two or three year old trees with a straight body of the desired length without branches, are to be preferred, for on setting out we can cut back the shoot to the point where we wish the head to form. Low heads are the safest, but in the timber the bodies can be left longer as the force of the wind is more or less broken, and before the protecting timber is all cut away the trees will usually have sufficient strength and shade to withstand both winds and sun.

When the trees have been selected, dug and labeled, they should be securely packed for shipment. The roots must be carefully protected with wet straw or marsh hay to prevent them from becoming in the least dry in transportation. On reaching their destination they should be placed in trenches, already prepared, each variety or bundle by itself, and the roots be covered thoroughly so as to shield them from the air and sun. Here they are to remain until they can be set out in the orchard.

Setting out the Trees.—The ground for the orchard should be selected the preceding fall, and plowed deep and well—if subsoiled, all the better—leaving the dead-furrows in the line and just the distance apart we want the rows of trees to stand, say twenty feet north and south. This land should be cross-plowed in the spring, a short time before the trees are to be set, leaving the dead-furrows where the east and west rows of trees are to be—say 17 1-3 feet apart, as this is the proper distance where the trees are to be set 20 feet apart each way, in the quincunx form. These dead-furrows save digging part of the holes, and also make it much easier to lay out the rows in proper order.

Before setting out the trees drive rows of stake or fence pickets to guide in setting, and to be left standing for protection to the bodies of the trees from the noon-day sun, summer and winter, and from injury in the after cultivation of the land. Commence setting these stakes in the first furrow, placing one at each point where the dead-furrows intersect; in the second row, where the quincunx order is adopted, they should stand at the highest point of the ridge thrown up by the cross plowings. In this way lay off the whole field to be planted with alternate rows on the ridges and in the furrows, being careful to get them perfectly straight.

The trees are to be set two inches north of the stakes, and, of course, the place where they are to stand, must be prepared in a suitable manner. On the ridges, holes must be dug of sufficient size to permit the roots to be spread out straight, and in a natural position, and deep enough so that when they are covered they may stand a few inches deeper than when in the nursery, but be careful not to set them too deep. In the furrow, prepare a soft bed of well pulverized surface soil for the roots to rest upon, filling in or lowering as may be necessary to bring them to the proper position with reference to the surface when finished. When everything is in readiness for setting, take the trees, each variety by itself, from the trenches where they were heeled in. Before they are distributed to the hands engaged in setting, "puddle" them. This is usually done by dipping the roots into a mud hole made for the purpose near the trenches.

The different varieties should be kept in rows together, and it is well to place the earliest ones nearest to the house.

When the tree is in position, the roots straightened out and equally distributed, fill in with fine dirt; as the roots are still wet from the puddling much of the earth will cling to them. When well covered, press the soil down closely around the body of the tree with the toe of the boot; fill up to the proper depth and level off the surface, leaving the soil at the top loose. On low ground, where the surface water will not pass off readily—especially in the rows set in the furrows—the earth should be thrown up towards the tree until the surface slopes gradually from each row. This can best be done with a plow—making narrow ridges and throwing the earth towards the trees set in the furrows. The trees are now set, but if the soil is light and sandy they should be kept well mulched throughout the season.

In some locations the ground cannot be prepared in this manner, but the holes must be dug with a spade. When this is the case, stake out the orchard into rows at the required distances apart—say twenty or twenty-four feet, in either the square or quincunx form—dig the holes two or three spades deep, and about three feet in diameter, throwing the surface soil one side and the subsoil the other; set the stakes in their proper place in the holes, and with the surface soil make a mound in the hole for the roots to rest upon, sufficiently high to bring them into their proper position with reference to the surface, and proceed with the setting as mentioned before.

After Management.—If we want a good orchard the land should be kept under cultivation—with hoed crops—until the trees come into full bearing, and in the growing season the soil around the trees should be kept loose, the same as with a crop of corn or potatoes. In the fall a small mound of earth should be made around each tree and then mulched. As soon as convenient in the spring spread out the mulch and mound again; do this each year until the trees are of bearing size, when a permanent mulch may be applied.

In heavy soil, mulching small trees during the growing season tends to induce late growth in the fall, and sometimes causes a new set of roots to start out near the surface. These roots are tender, and unless promptly removed will be killed and the tree injured. When a mulch has once been applied to trees, whether old or young, it should be kept up, as it tends to draw the roots to the surface, where, if the protection is removed, they are easily affected by the hot, dry weather of summer and the severe cold of winter. No crop should be raised in the orchard when the trees come into bearing unless the ground is heavily manured, but if not mulched the cultivation should be kept up.

TRIMMING should always be done during the growing season, and when the trees are yet small. Where the head is kept open in forming, and the top well balanced by pinching back the branches, but very little pruning will be required after the few first years.

By following the above method and the use of good practical common sense, almost any farmer can make the orchard profitable. In some localities the conditions are more favorable than others, but there are few places where the obstacles cannot be overcome by careful attention to the points mentioned.

I will add a description of some of our hardiest varieties.

Tetofsky.—This is one of the earliest varieties, and the best suited to our climate. It, as well as the Duchess of Oldenburg, has been sold at high prices all through the country, as a large Russian crab. Mr. Charles Gifford, of Milwaukee, Secretary of the Western Fruit Grower's Association, in early days, sent samples of this apple in connection with Hyslop Crabs to the exhibitions of that society in 1851–6. Some nurserymen got hold of it, and losing the labels called it a Russian Crab. It is Russian in its origin, but does not belong to the crab family. The fruit is quite small with us, but is larger in size when it matures further north. Here it ripens about the first week in July; at Stevens Point it is nearly a month later. There are several old trees of this variety around Milwaukee, which have given the best of satisfaction. The tree is vigorous when young, upright, hardy and productive; wood light brown; leaves broad, pale or light green color, and a little re-curved. The fruit is in size small to medium, round, flattened, and somewhat conical; surface smooth, yellow striped, splashed carmine and white bloom; flesh yellowish white, fine grained and juicy; flavor acid, quality good.

Red Astrachan.—This is another Russian apple which has proved very hardy in this section. The winter of 1864–5 which injured many varieties so called, did not discolor the wood. It yields bountifully, and the fruit is of first-rate quality for cooking and for market, and is free from the scabs that in some seasons affect many of our early varieties. Season, July and the first part of August.

Duchess of Oldenburg is also a Russian variety, and has proved very satisfactory wherever it has been tried in this state. The tree is medium sized, round headed, sufficiently vigorous and perfectly hardy. It has passed unharmed through all our cold winters for thirty years; and, as far as is known, seedlings from it possess the same characteristic hardiness. Fruit medium, regular, roundish oblate; surface smooth; color waxen yellow, partially covered with distinct and regular stripes of red and carmine, often having a light bloom all over it; basin regular, wide; eye large and closed, cavity, regular, acute; stem, medium to long, rather slender; flesh white, tender, juicy, sour. It is a good cooking apple, and looks well. Season, August to middle of September.

Fameuse.—This variety is supposed to have originated in Canada, and is highly prized throughout the state, as a long test has proved its value. The winters of 1856 and 1864 reddened the new wood to some extent, but did not injure the older wood or the bodies of the trees. Tree vigorous, productive; shoots red, with abundant, dark green foliage; fruit medium, roundish oblong, regular; surface yellowish white, nearly covered with deep red where exposed to the sun, but striped in the shade, and some without a splash of red on them;

DUCHESS OF OLDENBURG.

dots small; basin medium, regular; eye quite small and closed; cavity wide; stem rather slender and short; flesh snowy white, very tender, fine grained, juicy; flavor sub-acid, mild, delicately aromatic; quality good; a dessert fruit and good for cooking and market; sometimes becomes scabby, especially at the south. Season October to January.

Golden Russet.—The variety disseminated under this name in Wisconsin is supposed to have been sent out by Barry, of Rochester, N. Y. The winter of 1864 did not injure it, but that of 1856 colored some of the wood. It is described as follows: Tree thrifty, vigorous grower, spreading, productive, a rather early bearer; shoots slender, olive, speckled; fruit medium, round, large ones are oblate, often cylindrical, sometimes inclined, regular; surface greenish yellow, covered with thick russet; dots minute, white, scattered; basin regular; seeds small, flat; flesh greenish yellow, breaking granular, juicy; flavor sub-acid; quality good to best; use table and kitchen. Season from January to June.

Tallman Sweet.—This is considered one of the best varieties of hardy sweet apples. It is very productive and is a general favorite with us. Although the wood was badly colored by the severe winter of 1856, and somewhat in the winter of 1864, yet it has fully recovered, and still holds its own. On this account it should not be on the list of the "first five," and never should be classed as Iron Clad, as many of our nurserymen now term it. We think there are hardier and better sweet apples for Wisconsin. For baking and stock feeding the Tallman Sweet is considered one of the best, yet we regard the Bailey Sweet and Sweet Pear as better for home use. Fruit medium to large, regular, nearly round, somewhat flattened; surface smooth, yellow; dots minute, dark; frequently a distinct line of green on one side from stem to the eye; basin wide, regular, leather-cracked; eye small, closed; cavity rather wide, regular; stem medium size, long; seeds numerous, plump, dark; flesh yellow, breaking firm; flavor sweet, rich; quality good; season November to February.

Smith's Cider (erroneously called Plumb's Cider,) originated in Bucks county, Pennsylvania, and has proved as hardy in our state as the Russian varieties already mentioned. Judged by the test on which the preceding classification was made, it should be placed with the Iron Clads; we have assigned it the third place in our list.

*Plumb's Cider.**—So named by our State Horticultural Society, but pronounced by Dr. Warder as identical with Smith's Cider. This is a good market apple, and is used mostly for cooking purposes and for cider. It has a peculiar spicy flavor, not agreeable to all tastes, and if used with some other variety, makes the best of pies and sauce. Tree vigorous, hardy, productive and early bearer; limbs straggling; shoots rather slender, light olive; foliage large, light green; fruit medium to large, round, varying from flattened to elongated, nearly round, sometimes lop-sided; surface smooth, pale yellow, covered with mixed light red, splashed indistinctly with bright carmine, beautiful; dots distinct, large, light gray; basin shallow, wide, somewhat plaited; eye small, closed; cavity acute, regular, brown; stem rather long, variable; seeds numerous, plump, pointed; flesh white, breaking, juicy; flavor acid or sub-acid, aromatic, peculiar; quality good for cooking and for cider; season, November to March.

All things considered, this variety will give good satisfaction in this state.

Alexander.—Although this variety was taken from the list recommended by our State Horticultural Society at the winter meeting of 1870, by the vote of a small majority of the members present, it has many friends. Those who voted to remove it from the list were invariably located in sections where the soil is light and sandy; which alone will account for its rejec-

* This description is evidently the one usually given for Smith's Cider as known at the east, and as there is still some doubt in regard to the identity of the two varieties, it seems advisable in this connection to insert the description given by Mr. Plumb, who introduced the variety in question into this state:

"PLUMB'S CIDER.—Resembles the St. Lawrence tree, but more vigorous, great bearer, very hardy and productive; fruit round, slightly oval, medium sized, red striped; stem slender, in a very narrow, deep cavity; calyx, small, closed, slight basin; core open; seeds many, small, long ovate; flesh, white, tender, brisk, sub-acid; excellent cooking and eating. September to January. Has been cultivated in the west for the last seventeen years, supposed to be an old variety by some, but has not yet been identified."

tion, as a heavy, limestone soil is much more favorable to the character of the tree. On light soils the fruit drops badly and is not of as good a quality, but on heavy land it hangs on well and comes to maturity. It is a Russian apple, and is much admired by many on account of the size and beauty of its fruit and for its market qualities. There was not the least discoloring of the wood in the severe winters of 1856 and 1864, and we consider it as entitled to a place on the list of Iron Clads. It is somewhat liable to be attacked with the fire blight, but as this only affects one or two seasons' growth, and is confined to here and there a limb it always recovers again in a year. The tree is medium size, spreading and very productive, bearing early and every other year. The fruit large, fair and handsome, conical, truncated, sometimes obscurely angular; surface smooth, pale yellow, striped and splashed distinctly bright red, sometimes shaded mixed red; dots minute; basin medium, regular; eye small, closed; cavity rather deep, narrow, regular, brown; stem medium to short, stout; seeds large; flesh whitish, breaking, rather coarse grained, juicy; flavor acid, good for cooking purposes and cider; season September to January.

Pewaukee.—This variety is a seedling of the Duchess of Oldenburg, and has the form, habits of growth, hardiness and adaptability to our climate of its parent; it is a fast grower, constant bearer and long keeper. It has proved itself to be the *ne plus ultra* for the west and northwest, and especially for Wisconsin, as it possesses nearly all the essential qualities so long sought for by myself and the leading horticulturists of the West. We have fruited it for a long time, but have not put it on exhibition until at comparatively a recent date, when our state society commenced to offer premiums for the best seedling apple. Its standing among the competitors the record will show. Fruit medium to large, round, oblate, waved; surface bright yellow, partially covered with dull red, striped and splashed with carmine, covered with gray bloom, and overspread with whitish dots; cavity small; basin shallow and plaited; calix rather large; stem variable in length, with a fleshy substance on one side, from one half to an inch in length; core small; seeds dark brown, pointed; flesh yellowish white, breaking, juicy; flavor sub-acid, rich, aromatic, spicy, (something like Jonathan) somewhat course in texture; quality good to best; use dessert and cooking; season January, May or June.

Walbridge.—At a number of the recent meetings of our State Horticultural Society, there has been considerable discussion with reference to this apple, as to its quality, identity, etc. Some claim that it is the same as the Coggswell, but judging from the descriptions given, and the comparisons made during the year of wood and fruit, also from correspondence with prominent fruit-growers, east and south, we have come to the conclusion that it must be a distinct variety; for in no case did the description received apply to the tree or its fruit as grown in this state. On personal examination of several old trees, I found quite a difference in the description of the wood of the two varieties, which can only be explained as the effect of our soil and climate, or on the supposition that they are two distinct kinds, yet with a few points in common. It is certainly a good grower, free bearer; but as to hardiness, not sufficiently so to be placed with the iron-clads, as the winter of 1864 changed the color of the wood. In the writer's opinion, it ranks in hardiness with the Westfield Seek-no-further, Haas, Perry Russett, Fameuse, Tallman Sweet, Blue Pearmain, St. Lawrence, Ben Davis and Fall Orange; all of which are considered hardy here, but are not equal in this respect to those termed Iron Clads. Tree very vigorous, spreading, productive; shoots long, light gray, covered with down; foliage grayish green; leaves upright; fruit medium to large, globular to roundish flat; surface smooth, greenish yellow ground covered with dull red, mixed with bright red on the sunny side, with gray, irregular dots; basin regular, small, a little russety, quite smooth; eye small to medium, closed; cavity medium, regular; stem medium, curved, grayish brown; core roundish, oval, rather small, closed, almost clasping the eye; seeds numerous, regular size, dark brown; flesh white, firm, mild, sub-acid, good; skin quite tough, a good keeper; season March and April.

ECONOMICAL USE OF STRAW ON THE FARM.

BY LEWIS CLARK, BELOIT.

In order to present this subject properly, it should be considered in relation to the various conditions and circumstances in which the straw is raised, and is to be used; as the size, location and character of the farm; the amount of grain raised; the capital employed; whether machinery can be used in working it up, the amount and kind of stock kept; etc., etc. I shall not attempt to speak of it in all these relations, or to set forth its chemical properties and intrinsic value for the different purposes for which it may be used, but will confine myself to the most important, practical uses that can be made of it in the great majority of cases.

At the outset, I would protest against the most common method of disposing of it—burning—as the poorest possible use to which it can be put. Its whole value is thus dissipated in thin air, and borne away by the winds, to our own loss and the injury of posterity.

Another method, adopted by many, is but little better, that is, to permit the stock to pull, run over and trample it down in the stack or pile. A small portion may be eaten, and hence a little benefit be derived, but the great bulk is trodden under foot and wasted. Were the refuse removed frequently, and a chance given to get at the clean straw, a larger portion would be eaten, but it would still be attended with much waste.

To begin with, if we would derive the greatest possible benefit from our straw it must be properly secured. As much care should be taken to keep it dry and bright as we take with hay. If the grain is stacked, special pains should be taken to secure the straw as well as the grain from injury by the weather. If barn room is plenty and the grain is stored there, in threshing run the straw from one barn to another, if possible, or to another part of the same barn, so that it may be under cover. In harvesting it is advisable to haul as much of the grain as possible to the barn or stack yard, so as to have the straw convenient for winter use. This will save time in threshing, and both time and labor in handling the straw, as it can be drawn much easier when bound than when loose.

In stacking grain arrange the stacks so as to make it convenient to properly preserve the straw with as little labor as possible. Four stacks are usually put together; these, if of medium size, will make about an ordinary day's work in threshing, and the straw can all be put into one stack with little extra labor. Two men will be required most of the time to run the straw away from the machine where no attention is paid to preserving it; by the help of a third man it can be easily secured in a stack.

A common error is to commence stacking without much reference to form, and to keep piling up as may be most convenient; in this way the stack is usually too broad at the base and irregular in outline, and cannot be so well protected. The stack should be long; at right angles with the carrier, and narrow at the bottom. As it runs up, the sides may be built out six or eight feet. The topping out should be commenced in time and should be done gradually. The hole at the end of the carrier should be well filled, and rounded up to the top of the stack to prevent the rain from working down into the center. Much depends upon finishing this part of the stack properly. The loose straw on the sides and around the stack, with the chaff, should be raked away, leaving the stack in perfect shape. When put up in this way, and well topped out the straw will keep without trouble, and can easily be handled when needed.

If the grain is well secured, and is not needed for feed or the market, the threshing might be put off until late in the fall or early winter, thereby saving the straw from exposure to the fall rains.

ITS USE.—It is universally admitted, by the practical farmers of this country, that, to make our farms pay, we must increase the fertility of our land; and, to do this to the best advantage, we must keep more stock. Here the question arises: How shall we do it? We must raise more or less grain — some will grow little or nothing else — and all must devote a portion of their farms to this purpose, thereby diminishing the crop of hay. One remedy is to make such use of the straw, as to fill the place of hay. Where special reference to feeding has been kept in view in the cutting, curing and stacking the grain, and in saving the straw, it will make a very good substitute for hay, especially when cut and steamed, and used with more or less ground feed. It can be used alone in this way, with most kinds of stock, to advantage —or may be alternated with hay.

Many farmers at the west raise annually a large quantity of straw and other coarse fodder, and keep but little stock. They have already more than their cattle can use, and do not care to increase their herd. To such, and to many others who are not disposed to be to the expense of buying cutters and steamers, or to bestow so much care and labor on their stock, I would recommend the following method: Each day during the winter scatter a large quantity of straw in the stock yard. If not stacked so that it can be pitched in handily haul it in with a team; regulating the amount as may be necessary to work it all up before warm weather.

Any one who has not tried this process will be surprised to see how much of it the stock will eat. Sheep like it remarkably well, and when spread upon the ground or put into board racks they will work it all over, picking out every head with grain in it and all the other parts they like. With straw fed in this way, and five acres of cut up corn, given out every day at the rate of one hill for each sheep, one hundred head can be easily wintered without hay, and most of them will be in good condition to turn into mutton in the spring. Thirty-five years ago, in western New York, I carried two hundred sheep through the winter in good condition on wheat straw, threshed with a machine; they had no grain except what was in the straw and only about one ton of hay.

I speak of this, not to recommend the use of straw alone, but to show its value for feeding purposes. At times all kinds of stock eat it with avidity, either because it is palatable, or from desire of a change of food. Most every farmer has seen his cattle come from the pasture, or leave good hay to go and pull at an old straw stack, or to chew the butts of corn stalks. When the straw is thrown into the yard as mentioned above, if sheep are kept on the farm, they should be turned in first, as they will save all the grain that may be left; after they have picked it over, let in the other barn-yard stock, mules, colts and cattle, and if the weather is cold they will use it up effectually during the day. From the refuse, before hauling in fresh straw, an abundant supply of litter should be taken for the sheds, stables and pens, which will add materially to the comfort of the stock and increase the amount of manure made.

By this manner of using the straw it will readily be seen that benefit is received in three ways:

First. In feeding; by which simple process, without any outlay for machinery, and but little extra labor, quite an increase could be made in the number of stock kept on nearly every farm in the state.

Second. In bedding for the stock; which used freely will effect a saving in the amount of food required, and will promote the health, thrift and comfort of the animals.

Third. In manure; which though last is not the least value obtained. All will readily perceive that in addition to the direct value of the straw, itself as a fertilizer—which we think is under estimated by many farmers--all the drippings and liquids are saved.

If the straw should accumulate in the yard beyond what is needed, when pulverized and beaten up it can from time to time be drawn out and spread on fall sowed grain, rye or wheat, thereby increasing the yield, if not preventing a total failure, and ensuring a good catch of timothy or clover where the land is to be seeded down. Or, it may be taken to the meadow, where the benefits of it as a top-dressing will be manifest in heavier crops of hay for years after. It is also the right material with which to mulch fruit trees and shrubbery, and it is at this season of the year when this work should be done.

In mild weather the straw can be drawn right from the stack and spread upon the grain field, meadow or old pasture which it is desired to mulch, and the stock be turned on to pick it over as before. What they leave, with their droppings, will be right where needed, and by using a little care in spreading in the spring will greatly benefit the next season's crop.

All the manure left in the yard should be hauled out upon the corn ground in early spring, and plowed in. By following out this plan each year's growth of straw will contribute to the next season's crop instead of being borne away by the winds or remaining an incumbrance upon the land where it is permitted to lie year after year and rot.

Where it is desirable to keep a large number of cattle on the same amount of food, a simple cutting machine may be used. This will not only save one-third of the food, but if properly used will carry the stock through in a better condition. Many have been driven to their use at first, by a scarcity of fodder, but having tried them, held on to them as a matter of economy and profit. I have used one more or less for over fifty years. There are many kinds in use, but I prefer one that will cut corn stalks, ears and all, and can be run by horse or hand power. It is much less work to cut feed, even by hand, than many imagine, and it can be done at leisure times, or when the weather will not admit of out-door work, and be packed away for future use. Straw and coarse fodder will require much less space for storing after they are cut than before, and in some parts of Europe it is cut as soon as the pressure of work will permit, and packed into mows to keep it in better condition and have it ready for use at all times.

Bran, shorts, rye, corn or oat meal either mixed or separate, may be fed with the cut straw in quantities varying according to the purposes for which they are needed. For milch cows, bran, shorts and a little corn meal are preferable, but for teams, fattening cattle and stock generally, it is best to use that kind which has the greatest amount of nutriment for the price.

Most animals like a variety, and therefore as a rule it will not be advisable to feed straw alone, but to alternate it with cut hay, corn-stalks, etc.; or what will be better yet, when cutting the straw, mix in the hay or stalks and cut them up together. For a number of years I have raised Yankee corn expressly for this purpose, cutting it up early, and binding it in shocks until perfectly cured, then cutting up and feeding ears and stalks together.

After the fodder is cut, take such a quantity of it as may be required for use, or what can be handled conveniently, and put it into a box or bin adapted to the purpose, sprinkle in the desired amount of ground feed. After it has been well mixed, put on sufficient water to stick the meal to the cut feed. Any kind of roots that are to be given out can be cut up with a root slicer or spade and stirred in. Add a little salt. In a short time the flavor of the meal, hay or roots will be imparted to the straw, and the whole will be eaten with a relish. This mixture can be given bountifully to all fattening animals, teams, cows, etc., and what they leave can be thrown out to the other stock.

By preparing the straw in this manner, it can be readily seen that, as it will all be eaten, a much larger amount of stock can be kept than when fed in the ordinary way. Oats in the sheaf can be stored in the mow or stack and used in this way without meal. Running through the straw cutter will be full as cheap, I think, as threshing out the grain. This makes a good ordinary feed, and by the addition of meal will serve a good purpose in fitting the teams for the spring's work.

By fermenting corn meal and mixing it with cut straw, you will get a diet as well adapted to the wants of the milch cow as a good clover pasture in June. I have taken to market winter butter made from cows fed in this way that had all the appearance in color, etc., of June or September make, and it was taken by the dealers to be such.

It will add much to the value of the cut feed, to steam or cook it. This will be attended with additional labor and expense; but, as it has not been extensively tried yet, it remains a question as to what extent it can be adopted with profit by our farmers. It creates a necessity for more winter labor, and will be advantageous in enabling the farmer to give employment to stated help, the year through. I cannot speak of the benefits to be derived from this process, by experience, but have no doubt, that, where a large amount of stock is kept and it is attended to properly, it can be made to pay.

PORK-RAISING IN WISCONSIN.

BY HON. M. ANDERSON, CROSS PLAINS.

What breed of hogs is best adapted to the wants of the farmers in Wisconsin? This is rather a delicate question, as there are so many different breeds, each having their friends and strong advocates; and even after a careful trial of all kinds it is often difficult to decide which is best in all respects. I have raised nearly all of the different varieties, Suffolks, Berkshires, Chester Whites, Poland Chinas (or Magee), etc., and find something to recommend in all of them; but the result of my experiments and trials has led me to think that the kind we want is one that will make the greatest amount of pork out of a given amount of food; one that will be marketable in summer and winter; and one that can be shipped alive to distant markets, —as most of the hogs sold in summer are sent alive to Chicago, Milwaukee, New York or other eastern markets. To answer these requirements we should have a hog with short, stout legs; long body; broad back; heavy hams; deep in the sides, and one that will grow and keep in good condition on grass, be fit for market at eight or nine months old, or will continue to grow if kept through the second year. I have found that with me the Poland China come the nearest to answering these requisites. They will bring the highest market prices, summer and winter, and seem to be preferred by packers to any other breed.

The Berkshire is a good breed for summer market, as they will bear shipping well and will fatten early; but where kept over the season will not gain as much the second year, as the Poland China or Chester White. The Suffolks fatten easily, but cannot be shipped any distance when alive without heavy loss. Some of the Chester Whites are very good hogs, but as a breed they are too coarse for the summer market, which has been our best market for several years past.]

The small breeds are not adapted to the wants of the western farmer; they may suit the eastern states where few hogs are kept, and those few fed with great care, and where they have to be shipped but a short distance to market. When raised in large droves, as we do at the west, they will not thrive so well. With us there is twice the profit on a pound of pork made from grass than on that made from corn, and what will be most profitable to us is a hog that will grow two summers on grass and fatten at 18 or 20 months of age.

The profit of raising pork depends much on the management in breeding and feeding. I breed principally from sows one and two years old, and have the pigs come in April and May. Each sow should have a separate pen, but should be let out each day for exercise, while the pigs are retained in the pen. When they are four or five weeks old, both should be turned out together in a pasture to feed on grass, giving an additional mess three times a day. It is highly beneficial to change the feed often. Shelled corn, corn meal steamed, and swill made of bran and shorts are excellent for nursing pigs. Pigs when a few weeks old will eat shelled corn eagerly, and it should be given to them each day; but of course there is nothing better for them than milk.

The hog house should be so arranged as to be warm, and at the same time be well ventilated, for early pigs are tender and often suffer from the cold. Western farmers are, as a class, particularly negligent in this matter, and their losses are consequently great. It is extremely poor policy to withhold shelter and protection from this kind of stock, for even should they possess great power of endurance—which we think is generally over-estimated—it is at the expense of thrift and animal vigor. It may require less present labor and present outlay for food to allow them half starved to hunt their shelter during the inclement season of the year, but it costs dearly in the end. The food given might be sufficient in comfortable quarters to keep up the vital forces and have something over to store up for the farmer's profit, but now it is not only all used to keep up the animal heat necessary to withstand the cold, but often the surplus energy of the whole season's growth is exhausted for this same purpose, and this can be replaced only by much extra feed and care.

Hogs should be well fed until the clover begins to blossom, then if they have a good range they will need no other food. From the clover field they should be turned into a patch of early sowed oats, and when they have harvested this, turn them into a field of late oats, and lastly give them a field of early corn. The several fields of clover, oats and corn should in size be proportioned to the number of hogs. To many this may seem a wasteful manner of feeding, but when the field is regulated according to the drove, they will make clean work of it. I have fed out forty acres of corn in one field in this way without wasting a single bushel. The small pigs will follow the large ones and gather up what they leave. They should also have plenty of ashes and salt.

There are many advantages in this mode of feeding: It saves expense and labor in harvesting the corn and grain; saves labor in preparing and giving out the food; is more conducive to health—both on account of being allowed to run at large, instead of being confined in close pens or yards, and the character of the green food being better adapted to the wants of the animals. The clover and oats distend the stomach and bowels, giving greater depth of side, causing the animals to weigh heavier; and the oats are especially calculated to regulate the system, removing the worms from the intestines, and correcting other difficulties to which they are subject; it also improves the quality of the pork, giving a better distribution ot the muscle, or lean meat, with the fat. Another advantage is the benefit to the land; its fertility being much increased by the manure left upon it. When this, with a growth of oats or clover is turned under, the soil is in good condition for the succeeding crop.

This mode of feeding is better adapted to those who keep a large number of hogs, but can be followed if the fields are small, or where movable fences are used when but few hogs are kept.

For winter feeding, where the corn is hard, it has been my experience that it is much more profitable to shell, grind and cook it before giving it to the hogs. I use Anderson's steamer for this purpose, and save at least one-third the corn by it, besides fattening the hogs in a much shorter time. Mixing the meal with coarser food has the same effect as the clover—giving greater depth of side, and consequently an increased weight. The use of grass, clover and other green food has made pork-raising more profitable, but I think much might still be added to the profit by a better preparation of the food; mixing the more concentrated with the coarser kinds; cooking; increasing the variety, and substituting less expensive kinds in place of all corn. The uncertainty of our seasons and the changes in our markets, make it necessary for farmers to practice economy in labor and food, and as much as possible to keep their stock in such condition as to be available for market at any time, if they would raise pork with profit.

TWENTY YEARS' LESSONS IN FRUIT-GROWING.

BY A. G. TUTTLE, BARABOO.

The first attempts at fruit-growing in this state reach back little beyond twenty years. At that time very little was known of the wants or capabilities of our climate for the production of any kind of fruit, and no former experience in other localities proved of much value. Immediately following our first experiments came a succession of severe winters, as if to show us at once what we could, and what we could not do. This in the end was very fortunate, though at the time it seemed the height of disaster, and well nigh destroyed every hope of success, so that the cry became very general that fruit could not be grown in Wisconsin. So general was the belief in this, that whoever ventured the opinion that all was not lost, and that Wisconsin would yet become a fruit-producing state, was looked upon as a visionary dolt, whose very perversity excited only derision and contempt, and a man who offered a tree for sale was considered by many little better than a pick-pocket.

There are very few new enterprises, resulting however successfully, but have had their dark days; and though amid the general gloom the faint-hearted saw nothing then but disaster, there was still a little light stimulating the hopes of the ardent horticulturist when it was found that trees of northern origin came through comparatively uninjured. Hence arose the idea of adaptation—and the orchardists went to work by the light of a little experience. This proved to be the right course, and every year, and each extreme of climate has added something to our stock of experience, so that to-day it is generally acceded that most of the fruits can be grown in our state with entire success, and we present the anamoly of an entirely healthy country producing an abundance of fruit.

Now in the light of twenty years' experience what is necessary to success? This is the question which concern us; a question that can be satisfactorily answered by hundreds of orchardists throughout the state.

We have learned that all soils and all locations are not equally well adapted for fruit growing, and that very good and very poor locations may lie side by side—and were we to draw isothermal lines determining fruit belts, we should have to run them through nearly every man's farm. Soil and location have as much to do with success or failure as has the climate. In early times many of the orchards were planted in low, sheltered locations, in rich alluvial soil. The result led to the opinion that shelter was injurious, while the trouble was in the soil, and in the liability to early and severe freezing before the growth was finished. It was found that elevated locations, though much exposed and unprotected, were far better than the sheltered and frosty places in the rich valleys; the soil of the hills being much better adapted for the growth of the tree, and the degree of cold much less. Elevated, well drained clay lands, with an eastern, northeastern or southeastern exposure, with protection on the west and northwest are best adapted for orcharding.

Evergreens are best suited for purposes of protection, and no orchard should be planted, not naturally shielded by timber, without them. When an orchard is much exposed, it is well, in addition to those planted on the west or north-west sides, to give them the place of the trees here and there through the orchard—or to devote a row occasionally to them. This is much better than to plant close for protection, for it is as necessary for the production of fruit that the sun-light should penetrate the ground in an orchard, as it is in a corn-field to grow ears of corn. Husks and cornstalks may be grown though planted close, but very little fruit or corn. Where land is abundant thirty feet each way is near enough to plant; in no case should apple trees be set nearer than thirty-five feet, and then, only by setting alternately spreading and upright growers.

We have learned something of what to plant; and upon right knowledge here depends in a great measure our success or failure. The desire to multiply kinds has flooded our orchards with too great a variety, without regard to quality or profit. The best paying orchards in America, by far, are those containing but one or two varieties. Every family needs twenty-five or fifty trees for home use. These may be selected to cover the entire season, and suit the taste or fancy of the grower. Beyond this, plant such as pay the best—such as give the greatest returns of fruit and bring the best prices in the market. In the east they have the Greening, Baldwin and Spitzenberg, three great market apples. The great bulk of all the trees they plant are of these varieties. What have we to fill their places, as a market apple? Undoubtedly the Fameuse stands unrivaled in its season, and is worthy of place as one of our great market apples. I believe the Pewaukee is destined to fill the season following the Fameuse and to well supply the place of the Greening. It was grown from a seed of the Duchess by George P. Peffer, Esq., and took the prize as the best seedling at our State Fair, competing for three years with all other seedlings. I consider it the more valuable as being a seedling of the Duchess, apparently inheriting the extreme hardiness of that variety, far excelling it in quality, and keeping till late in spring. We have no Russian apples yet fruited in this country that are keepers, nor do I think we ever shall have any, unless brought from the south of Russia. Any apple that would mature so as to be of any value as high north as Moscow or St. Petersburgh, would be a summer or fall apple here.

There are several apples claiming our attention as late keepers, such as Ben Davis, Willow, Walbridge and Golden Russet. Undoubtedly the Golden Russet, if properly handled, is best in quality and one of the best keepers; next would rank the Walbridge, then Willow, and last Ben Davis. It is questionable whether it will be found profitable to grow largely any apple for which its keeping quality is the only recommendation. The Romanite, and perhaps some others will keep very late, even until they become worthless; they might as well rot as to lose their flavor. Perhaps we are yet to find our best late keeping apple. New varieties for popular favor are constantly being presented; new seedlings are being brought into notice. A good rule to govern the propagator is to reject all that do not prove superior in tree or fruit to those already known, ripening at the same season. We want improvement, sure and certain progress. To this standard all new fruit should be brought. Far too large a proportion of our orchards are set to summer and fall fruit. Late fall apples may be used profitably for cider, but where is the profit of large quantities of fruit ripening in August and September, such as Fall Stripe, deficient in juice and, if made into cider, hardly in drinkable condition more than forty-eight hours. Cider to be of any value must be from late fall apples, manufactured after the heat of the autumn is over. The earliest apple generally brings a good price, as the market is seldom over-stocked at that season.

We want above all *hardy varieties.* No beauty of form or excellence of quality can atone for want of hardiness.

The impression is very general, that trees to be of any value should be grown here, and that the planting of trees from abroad has been the chief cause of failure. The trouble is not that the trees have been grown abroad, but in the manner in which they have been grown and in the varieties. If they have been stimulated in their growth by an excessive use of manure, or are such varieties as will not stand our climate, of course they are of no value; but if a tree is properly grown and of the right kind it matters little whether it comes from New York, Ohio or Missouri, if it comes in good condition. Trees reproduced by grafting hold the same characteristics, the same constitutional vigor wherever grown. I never have known a lot of trees brought from the east that were all, or even a majority of them, of hardy sorts. Large quantities of sweet cherries were sold the past season in our state under the pretence that grafting on the Mahaleb stock made the tree hardy enough for Wisconsin, when every propagator knows that the reverse is true. If people will allow themselves to be caught with an unbaited hook they must expect to suffer loss. Irresponsible men will vend their wares where so many can be found credulous enough to believe their statements; and perhaps the honest dealer may be led at times to question the truth of the old adage, that "honesty is the best policy" by the temporary success which attends them—but in the end it will be found, in this as well as every other business, that integrity will win.

Every one who plants an orchard should be governed by the experience of those in their locality, or of some practical fruit-grower in our own state, rather than by the statements of foreign tree peddlers, who know little of our wants, and care less. That there are honest tree peddlers I have no doubt, but we have abundant evidence that our state swarms with a host of scamps, most of them foreign, but many of them home-grown, who had better be supported at Waupun at the expense of the state, than allowed to go at large. It would be well if a list could be published annually of such as are notoriously dishonest, selling trees under false names, purporting to come from reliable nurseries, when, in fact they do not purchase a tree of them, but only buy where they can buy some refuse stock, or an over-stock of some variety offered at low rates. People are beginning to learn what they want, and if not imposed upon by these swindlers will soon find that money invested in the purchase of trees is not "money thrown away."

We have learned something of the manner in which trees should be grown to ensure the greatest amount of hardiness, and to answer best the ends for which they are grown. It was thought at one time that the nearer the ground they branched out the better, and thousands of trees were sent out as low trained, when in fact they were miserable trees, suffered to grow up like bushes without any training at all, each shoot from near the ground striving to become the body. Trees grown in this way will come sooner into bearing, and have a greater bearing surface in a given time, but are short-lived and unsightly. As they grow the lower branches crowd each other and are broken down by winds and the weight of fruit. While advocating the training of trees higher than is the practice of some, I am by no means in favor of high training. I would have the branches, after the tree comes to bearing, afford protection to the trunk from the summer's sun—using a board for this purpose before, if necessary. Trees should be trained high enough to secure the growth of the branches at nearly right angles with the trunk, otherwise they will form what the late Mr. Cover called mal-formed crotches, by the natural tendency of the lower branches to an upright growth. Every tree, perfect in form, should have a central shaft upon which the branches should be regularly distributed, never allowing three or four branches to cluster together, or any side branch to take the lead of the center.

I believe in pruning as a necessity and I regret that any one should advocate the theory of no pruning. There is negligence and slovenliness enough manifested in the care of orchards without any one advocating it as necessary. If it is right to prune any where, it is right to prune here; nor is there any more danger of injury to orchards here, than any where else if done rightly and at the proper season. I regard the last half of March as the best time to prune in this latitude. Pruning in June is practiced to some extent and is well enough for young thrifty growing trees. Pruning at that time checks the wood growth, and so far is somewhat injurious to trees where the tendency is to fruit rather than growth of wood.

The usual method of propagation is by grafting small seedlings on the root. It has been quite thoroughly demonstrated that many of the tender varieties may be grown with certainty by re-grafting such hardy trees as Transcendent, Duchess, etc. Most of the so-called tender varieties injure in the bodies; as the tree puts on new growth of wood upon the outside, decay goes on within, until at length the tree breaks down showing a mass of decayed wood, unable to perform its office of sustaining the tree in position.

With the majority of farmers nothing seems more difficult to learn than that an orchard needs care and culture like other growing crops, and that neglect or abuse tell their sad story as in the growth of any other product of the farm. Nothing will repay care and cultivation better than the orchard; nothing will suffer more by neglect. It is better not to plant at all than to set trees in sod or small grain. Every orchard should be cultivated at least five years with some crop that requires hoeing; after that it is better to give the ground up to the trees alone, keeping down grass and weeds by shallow plowing and dragging. Many, however, seem to think that unless they can get a full crop of some farm product among the trees, so much of their land as is occupied by the orchard has gone to waste. When we go to work to raise fruit as we do any other farm crop we shall hear less whining about the climate, and get as certain returns of profit as from any other agricultural product.

In looking back over a period of twenty years and comparing our present attainments in fruit culture with what they were twenty years ago, we find that the hopes of the most ardent horticulturist have been more than realized. There is every encouragement for continued effort, in the hope that as we surround our homes with fruits, flowers and shade trees, we may in a measure find the Eden that was lost, and attain to something of the happiness and purity of man in his primeval state.

FARM FENCE.

BY DAVID WILLIAMS, DARIEN.

To farmers, this is a subject that challenges their attention nearly every day in the year, and assumes a rapidly increasing importance as the available material for fencing diminishes. The first supply (rails) is mainly exhausted, save such as may be left from the ravages of time. All the timber left of the original forests is required for fuel, except a small portion reserved for posts. A few groves of poplar are being preserved, which, if properly treated, will make valuable fencing. In fully one-half of the improved portion of the state the old time-honored rail has passed out of the catalogue of fencing material, so far as new fences are in question. The climate seems to forbid farmers to hope for live fences. The attempts in this direction have, so far as I have observed, proved a failure in all parts of this state, and will probably continue to prove failures if attempted with any material that has been tried thus far. That some hardy shrub valuable for fencing may yet be found is to be hoped for, more than expected. At present, farmers in fully one-half of the improved portions of the state are restricted to posts and boards for all farm fences; and not only the cost of this material, but its quality, its rapid deterioration, the diminishing supply, and the somewhat feeble character of its resisting power to the assaults of farm stock, present questions of very considerable importance for study and experiment.

The actual, aggregate cost of farm fence to the farmers of this state so very far exceeds any estimate likely to be made, except from careful computation, that I have with the assistance of a number of well informed farmers of this county (Walworth) made a careful computation of the first cost, annual deteriora tion, per cent., and cost of annual repair. There are sixteen townships or 756 square miles in the county. Estimating one sixteenth as lake, ponds, or abandoned lands, gives 540 square miles or 345,600 acres of improved or enclosed land. This, if fenced into forty acre lots, will require five rods of fence to the acre. (a careful estimate gives twenty-five acres as the average size of fields) or 1,728,000 rods of fence, exclusive of ornamental and villages fences. Estimating one eighth of this as division fence and therefore duplicated in the foregoing estimate, and to include also temporary and comparatively worthless fence, will give in even numbers 1,500,000 rods of farm fence for the county; 100,000 rods for each township (one sixteenth of the total area having been thrown out of the estimate as lakes, ponds or abandoned lands) of improved, or enclosed lands. From carefully prepared data I find about two fifths to be highway fence, making 600,000 rods of highway fence for the county, and 40,000 for each township.

Estimating the cost of this fence at one dollar per rod gives $1,500,000 for the county, and $100,000 for each township. Two-fifths of this for highway fences, gives $600,000 for the county, and $40,000 for each township—or a total cost of all farm fences of $4.34, nearly, per acre, and a cost of $1.73 per acre, for highway fence. Estimating ten per cent. on first cost for annual deterioration and repairs, and seven per cent. interest on first cost, gives $275,000 as the aggregate *annual* cost of farm fence for the county, and $18,333.33 for each township. Fully two-fifths of this is for highway fence. If to this sum be added the cost of village fences—mainly made necessary by the pernicious habit of using the highway as a public pasture — the total cost of fence for the county will be swelled to the considerable sum of $1,750,000, and the annual cost to the very respectable figure of $297,-500. That a very considerable per cent. of this aggregate can, and ought to be saved by discontinuing the use of the highway as a public pasture, at least nine-tenths of *farmers* will admit. But such is the force of habit, and the fear of giving offence, that but very few farmers in the State are willing to enforce the law, and clear the highway of these wandering, bovine guerrillas. That a further saving of fifty-five per cent. of the annual cost of fence can be made by improved methods of building, is the motive cause of this article.

The rapid deterioration of board fences is mainly from two causes: First, the mingling of poor, sappy boards with sound ones in building fence, by which gaps are being opened—inviting animal assaults. Second, the method of building mainly in vogue, secures a condition by which the wind soon obtains a leverage that rapidly destroys or impairs the value, and also gives animals a convenient opportunity to break down, through, or over it. And we may add, Third, the poor material and consequent early decay of posts. These three causes combined, necessitate constant watchfulness on the part of farmers, and ensure the necessity of yearly, cumbrous repairs, and rebuilding in from twelve to fifteen years.

The universal custom of building board fence on a level with the adjoining ground gives cattle a convenient opportunity to break it down by rubbing, and attempts to reach through, and the posts are soon loosened by the wind as the ground becomes soft about them. By this means the fence will frequently whip back and forth, breaking the nails, and sometimes the ends of the boards. It also produces a condition favorable to the action of frost in raising the posts out of the ground.

MY EXPERIENCE.—In 1859 I built two lines of fence, making a lane, into which all my fields opened—the lane leading to the barn. On one side of the lane the fence was built in the usual manner, level with the surrounding ground; on the other side, the bottom board was raised fifteen inches above the general level of the ground along the line, and when the fence was completed two furrows were thrown towards the fence on either side, the first against the fence, and the second furrow thrown on top of the first one, raising the ground or bank nearly to the bottom board of the fence. The bank was then smoothed off, and a plenty of grass seed strewn over it. This line of fence was never disturbed by any animal, nor a board nailed on, or a post righted up while I occupied the farm (nine years.) Neither did an animal attempt to get over it to my knowledge, and when I left the farm in 1868, the fence was nearly as true in line as the day it was built. The other line was a source of constant anxiety and watchfulness. Fully one fifth of the original fence boards had been replaced by new ones, and not a few of those remaining bore the marks of the frequent assaults of cattle and horses, either in attempts to get over or through the fence, or in rubbing against it; and the posts had to be frequently righted, while the wind, by swaying it, broke many nails. Now it presents a dilapidated, insecure barrier to cattle, while the other line is apparently good. The material was the same in both lines.

Now the reason—the sharply inclined bank gave no convenient standing place for cattle to rub against the fence; and animals in approaching, found their fore feet below the level, thus pitching the head down, and making the fence seem insurmountably high. And for the same reason no cattle or horses ever attempted to crowd or reach through. The sharply inclined bank gave also a dry, firm bed for the posts; holding them at all times securely in line, and firm against the force of the wind, and, I think, added to the life of the fence at least fifteen per cent. From my experience I feel warranted in affirming that this method will save not less than six per cent. annual cost over the usual mode of building. I will further explain, that in the line of fence before named, built on the old plan, the posts were set three feet in the ground—holes bored two feet and the posts sharpened and driven a foot—while the posts in the banked line were set but a little over two feet, but were banked a foot. One mistake I made in this line of fence was in sawing the boards and butting the ends together; I am now convinced that the better way is to lap the boards on the posts, and use but two nails, about sixteens on the lapped parts, and twelves on the middle, unless the posts are oak, when eights and twelves are sufficient (fencing size). By this method of building, with posts kyanized, or steeped in gas tar, I am confident that at least eight per cent. can be saved from the present annual cost of farm board and post fences by diminishing the cost of repair, and increasing their durability.

THE DAIRY—HOW TO GET AND KEEP A GOOD STOCK OF COWS.

BY CHESTER HAZEN, LADOGA.

In selecting dairy stock make it a rule to get the best cows you can find. A very good way, one that will prove as satisfactory in its results as any, is to purchase one and two year old heifers, keeping them until they come in. Out of this lot some, with proper care, will make extra cows, while others will be of little value for dairy purposes, not worth their keeping. After a satisfactory trial the poor milkers can be turned into beef without loss, and the balance will, in most cases, be worth as much as the entire lot cost. In this way a start in the right direction is made.

The next thing is to make good use of the advantage you have gained; to increase and further improve your milking stock. For this purpose great care should be used in selecting the bull to breed from. Attention should be given to milking points, and constitution in both sexes. No bull should be used that is not from a cow of good milking qualities, and the stronger these qualities are marked in her and her ancestors the better. Raise all the heifer calves from your best cows.

As a rule, large, coarse cows are not the most desirable for the dairy, and therefore, I desire to have the heifers come in when two years old. This seems to check the growth of the animal, both in bone and muscle, and develops the milking qualities instead. I am satisfied that in this way we secure better cows than where they commence giving milk at three years old, and also gain one year's time in bringing the animal into practical use.

There are a variety of opinions among agricultural writers and farmers as to the best method of raising the calves. The way adopted by most fancy stock breeders—to give the calf the milk of a good cow through the whole season—costs more than most dairy farmers can afford, as the milk at the present price of cheese would be worth $40 or $50, and the calf at eight or ten months of age would be worth no more for the dairyman's use than one raised in the common way. My method differs from that of many others, but the results with me have been very satisfactory. It is as follows: Take the calf from the cow when it is one or two days old and teach it to drink; give all new milk for two or three weeks, then commence mixing skimmed milk with the new, being careful at first to use no milk over twenty-four hours old; continue to increase the proportion of skimmed milk until the calf is four or five weeks old, when it will do to give it all skimmed milk. As the calf grows older it will be safe to give older milk, and it will soon learn to drink sour milk and sour factory whey. I never put ground feed of any kind in the milk or whey, but always commence to feed it to them separately when they are three or four weeks old, and continue to give them a small quantity of it, or bran and oats, each day through the summer and fall.

The amount of milk required by a calf from one to three weeks old is from three to four quarts each feed, night and morning; a calf from two to four months old should have from four to six quarts to a feed. I always make each one drink by itself, and take special care to avoid overfeeding, especially when giving whey. Calves fed in this manner through the summer and fall do well.

In the winter they should have from a pint to a quart of ground feed each day, with plenty of good hay. Oats and corn ground together are very good; and a little oil meal mixed with them will give excellent results. Give them good stables or sheds; feed regularly; salt once a week; furnish plenty of water and take good care of them, and there is no doubt but that they will do well; the heifers at two years of age will be good sized and thrifty cows, and will make better milkers than when raised in the ordinary way, or even, than when they are allowed to run three years before giving milk.

My cows, with the exception of a few half and quarter Durhams, are mostly native stock. I find that small or medium sized animals are usually the best milkers, and the most profitable to keep. Ayrshire stock are highly recommended for their dairy qualities. In 1870 and 1871 I purchased a number of this breed in Canada by way of experiment, and now have two full-blood cows, two bulls and two calves. The cows are excellent milkers, and the breed seems in every way to be adapted to this climate, being medium size, good feeders, tough and hardy. My object in getting this breed was to improve my dairy stock, and the result has fully answered my expectations.

The care and food of a dairy are of as much importance as the proper selection of the cows; for even good cows unless well fed and cared for are poor property, yielding little or no profit. They should always have good, comfortable stables in the winter, be liberally supplied with the best quality of hay, with a light feed (from one to two quarts) of meal each day. With this treatment, if fed and watered regularly, they will pass the winter in good condition, be fat enough for beef in the spring, and will not have to lay on flesh for a number of weeks before they come to their full flow of milk.

To secure the most satisfactory results, good pastures should be provided; the tame grasses, timothy and clover, are the best. A daily mess of ground food through the summer will be found profitable; and some provision (sowing corn or some other crop to cut up green) should be made for droughts or short feed in the fall. Pastures should have plenty of pure water in them, easily accessible at all times. Shade trees or some kind of shelter from the scorching heat of the sun are essential to the comfort, and consequently to the profitableness of the cows. When the weather is warm and the flies are troublesome, they should have a pasture to run in nights. At this season of the year they will feed more in the night than during the day.

Good careful hands at the milk-pail are very essential in the proper management of the dairy. Each milker should have the same cows assigned to him to milk regularly night and morning, and the milking should be done, as near as possible, at the same hour each day.

It is eminently true that the better the care taken of the cows, and the better they are fed, the greater will be the flow of milk. The special aim of every dairyman should be to get the greatest amount of milk from a given number of cows, for in this they will find their greatest profit. The above are the conclusions reached from my twenty 'year's, personal experience in dairying in Wisconsin.

ECONOMY IN PORK-RAISING.

BY M. K. YOUNG, GLEN HAVEN.

The activities of mind that wrought out the change from the ruder to the more civilized conditions of the human race have stamped their impress fully as much in the economy as in the skill of production. This can be seen alike in the productive thought that grapples with the organic and the simple, physical condition of things; in the trained courser that with "matchless bottom" heads the record for speed, and in the full-rigged ship that yields obedience to the gentlest breeze, and yet defies the force of the raging storm. It is as true with reference to the ideal as with the actual; in the production of a tun of alfalfa, as in that of a pound of pork.

It is on this subject—economy in the production of pork, how to make it the cheapest—that I wish to present a few practical suggestions.

Assuming that the producer has got the right breed of hogs (and who in these days has not) the next consideration is how and upon what to feed them. In making pork, *how to feed* depends much upon circumstances, the force of which each feeder must determine. We shall enjoin nothing peremptorily except to feed each hog all he will eat, and to so tone and excite his appetite as to make him eat all, that under circumstances of comfort he can digest and assimilate. All other things being equal, the sooner an hundred pounds of pork is made, the better, the smaller will be the loss in keeping up the animal force, and the less the interest on capital invested. This in pork growing is a cardinal point and must never be forced aside, unless by a stubborn demonstration of greater gains. In pork breeding, this is more often modified by considerations of time, adaptation and vitality.

Whether to cook food for hogs, either in the fattening or breeding departments, depends much on the cost of cooking, and the kind of food, and its relative nourishing value when cooked. If corn cobs or clover hay can be steamed into a pulp, and used with more concentrated food to cheapen the cost of production, it becomes a plain proposition of economy. Potatoes are much improved by cooking, indeed are worthless as food without it, as the dextrine of their starch can in no other way be released as well. The starch of the cereals, however, it is said, can be rendered available by fermentation, care being taken that too much acid be not evolved. But in any process of cooking, we would suggest that it be done rapidly, by the blaze of the fire, and that the live coals be watered out and fed to the hogs. They should at all times have access to charcoal as well as salt.

In regard to *what to feed*, modifying circumstances must determine the matter. The hog's main food-elements are sugar and starch, and in whatever forms these can be produced and used in your latitude and locality the cheapest through the whole year, those are the forms in which to grow them. It will not do to use any kind of food that is too concentrated or too gross for a length of time without adding its opposite.

There is probably no one thing better for fattening hogs in all latitudes than corn, and yet whoever aims to make pork in all localities exclusively on corn will do it at a loss. He must have cheaper food, of more bulk, and no matter how great variety.

We suggest that pumpkins be used in their season, either cooked or not. Hubbard squashes are better. Both can be kept well into winter, and make a nice mash with any kind of steamed chop, or thrown into the pen occasionally uncooked, are much relished. The artichoke is a good fall and spring mess for store hogs when there is no clover. It is an enormous yielder, nutritious, and needs no winter storage. Sweet German turnips have done me good service as an early spring and summer feed for hogs. They are sweet, keep till July and yield well.

Of all gross feed for hogs that I have used, I regard the sugar beet the cheapest and best for my locality. A great quantity can be grown to the ground and for the labor. It needs no cooking, will keep till September good and crisp; the tops are eaten as readily as the roots, both being devoured with as much gusto as fresh chestnuts. For breeding sows with nursing pigs we regard them as indispensable. Lane's American Improved Imperial is the best variety I have yet tried, being rich in sugar, easily harvested and a great yielder.

These suggestions are derived from my own experience in my present locality, and of course will have to undergo some modification to fit other cases exactly, but may suggest the idea to farmers generally, that it will pay to use some suitable adjunct to the corn crop besides the clover pasture and the pea-patch in making pork.

GENERAL FARM MANAGEMENT.

BY ELI STILSON, OSHKOSH.

An Address delivered before the Agricultural Convention at Madison.

The question how to manage a farm successfully, is one so broad and so deep, that it underlies the whole science of agriculture. The questions what to do? and what not to do? how to do, and when to do? are great questions to the practical farmer. In short his good or ill success in life will be largely influenced by the conclusions he arrives at on these questions.

The practical farmer should regard his farm like the book of Nature spread out before him, inviting the closest study, and the most careful observation of all the facts pertaining to character of soil, climate, variety of production to which it is best adapted, and market for the same; what would be the best rotation of crops, and the relative exhaustion of each of those crops on his soil, and what element each of those crops would be a great exhauster of, and how quickest and cheapest to supply that exhaustion and add to the productive power of his farm and at the same time to increase his own revenues. The available productive power of the soil is the measure of a large share of the productive capital of the farmer, and the farmer who pursues any system of farming or rotation of crops which exhausts the fertility of his own soil may be likened to a joint stock company which pays out its capital in dividends and ends in poverty and bankruptcy.

Many will ask, can a farm be so managed as not to, slowly at least, exhaust the soil? We have but to point such to England, as one of those countries whose system of agriculture during the present century has not only kept up the fertility of her soil, but has also nearly doubled its capacity for production.

It is true we cannot expect to rival English agriculture by a single step, but by patient, thoughtful, and preserving industry we can elevate American agriculture to a much higher standard than has yet been obtained on this continent. There are heights and depths and breadths yet unexplored, and those the most advanced have yet barely entered the portico of this grand temple of agricultural science.

For agriculture is not only a science, but it should be made the Head Centre of all the other sciences, and it should call them to its aid to explore the labyrinths and reveal the laws that govern Nature's great laboratory. The chemist can tell the parts that compose a grain of wheat, yet with all the world before him he cannot put those parts together and make a single grain of wheat. Yet the science of agriculture is higher, and teaches how to produce what the chemist cannot make. Agriculture should not only call to its aid the arts and sciences, but also experience and experiments, to tell how to increase the productive power of our farms. At one time it was claimed that the chemist was to assist us in this great work by furnishing us an analysis of our soils, and teaching us in what they abound and in what they are deficient, what crops they could grow, and what crops they could not grow; but these hopes have failed, owing to the great variety of soil often in the same field, and the expense attending the analysis and several other causes. But we have derived other very important knowledge from their labors. Their analyses of crops cannot be too highly prized or closely studied. While analysis of soil is like a sealed book to all except to the one for whom it is made, the analysis of crops is a chart to be read and studied by all who would understand agriculture and it will be found in harmony with experience and experiments.

The farmer should know what crops are great feeders on his most valuable elements, and what are not. Let him for instance, examine the tables of analyses of flax seed and buckwheat, and see what gross feeders they are on the phosphates before he undertakes the growing of them largely. An acre of hops consumes as much nitrogen as is contained in 1,000 pounds of Peruvian guano, and as much phosphoric acid as is contained in 350 bushels of corn. The farmer should know whether he is selling the annual growth of his farm, or whether he is selling largely of the most valuable component parts of the farm itself, and thus robbing his soil.

While science has, in various ways, lent material aid to agriculture, the mechanic arts have made a perfect revolution in the modes and ways of farming. The farmer no longer plods to sow, or bends to the sickle or cradle to reap, or the scythe to mow, but he hitches his team to those modern engines of peace and civilization of to-day, agricultural machinery, and he goes forth to perform from twice to six times the labor he did thirty years ago. Even the fiery steed on the iron rail markets the products of a continent at the farmer's bidding. Physical force at one time was the preponderating power in agriculture, but the coming farmer must cultivate his brain—he must be a man of culture, deep study and close observation; a man that can combine and execute, and that, too, with an untiring perseverance, and then success will surely crown his efforts.

Man was created with mental as well as physical powers, and the laws of health require the use of his thinking powers, as well as the use of his muscles to develop the healthy man.

With this hasty examination of the surroundings and situation of the farmer, I will point out a few of the many labors he has before him.

Character of Soil.—The farmer should study well the character of his soil and the climate; not that he should grow entirely that product to which he finds his soil and climate best adapted, but that he may vary the production so as to produce more of that to which he finds his soil, climate and market best adapted, and less of that to which it is not so well adapted. He may have a fine wheat soil, yet he should grow corn and wheat for his own use, and keep stock also, so as to convert these and the straw into manure to produce the wheat. The subject of drainage should be considered, to see if there are not portions of the farm that require under-draining, and if so, then let that be put on the list of paying investments, and let the work be undertaken immediately.

Rotation of Crops.—This is a very important subject to the farmer, and one on which hangs no inconsiderable portion of his revenue and success as a farmer. No rotation is admissable in this State, on arable land that includes less than two or more than three years in grass, of which clover forms an important part. Four quarts of clover seed with four quarts of timothy seed form a good seeding for hay and pasture, but on some moist soils three quarts of clover with five quarts of timothy seed are preferred.

Clover should be cut from June 20 to July 10 (seasons vary), and should not be allowed to lie in the sun too long to burn, but, after being put up for two or three days in small heaps, should be opened, aired and drawn as soon as fit, as over-drying is very injurious—so also is over ripeness.

The second crop the first year may be saved for clover seed, and most years, with good management, it is one of our best paying crops. After being in grass two or three years, apply fifteen loads of barn-yard manure to the acre, and break in the spring and plant to corn. Let the cultivation be thorough, as it will not only help the corn but the crops that are to follow. Spring wheat should follow the corn, and that with barley, oats, or perhaps wheat again, as the farmer's experience, variety of soil and other circumstances shall require, remembering that the oat crop is the greatest exhauster and poorest crop of the three to lay down land to grass with. If winter wheat is required, follow the corn with barley or other spring grain (if the corn cannot be removed in time for winter wheat), and follow those with winter wheat; or, if the land is to lay in fallow, then break early and plow a second time and sow to winter wheat, and follow with corn, and then barley, spring wheat, and seed down.

Another rotation for spring wheat has been tried to a limited extent and has thus far done well; to break up the sod in July shallow, and then plow deep in the fall and sow to wheat in the spring, adding a small quantity of manure before breaking, then follow the wheat with corn and that with barley, wheat, or oats and seed down.

VARIETY OF SEED AND MODE OF SOWING.—No one variety of wheat is adapted to all kinds of soil and weather. Canada Club should only be sown on the best of wheat soil, and sown early, while Fife will often succeed on moist or very black soil, though great heat at the time of ripening sometimes causes blight, but it will endure wet better than Club wheat. Rio Grande or China is perhaps more sure than Club or Fife on most soils, producing regular and average crops of good quality of wheat, but its long beards make it unpleasant to work in when large amounts are grown.

Several new varieties are candidates for favor, but require further trial. The seed should be pure, of some one variety and perfectly clean. For smut, wash in blue vitrol, one and a half ounces with two quarts of water to each bushel.

For sowing spring wheat the broadcast seeder stands unrivalled, both for sowing and cultivation, while there are strong arguments in favor of the drill for winter wheat. The plowing should be deep and thorough, and the cultivation and harrowing of the land such as to give it the finest tilth, without which no man has any just reason to expect a full crop; the sowing should be done as soon as the land is fit in the spring.

The harvest should be commenced just as soon as the grain will not shrink; some theoretical writers have erred by recommending a time so early as to cause the grain to shrink. The practiced eye and close observation will soon tell when the golden grain is fit for the harvest. When threshed and before sold, the grain should be well cleaned, as he that sells dirty grain suffers double discount.

HOW TO CONVERT THE STRAW INTO MANURE.—This, to many, is the most difficult part of the problem, owing to the want of sufficient stock, and without which the land cannot be kept up. With a sufficiency of stock the straw is easily converted into manure as fodder and litter. Young cattle, dairy cows, horses and sheep, are all valuable in this respect. To rot down the straw without stock is the work of years, and its gasses are scattered to the four winds, and its salts slowly set free are carried away by the rains.

It is a mistaken idea that a moderate quantity of manure, properly applied, causes grain to lodge, for the soluble silicate of potash or bone earth of the straw is not required by the stock on the farm, and is thus returned to the land for future crops.

PLASTER—SULPHATE OF LIME.—This article has a three-fold effect. Its properties as a manure are equaled by its solvent properties to render substances fit for plant food, while as an absorbent of nitrogen and other substances for plant food it stands unrivalled; but it requires to be applied understandingly. Suppose the farmer who raises wheat alone and keeps little or no stock, should persistently apply large quantities of plaster to his land, the result would be, that at first it might increase his crop, but would only hasten the complete exhaustion of his soil, there being no compensating return of manure. But not so with the farmer who applies the plaster to his clover and feeds the clover on the farm, for he will increase the capacity of the land to carry more stock and produce more manure, and as the clover feeds largely on the subsoil and air, he is making heavy drafts on these and adding the same to his soil, and then he can make heavy drafts on the Farmer's Bank, (his farm), and it will honor them in large crops of golden grain.

LIVE STOCK.—As no farm in Wisconsin can long maintain its productiveness that does not include in its management the keeping of live stock—for without it the end will be poverty of soil, poverty of purse, and the farmers' sons driven to some other avenue of industry for a support, being disgusted with the idea of gaining a scanty support on a worn out farm—the question for the farmer to solve is not, shall he keep or not keep stock for the inexorable laws of nature have already solved that for him; but the question is to what kind of stock is his farm and the surrounding circumstances best adapted. If there is a cheese factory within his reach, perhaps that may be his best course; if not a cheese factory, if he has suitable help and if he has it within his own family, then so much the better, a butter dairy with the raising of young stock, may be the best for him.

The rearing of good horses may be followed with profit, or a flock of sheep, great or small, according to the area of the farm, will pay a fair profit and do more than any other stock to keep up the farm when well managed. On small farms and with a home market for early lambs the combing wools may be made to pay best, but on larger farms, or those remote from market, the Merinos may be made to pay best, as they will herd in larger flocks than the combing wools, and are not as gross feeders.

Whatever variety of cattle, sheep and hogs the farmer keeps should be of the best kind obtainable within reasonable price, and then he should breed only to thoroughbred males, if it is in his power to buy or hire such; when he is not able, let a number combine and buy one for their use, and it will soon pay the principal and interest. Every intelligent breeder of cattle knows the difference between high grade short-horns, bred from thoroughbreds on one side, in propensity to fatten, early maturity and profit over the native stock. To attempt to improve grade stock with grade the result is too slow to accomplish much in a life-time, as the propensity to breed back is strong in the native, and the breeder is like a blind man groping his way along, sometimes forward and sometimes backward. But not so with the intelligent man who breeds grades to thoroughbreds; he knows that each successive cross brings him nearer his standard or type of excellence. In this way a single thoroughbred has been known to add thousands of dollars to the value of grade cattle in the same or adjoining towns.

With the horse the term thoroughbred is monopolized by the race-horse, while other breeds are of remote origin, so that the breeder of horses will be governed by the rule laid down, rather than the term thoroughbred, as that term applies to only one breed of horses while it applies to many distinct breeds of cattle, sheep and hogs. These rules of breeding are no vague theories, but are the result of careful observations, commenced in the past century by eminent breeders, and continued down to the present time.

All stock should be kept in a thriving condition the year through. It is a grave mistake to allow stock to fall off in condition one part of the year, to be made up at the expense of the growth during a part of the balance of the year.

FRUIT.—No farmer has done his duty to his country, his calling, his family, and himself, until he has provided for an ample supply of the leading kinds of fruit, grown in this climate, for the use of his farm and family, and he will often find it can be made a source of income. How does the farmer expect in his old age to sit down under his own vine and fruit tree, if he has never planted or pruned any, but perhaps has let the cattle browse down those planted by others?

FARM BUILDINGS.—These should be built as substantially and neatly as the farmer's means will warrant. The house may have taste and neatness, without materially adding to the cost, and should be so arranged as to be convenient and handy for the farmer's wife and the saving of labor, and the barns and out-buildings commodious and adapted to the farm and amount of stock kept. All kinds of stock require shelter in this state, as it costs less to provide shelter than provide the extra food without the shelter; shelter greatly reduces the risk and is also an act of kindness to the stock.

Wisconsin, for a state so new, can well be proud of the great number of its magnificent and commodious barns and out-buildings, that are scattered over its fertile prairies, openings and timber belts, and to which the pineries of the north have been a God-send.

MAKING FARM LIFE ATTRACTIVE.—In conclusion let the farmer devote a reasonable portion of his time and income to providing things convenient, neat, and pleasant for his home and its surroundings. The farmer's life and that of his family must be a life of industry, but, by the use of improved implements and machinery much of its toil may be saved. While the farmer's golden grain is waving in the breeze, and his orchard and vineyard are bending with autumnal fruit, and his side-board is loaded with plenty, the result of their united toil, let him not forget the intellectual culture and education of his family.

From the noble sons and daughters of the various industries are to come the men and women that are to tread the paths of science, arts and literature, the halls of legislation, the pulpit and the forum, as many of the children of luxury and indolence soon sink into oblivion or obscurity. Then let the farmer make his farm attractive, and his home inviting and pleasant, around which bright memories shall cluster, and from which shall go forth the children's children, strong and vigorous, to fight the battles of life, and the family re-unions shall make its walls re-echo with "Home, sweet home."

COMMUNICATIONS.

BEET SUGAR MAKING IN SAUK COUNTY.

HON. J. W. HOYT, *Secretary Wisconsin State Agricultural Society:*

DEAR SIR: Having promised you to make a report of the beet-sugar business in this locality, I beg your acceptance of the following:

We have suffered many embarrassments from first to last. The first year we were not able to finish the factory in time; consequently, only a small proportion of the beets grown could be worked up.

Last summer the drouth injured the beets in such a manner that the yield per acre was not more than four and a half tons on the average; and even those actually produced did not properly mature. Consequently the saccharine matter was less than sufficient to make a profitable season's manufacture. Polarization showed ten to twelve per cent. instead of fourteen to sixteen per cent.

You know that the value of the sugar beet is only reckoned by the proportion of saccharine matter it contains—that the proportion of *sugar* to the whole amount of saccharine matter must not be below eighty-two per cent., if sugar-making is to be carried on with profit.

In this respect we have a decided advantage in this particular district of the state. The soil is mild and normal for raising beets; extraordinary salts not being present in injurious proportions; saltpetre, which, in some localities, has occasioned the total failure of enterprises like ours, is not found here at all. This important fact gives vitality to our company, and guarantees it a future as the reward of patient, persistent effort.

We planted last year, about 230 acres of beets. As mentioned above, the crop yielded four and one-half tons to the acre, or a total of 1035 tons — not enough in the aggregate to keep the establishment running more than two months, instead of the full season, which should not be reckoned at less than five months.

Nevertheless, the results have been better than we had dared to hope, in consideration of the quality of the beets.

YIELD AND VALUATION *of* **1,035** ***tons, or*** **2,070,000** ***pounds beets.***

Sold,	450 bbls. of 220 lbs. each, or	99,000 lbs.	A sugar, at	12½ cts.,	$12,375
Sold,	79....do........do......	15,400 lbs.	B sugar, at	11½ cts.,	1,771
Uusold,	100....do.200....do......	20,000 lbs.	raw..do..	9 cts.,	1,800
Totals	....	134,400 lbs.	sugar	....	$15,946
Add 72,350 lbs. molasses, worth					723
Total valuation of saccharine product					$16,669

Estimating the capacity of the factory at 25 tons per day, and dividing the total number of days into the total amount of the above valuation of the products of the business, we have a total income *per diem* of $402, or, in round numbers, $400.

The expenses of the establishment in working out these results, though normal in respect to the capacity of the factory, amount to a much larger sum, relatively, than would be necessary if the capacity was twice as great. Stated accurately, they were as follows:

EXPENSES OF MANUFACTURE PER DAY.

Twenty-five tons of beets at $4 00		$100 00
Fuel—13 1-3 cords of wood at $1 00		40 00
Wages for sixty-five hands, at $1 00		65 00
Salaries (per one year, divided by sixty days, the short season)		40 00
Sundries, as;		
Grease and tallow	$2 50	......
Lights, etc	1 50	......
Lime and muriatic acid	5 00	......
Charcoal or coke	1 00	......
Packing, rubber, etc	1 90	......
Belting	3 00	......
Filtering cloths	2 00	......
Brooms, shovels, etc	1 00	......
Loss on bone black	5 00	......
Barrels	8 00	......
Stationery, etc., in office	2 00	......

Commission for selling	4 00	......
Changing and repairing	10 00	......
Wear and tear of machinery	45 00	......
Interest on capital	45 00	......
Insurance for one year	10 00	......
Incidentals	10 00	......
		156 00
Total expenses		$401 00

Or in round numbers, $400 *per day.* The pulp and tops of beets for feeding cannot be brought into the account, as the farmers took them back without paying for them,

It thus appears that only the expenses have been covered. Some of these, as wear and tear, changing and repairing, insurance, etc , have not been paid.

As already suggested, these unsatisfactory results are chargeable to the following causes:

1. Non-maturity of the beets.
2. The inferior capacity of the factory.
3. Insufficiency of supply to keep even this small establishment running the full season.
4. The low price of sugar.

Still, it has been demonstrated that the business will succeed if the above conditions can be made favorable.

Two of these conditions — increase in the capacity of the factory, and a full supply of beets to keep it going — are controllable, if we can but secure the requisite means. But, unhappily, the last three years have been very hard on the farmers and money is scarce.

The only way, at present, to bring the business up to a paying point appears to be for each farmer interested to furnish the beets, fuel and labor without cost to the company, and then share *pro rata* in the proceeds. Substantially this plan was adopted at our last meeting, held January 8th, 1872; besides which, the stock capital of the company is to be doubled, and seven acres of beets per share are to be planted, instead of five.

The economy of increasing the capacity of the factory to the working of 50 tons of beets per day will appear from the following tabular statement, which is based upon precisely the same conditions as to quality of beets, period of working, and price of products:

CASH PROCEEDS OF FACTORY WORKING UP 50 TONS PER DAY.

198,000 lbs "A" sugar, @12½ cents	$24,750 00
30,000 lbs "B" sugar, @11½ cents	3,542 00
40,000 lbs raw sugar, @9 cents	3,600 00
144,700 lbs crude molasses, @1 cent	1,446 00
Total valuation	$33,338 00
Proceeds per day	880 00

COST OF MANUFACTURING PER DAY.

Beets, 50 tons, @$4.00		$200 00
Fuel, 21⅓ cords, @$3.00		64 00
Wages, 85 hands, @$1.00		85 00
Salaries (60 days)		40 00
Sundries, as:		
Greese and tallow	$3 00	....
Lights, etc	1 50	....
Lime and muriatic acid	10 00	....
Charcoal and coke	2 00	....
Packing, etc	1 50	....
Belting	3 50	....
Filtering cloths	2 50	....
Brooms, shovels, etc	1 00	....
Loss on bone-black	10 00	....
Barrels	16 00	....
Stationery, etc., in office	2 00	....
Commission	8 00	....
Insurance	15 00	....
Changing and repairs	10 00	....
Wear and tear	65 00	....
Interest on capital	65 00	....
Incidentals	10 00	....
		$226 00
Total expenses per day		$615 00
Total cash proceeds		804 00
Net profits per day		$189 00

If now, we make an estimate of the proceeds and expenses of a business involving these same conditions as to quality of material and price of products, but running through a full season of five months, the result will be yet more convincing and satisfactory. Let us see:

CASH PROCEEDS OF A FIFTY TON FACTORY RUNNING WHOLE SEASON.

Reckoning twenty-six days as a month, the number of tons of beets, at fifty tons per day, that could be worked up in 130 days is 6,500; the yield of which would be as follows:

621,700 pounds A sugar, at 12½ cents	$77,712 50
96,700 pounds B sugar, at 11½ cents	11,120 50
125,600 pounds raw sugar, at 9 cents	11,304 00
455,000 pounds molasses at 1 cent	4,550 00
Total proceeds, 130 days	$104,687 00
Proceeds per day	805 00

COST OF PRODUCTION, PER DAY.

Beets, 50 tons, at $4 00		$200 00
Fuel, 21⅓ cords, at $3 00		64 00
Wages, 85 hands, at $1 00		85 00
Salaries (divided by 130 days)		20 00
Sundries, as:		
Grease and tallow	$3 00	......
Lights, etc	1 50	......
Lime and muriatic acid	10 00	......
Charcoal and coke	2 00	......
Packing, etc	1 50	......
Belting	3 50	......
Filtering cloths	2 50	......
Brooms, shovels, etc	1 00	......
Loss on bone-black	10 00	......
Barrels	16 00	......
Stationery (divided by 130 days)	1 00	......
Commission	8 00	......
Insurance (divided by 130 days)	7 00	......
Changing and repairing (divided by 130 days)	5 00	......
Wear and tear ....do	30 00	......
Interest on capital ....do	30 00	......
Incidentals ....do	5 00	......
		137 00
Total expenses per day		$506 00
Income, per day		800 00
Net profits, per day		$294 00

It thus appears that the business can be made to pay by regular running with average consumption of 50 tons daily, for the season.

So important an industrial branch should be encouraged by the state government, as it a public benefit; forcing the farmer to cultivate his soil, regularly employing a great many hands during the summer and winter, and keeping the money that would otherwise be paid for imported sugar in the country. The old king of Prussia, Frederick II, as well as Napoleon I, carefully protected and fostered this branch of industry because of its great utility to the country. Certainly both of them were sharp-eyed.

W. WEFERLING,

Supt. First Sauk County Beet-Sugar Co.

BLACK HAWK, Wis., February, 1872.

BEE-KEEPING—SEASON OF 1871.

REPORT OF MR. GRIMM'S APIARY.

DR. J. W. HOYT, *Secretary Wisconsin State Agricultural Society:*

DEAR SIR—In compliance with your request I send you a brief report of the results of the season of 1871 in my apiary. After the spring sales my stock consisted of 290 colonies. Five of these were queenless, and so weak that I deemed it advisable to unite them. Fifteen more were queenless, or had drone-laying queens, and as it was impossible to furnish them with new queens at that time, they became so much reduced before they were supplied as to be of little account in the production of honey or the increase of swarms. Twelve other stocks were used to breed queens for market, and consequently added but a small amount to the season's yield.

From these 285 colonies, including the twenty-seven mentioned as contributing little to the general store, I raised 359 new swarms and took nearly 10,000 pounds of comb honey in boxes and small frames, and 11,000 pounds of strained honey. During the season I sold twenty-seven colonies and 203 queens. At the close of the season I placed in winter quarters 617 colonies, all in good condition.

Parties unacquainted with bee-keeping may suppose that this amount of honey was gathered from one locality, as the product of one apiary; but this is not the case. At the commencement of the season my bees were located in three different places, and afterwards, as the number of swarms increased, two more apiaries were formed. To secure a large yield of honey and a good increase of stock, not over 100 colonies should be kept at any one place. At three miles from this another apiary of the same number of swarms can be located. Probably if fifty hives were kept at a place the results would be proportionately better, but I have not been able to determine by actual trial whether it would be enough better to pay the additional cost.

The crop of honey may be largely increased by the aid of the "honey or mel-extractor." By its use at the right time and in the proper manner a single stock will give three times as much honey as in the comb. There is a difference of about one-third in the market price of strained and comb honey, but the strained is so much easier to keep, and so much more convenient to ship that I have concluded to use the "extractor" to a greater extent in the future. I would advise all bee-keepers who use the old-fashioned box hives to change their bees immediately into hives with movable frames and to get one of these extractors, and I will venture to say, that, in one season, a single swarm, properly kept, will pay for it in extra yield of honey. By its use I obtained the last season an average of 180 pounds of honey from quite a number of hives. In all but three cases, the hives yielding this amount were young swarms, or colonies that had swarmed this season.

Nearly all of the honey gathered by my bees, came from basswood blossoms. The season for these is usually short — the past year it was only about sixteen days. From this it will be readily seen that a location near a tract of basswood timber is a very desirable one for an apiary.

Respectfully yours,

ADAM GRIMM.

JEFFERSON, December, 1871.

ADVICE TO BEGINNERS IN BEE-KEEPING.

DR. J. W. HOYT, *Secretary Wisconsin State Agricultural Society:*

DEAR SIR—It is a very common remark with many persons who are acquainted with my success in bee-keeping, "If we were as well posted in the business as you are, there is no doubt but that we could make it profitable, but there is little hope of our being able to acquire the art." To such persons, especially those about commencing to keep bees, I would like to say a few words.

The question arises, Is bee-keeping such a difficult art to master? Does it require so much study and application that only a few persons can be found who have the necessary talents to acquire it? I think not. From the progress already made in the science of apiculture, it appears to me to be possible to acquire the art theoretically as well as practically, and that too as easily as in any other business. Theories will not give all that it is needful to know to make a successful bee-keeper, but if rightly apprehended, they will indicate the right way, and by giving the most important points, will make success easily attainable. Experience must guide where theoretical knowledge ends.

"But how shall we learn the art? Shall we commence by serving an apprenticeship with some good bee-keeper?" You need be apprentice to no one; be your own instructor; but bear in mind that it is indispensable to get the theory well in hand first, and then put your knowledge into practice. This you can do by getting the necessary books on the subject, and a few hives of bees. "The Hive and Honey Bee," by Langstroth, I regard as the best standard work on bee-keeping in the United States. The next is Quimby's "Bee-Keeping Explained." When you have thoroughly learned the principles laid down in these books, you will begin to feel competent to manage a few colonies of bees. This will be the time to commence putting your knowledge into practice, but do not start with a large number of hives. From two to six would be all that I would advise you to commence with; you will find that they will increase as fast, or even faster, than your skill increases. Do not make the mistake of supposing that you have learned all about bees, and that you can manage a large number of stocks successfully. Should you go astray, or fail at the outset, like the child who falls in his first attempts to walk, get up and try it again.

Bee-stings are unpleasant, and many persons suffer severely from even one sting, but we seldom hear of any serious consequences resulting from them. If you are very sensitive to them at first, you will find that each subsequent sting will affect you less and less, and that at length you will become almost indifferent to them. To my own knowledge, few persons suffered more from their stings than myself and other members of my family when we first commenced to handle bees. My girls were so much affected by them that it took a good deal of coaxing before I could induce them to handle bees; but now each one of them takes care of a separate apiary of over one hundred colonies during swarming and honey gathering time. They open and examine any hive they choose without minding the few stings they sometimes get. I mention this to show that those who shrink from taking care of bees on account of their sting can overcome this fear and manage them as successfully as anyone.

When the bee-keeper has reached this point, he will find it one of the most fascinating pursuits he can engage in. There is little hard work about it, but it requires care—constant care and watchfulness. Keep in mind that whatever has to be done in the bee business *must be done at the proper time.* Delay will never answer. All you do *must be well done*, not in a careless, bungling manner.

It is not necessary to tell you what kind of stock you should buy. The books mentioned above give valuable advice on this point. If you have not confidence in your own ability to select the proper kind, you can get some one who knows the difference between good and poor stocks to aid you. Do not on any account get poor stocks. Even at low prices they are too dear. Get colonies in movable comb hives if possible—in preference to those in the common box hives—those in the shallow Langstroth hive I consider the best; should they cost two or three dollars more, they are worth the difference.

Do not fall into the error of buying a hive or patent right of every beeman that comes along. They are nearly all humbuggers, who simply want your money, and do not care a farthing what becomes of you and your bees afterwards. I will not deny that some of them have invented hives that will answer as well as Langstroth's in the hands of a practical beeman, but you are no judge of this. Purchase what is acknowledged to be the standard hive for this country. If you can get what stocks you want in the neighborhood—not nearer than two miles if in the working season—you may get them most any time during the year. From a distance, they can be moved the safest about the first of May. Bees can be sent by railroad almost any distance, if properly prepared.

If you have a few stocks, do not try to increase them too fast. Let them swarm naturally. Not often will they swarm too much. Most beginners are very anxious to increase the number of their stocks and make the mistake of dividing too early and too much; a mistake that is usually followed by loss and discouragement.

Perhaps the next question will be: Is my location a good one for an apiary? I cannot, of course, answer this question. The three main sources of honey in this and most other states of the Union are white clover, basswood and buckwheat. These sources are in most seasons to be relied upon. Where all three are found in the right kind of soil, there is the paradise for bee-keepers. For clover, a loomy soil, well mixed with sand, on high ground is the best. For basswood, a rich clay soil on low land is best. On sandy soil, basswood in this section yields honey only in wet seasons. For buckwheat, a rich, sandy soil, on high ground is preferable. If only two of the above mentioned, main sources of honey are found, the location may nevertheless be a good one, and even if only white clover or basswood are abundant, bees properly managed, may be kept with much profit to their owners. I doubt whether bee-keeping will pay in locations where they have to gather nearly all their supply for winter and the surplus for their owner from buckwheat. There is, however, no location where men can support themselves by the cultivation of the soil in which a small number of stocks cannot be kept with profit.

What kind of bees shall I get? will be another question asked. And here the reader will expect—especially, if he is acquainted with my reports in the papers and the business I carry on, (propagating and selling Italian bees,) me to recommend the Italian bee unconditionally, but I cannot do so.

Italian bees, although superior in many respects to the black bee, require more careful treatment and will be lost more frequently in the hands of beginner than black bees. They require, on account of their usual weakness in numbers in the autumn, more protection through the winter than black bees and, therefore, unless you are willing to carefully protect your stocks, you had better not meddle with Italian bees.

"How many stocks shall I keep when I have learned the business?" In last year's report of the Society, pages 302–308, Mr. Mason, of Appleton, says: "that if the estimated deposits of honey on a given area made by Langstroth, Quimby and other bee-masters are at all correct and reliable, the supplies of honey from white clover alone are practicably inexhaustible."

Mr. Kidder is quoted as saying, "that one acre of white clover would yield 830 pounds of honey, one quarter section 132,800 pounds, and one square mile 581,200 pounds. And he goes on to state, that Alsike clover is still more productive. In vindication of Langstroth and Quimby I will say that those writers nowhere, as far as I am acquainted with their writings, make such wild estimates. My own observation on this point is that when I attempt to keep more than 100 colonies in one location, the yield of surplus honey decreases in the ratio of the increase of stocks. In one good honey season, when I had nearly 400 colonies in one location the yield of surplus honey was of no account, or after equalizing the stores of all the stocks, almost nothing. In order to gather food and winter-stores the workers of that apiary had to go three miles and more to get loaded. If white clover contains so much honey there would have been no need for their foraging to so great a distance. I have now satisfied myself by experiments, that from 50 to 100 stocks would be a sufficient number for one apiary. If any person wants to keep more than this, different apiaries from two to three miles apart should be made. It will pay well to do so. From actual experience I must therefore disagree with Mr. Mason's statement, "that 500, or even 1,000, swarms can be kept in a single apiary with marked success."

The report of the results of my apiaries for the past season will be found elsewhere, and those who would like to know what can be done in bee-keeping are referred to it. To prevent a wrong impression, I will add here that I have my bees scattered in five different locations during the summer; and that I had the most honey, taking all things into account, from those two apiaries where there were only thirty and forty stocks.

The reader may ask, will not the price of honey be so low that bee-keeping will not pay, if many persons should engage in it? I can only say, that it is not at all likely. I would consider ten cents per pound for honey much better pay than $1.50 per bushel for wheat; and if honey could be sold at that price, the consumption would so increase that a product of tenfold the present amount would be disposed of in market in less time than it now takes to sell the present supply.

And now, kind reader, should you undertake to commence bee-keeping, do not get discouraged if you fail in your first attempt. There are seasons in which bee-keeping is really a losing business, but they are rare, and in good years bee-keeping pays from one to three hundred per cent. on the capital invested.

Respectfully yours,

ADAM GRIMM.

JEFFERSON, December, 1871.

GRAPE CULTURE IN WISCONSIN.

DR. J. W. HOYT, *Secretary State Agricultural Society.*

SIR: In response to your request that I would furnish an account of my system of grape culture, I offer the following for what it may be worth, as the fruit of my own experience, and my conclusions thereon.

My experimental tests have been more the result of necessity than prolonged investigation. I can only hope to call the attention of vintners and others to the results of these experiments in an amateur way, with the desire that they may profit from what I believe to be an improvement in the culture of the vine in this latitude, where the climate is too inhospitable for those varieties that flourish in the California and European wine districts. That there are varieties, even in this high latitude, which if treated prudently, may be rendered very profitable, especially when made into wine, there can be no doubt.

The necessity of winter protection, and the great amount of labor required for summer pruning and cultivation by the orthodox method of treatment have heretofore proved a great objection to the general cultivation of the vine for its delicious and profitable fruit. If this objection be substantially removed, the way is clear.

My main object will be to show that more and better fruit can be realized from less labor and expense than has heretofore been bestowed in the cultivation of this fruit. My method is as follows:

1st. Cover with straw instead of soil; letting the straw remain on the ground from year to year, both as a mild fertilizer and "cultivator."

2d. No summer pruning, except just enough to keep the vines open and to permit a free circulation of air and allow the solar rays to reach the straw.

3d. No summer tillage—leaving that to the straw and the ever industrious earth worms.

4th. No deep subsoiling is necessary with the practice as set forth above.

Thus it will be seen, that my mode (I must be permitted to lay claim to it, since I have no knowledge of its being practiced by others) dispenses with considerable cost in covering for winter—one man being able to cover with straw many times as much as two could with earth—with no abrasion of roots and subsequent tendency to bleed. It also dispenses with nearly all the cost of summer pruning; which I believe to be unnecessary, except as stated above. It dispenses with summer tillage; thus making a great saving of expense in tending, and I am convinced that the vines are much more thrifty and luxuriant, and the fruit sweeter, larger and more abundant. Good deep plowing, with thorough cross plowing, and, if the ground is rough, well harrowed and rolled, is, with the straw mulching, just as efficient, and vastly cheaper than deep subsoiling by hand or other means, I have tried both, with the other treatment similar, and from my limited means of observation I have no doubt the plan suggested above is equal at least to the deepest subsoiling. My vines, planted on the plowed soil are doing much better than on another piece adjoining where I spaded two feet deep, but as the vines are some closer on the latter, and the experiment is on so small a scale (150 vines on the subsoiled, and 1,000 on the plowed portion) I do not feel at liberty to wholly charge the better appearance and fuller fruit to the difference in the treatment of the soil.

Now, as the main objection to the planting of vineyards in this latitude lies in the extra cost of winter protection, summer tillage and pruning, I will address myself particularly to this branch of the subject. Farmers care more for practical facts and logical deductions than for a fine display of glittering literary generalities. I shall therefore bid for popular attention by offering some plain, and as I believe, practical facts and suggestions. And right here, at the threshold, let me challenge the attention of those interested to the great point that all should know, that grape raising is not what nearly every man supposes, an occult art or mysterious secret only to be learned by the few at great cost and by laborious attention. On the contrary, it is one of the simplest problems in the Euclid of Agriculture.

Let the beginner in grape culture keep this fact in mind and the great difficulty is overcome. Let him understand that no more skill or ingenuity is required to plant, rear and protect a grape vine than to grow a hill of potatoes, that no more trouble and expense need be incurred to take care of a grape vine than is required for a well tilled hill of beans, while the profits are immensely greater, and he may then be supposed to be in a frame of mind to listen to the plain lesson he is expected to learn.

Without attempting to criticise or find fault with the many learned essays on the various modes of treating the vines, I must be permitted to believe that the elaborate directions that have entered into the technology of this subject, have tended to confuse rather than to enlighten the common farmer. After reading a score or two of small-type pages on the favorite mode of the writer in planting, training, trimming and caring for the vines, he very naturally comes to the conclusion that he has struck a subject too great for his spare time—if not even too intricate and abstruse for his understanding. Hence he drops the pamphlet in despair, and dismisses the subject from his mind; whereas, if the writer had told him, in plain, terse English, to procure his well rooted layers; plow his ground well; plant his vines with no more display than would be necessary to plant a currant bush; let the vines have their own way the first season, after covering the ground six inches deep with straw to keep the weeds in check; prune back in the fall to one or two canes and one or two eyes; cover well with straw just before freezing commences; tie up to trellis in the spring; let nature do her best during the summer; and in subsequent years when the vines are strong, summer-prune just sufficiently (giving no special directions) to let in the air and light between the rows, which should be not less than five feet apart, and the "hills" some eight feet apart; and have left the farmer to find out by his own observation what is necessary to know besides, the great scare-crow in grape raising would vanish.

The above are essentially all the directions necessary to encumber the novitiate with. If he is an observing man, he will soon learn the peculiar habits of the vine, and will adapt their ever varying peculiarities to special local causes; for it is an admitted fact that the same species of vines require somewhat different treatment in different localities, and even in the same vineyard. Hence no general line of specific instructions as to all the minutiæ can be safely given or followed.

As experimental facts are more valuable than theoretical problems, I will give a history of my own experience—too limited, I must admit, to be implicitly relied upon in all cases, yet sufficiently important to justify further experiments.

I have several lots in the city of Madison, located on lake Monona and sloping gradually to the south-south-west. The soil is a vegetable mould, interspersed with slight traces of the silicates and aluminum. Its inclined position and exposure to the full force of the solar rays render it extremely liable to drouth. In fact, in a period of two weeks without heavy rains, I have observed that any unmulched currant bushes, gooseberries, etc., will exhibit dry and friable leaves that prematurely drop off. The soil is too destitute of moisture, except in very wet seasons, for strawberries, and as this delicious fruit cannot well be mulched, and the roots never penetrate much below the surface, I have seldom secured a good crop, and have nearly abandoned the attempt.

In 1855 I set out five grape vines, more with a view to humor my weakness for the greatest possible number of varieties of *shrubs*, than from any hope of adding to the luxury of my table or profit to my pocket. I had had no experience, and, like most amateurs, believed there was a skill required, a mystery involved, too formidable to tempt my ambition to acquire the one or fathom the other. And when I had planted my Concord, Diana, Northern Muscadine, Marion Port and Sage's Mammoth, I was content to let my vineyard take care of itself. For two years I paid no attention to the new-comers, except to tie up the luxuriant shoots according to the most approved "book science." The Concord bore abundantly the third year, while the other varieties scarcely paid ground rent. Still, the Concord having acquitted itself so well, at the expense of so little genius and attention in 1859 I resolved on enlarging my vineyard, and prepared a piece of ground 100 feet by 50, by sub-soiling with the spade two feet in depth, putting a thick layer of straw at the bottom, the top soil being first placed thereon and the sub-soil at the top. I gave a strong top-dressing of manure to this, and added all the old shoes and old boots and every old vegetable and animal substance recommended by the most erudite esayists. I planted 150 good, strong roots; divided between the Concord, Delaware, Hartford Prolific, Isabella, Muscadine, Rebecca, Diana, Marion Port (worthless with me) and Catawba. Intending to treat them on the "Cincinnati plan," I set the plants two and a-half feet apart in the rows, and the rows three feet apart—a monstrous *absurdity* when brought to the test of my subsequent treatment. I summer-pruned for two years according to the Longworthean theory, and my vines behaved most gallantly.

Being infused with an agricultural mania, I purchased a farm close by, and made the most elaborate calculations for raising grapes, while my ideal wine cellars were equal to the most approved Burgundian grottos; but other pursuits offered greater charms, and I finally abandoned the intention of becoming the Longworth of Wisconsin. In the mean time, however, I had enlarged my "vineyard," by planting one thousand Concord vines; my experience, limited as it was, having taught me that where dollars were the object the Concord was the best. I planted this thousand on about one-half an acre of new land, which I had plowed and cross-plowed. As soon as planted, I covered the whole surface to the depth of six inches with straw, after putting up a three-slat trellis along each row. This was in 1861. As I was engaged in other pursuits and it would not pay to employ a man to cultivate the vines on so small a scale, I placed straw on them six inches in depth each fall, for a covering, and let it remain; my primary object being to smother the grass and weeds.

For two years, I summer pruned during spare hours, but since that time, having been absent from home and not wishing to risk raw hands without superintendence, the vines have been left to themselves, costing me little if anything more than the straw and the fall pruning or "cutting back." Thus through necessity, the vines were left to straw as their "gardener" or "cultivator," and to Nature for their further care and sustenance. This necessity of neglect taught me a valuable lesson I should have learned in no other way. With the slight exception of summer attention to prevent the vines from covering the ground too thickly, thus smothering the fruit in some cases, and keeping out the air, sunlight, etc., my vines have had all the care and attention they needed, ; and they have fruited heavier than ever before, the fruit being sweeter, and ripening earlier. The report of the Commissioner of Agriculture gives the last week of September as the period of ripening the Concord, even from 400 to 600 miles south of this, while my Concords, in some places, were fit for the palate the last week in August, the past season, and were actually all gone before the last week in September. I attribute this, not to any natural advantage, but to the effect of the straw mulching.

The following are some of the most important benefits derived from this system of cultivation:

1st. The straw, if sufficiently compact, will smother weeds and grass, and prevent the necessity of stirring the soil, or disturbing the rootlets.

2d. It favors an equilibrium of temperature, and this prevents what is termed "sun scald," in any locality.

Although on a southern slope, facing the reflection of the lake, with a dry, hard baked soil, I have never noticed the least tendency to "sun scald" in my vineyard, and have never suffered from late frosts in the spring or early frosts in the fall. This escape also should be attributed to the straw mulch; as on the one hand, it retards the thawing out of the ground, and the starting of the buds in the spring, keeping back the fruit-settings and shoots until the danger from frosts is passed; and on the other, when the weather becomes warm, it absorbs and retains the heat of the sun's rays, and by giving out this warmth during the cool of the day and part, if not all, of the night, it acts as an artificial thermal stimulant, and hastens forward the growth of vine and maturity of fruit, so that they not only make up for the set back of early spring, but gain two weeks in time of ripening over the same varieties treated in the usual way.

3d. It keeps the surface of the soil damp in the dryest of weather, and prevents a too rapid evaporation.

4th. Another great advantage is the most perfect pulverization of the soil. The surface of the soil being kept moist by the ample covering which permits no mat of grass or other vegetable roots to interfere with their operations, millions of earth worms are at work night and day in eating and digesting the lighter soils, thus creating nitrogen, ammonia, etc., in great abundance, without the least appreciable detriment.

5th. It serves to keep the roots near the surface. In my opinion, based upon limited observation, it is not necessary for the roots of small vinous fruits to penetrate deep into subsoils. If the surface is parched up some stray roots will "dive for water," but if fluid nourishment can be obtained without deep penetration the roots will keep to the surface, and auxiliaries will multiply and expand to meet every demand from the extending vine.

6th. The annual covering of straw is beneficial as a fertilizer; no other manure will be needed. Straw not only contains within itself many chemical ingredients necessary to the growth of the canes, but it forms a blanket covering to the earth, and prevents the various acids, gases and succulent juices from a too rapid evaporation.

The question has been frequently asked: Do not the mice burrow in the straw and girdle the canes? I have never witnessed the least trace of such spoilation, nor have I noticed any rot, mildew or other disease. The black aphides are the only insect enemies I have ever noticed, and they have never appeared to do much harm.

The birds have proved very destructive. No less than one-half of my entire crop was destroyed the past season by them. The Delawares are their favorite plunder. Scarcely are the berries turned in color when the feathered tribe mount the trellises and insert their mandibles in the fruit, requiring but a few moments to render unmarketable the best bunches. In this way a single bird will destroy many pounds in a few hours. The sharp crack of the fowling piece and the occasional loss of a mate probably would put an end to the carnival, but my continued absence from home has added to the freedom of their license, and in the absence of all restraint my crop was fearfully injured.

An interesting table in the Report of Agriculture for 1868, gives the number of pounds of grapes to the acre in the various grape-growing states, as follows:

	Pounds.
Connecticut	6,000
Illinois	5,072
Indiana	6,666
Iowa	6,200
Missouri	6,900
Massachusetts	7,000
New York	4,571
Ohio	3,475
Pennsylvania	3,000
South Carolina	2,400

I regret that I did not accurately determine the weight of my grapes on the half acre of Concords, but I weighed the fruit on some of the vines, one of the heaviest going as high as forty-three pounds. My estimate was an average of not less than ten pounds to the vine, which with 1,000 vines would equal 10,000 pounds on a half acre. I may reduce my estimate one half and then exceed the highest amount credited to any other state by 100 per cent.

Now, as I only set out to show that grapes may be raised in Wisconsin on a cheaper, more certain and profitable scale than by the usual methods, I shall have gained my point if others may be induced to test the simple plan herewith recommended. Every farmer may supply his table with this delicious fruit, without any appreciable cost or trouble. A dozen vines of proper bearing age will be ample for the domestic wants of any family. The cost would not exceed the cost of a dozen glasses of whisky, and would prove a perpetual benefit.

Every well-to-do farmer may raise one acre of grapes, and make it more profitable than five acres of any other product by reducing the fruit to wine. With proper attention, and by adding a small amount of sugar to neutralize the excess of acids in our native varieties, he may realize from 500 to 700 gallons per acre; and as Concord wine ranks with the Catawba in the St. Louis market—both rated at $2 per gallon—the profits in proportion to the outlay of capital would range higher than any other product of the soil, besides being non-exhaustive, and presenting less objections than any other crop.

All of which is respectfully submitted.

S. D. CARPENTER.

EXPERIMENTS AT THE UNIVERSITY FARM.

DR. J. W. HOYT, *Secretary Wisconsin State Agricultural Society:*

DEAR SIR—I herewith send you a statement of the results of the most important experiments made the past season by the Department of Agriculture at the University of Wisconsin:

WHITE WINTER WHEAT, *Touzelle Variety.*—Seed imported from France, and furnished by the Department of Agriculture at Washington. A large, white, plump grain, weighing sixty-two pounds per bushel. Fifteen quarts (29 lbs.,) were sown September 10, 1870, upon an area of 47.9 square rods. Protected from winds upon the west and north sides by growing timber. Mulched in December with coarse litter at the rate of twenty loads per acre. Harvested July 8, 1871. Drawn July 14. Threshed August 10. * Gross weight 1,191 pounds. Weight of grain 392 pounds. One bushel weighs 59 3-4 pounds. Yield per acre, 23.38 bushels. Per cent. of grain to gross weight, 32.9. One pound seed yields 13 1-2 pounds.

This variety was first tried the previous year, upon land but partially protected upon the west side, from the winter winds. It there winter-killed entirely. Upon second trial, in a situation more favorable for protection from cold winds, and, with a more favorable winter, it yielded well. The straw appears weak, and the grain is darker than the seed sown. The experiment will be continued until it's worth as a variety for cultivation is well proven.

* Taken at the time of drawing from the field.

Red Bearded Saisette Winter Wheat.—Seed imported from France, and furnished by Department of Agriculture. One bushel weighs 62 pounds. Fifteen quarts (29 lbs.) sown September 10, 1870, upon 47.9 square rods. Protected from winds, and mulched the same as the Touzelle variety. Harvested July 8, 1871. Drawn July 14. Threshed August 7. Gross weight, 1,287 pounds. Weight of grain, 399 pounds. One bushel weighs 60 1-4 pounds. Yield per acre, twenty-two bushels. Per cent. of grain to gross weight, thirty-one. One pound seed yields 13.7 pounds grain.

Besides repeating the above experiments, several other varieties of winter wheat are now in cultivation. Among these is the "Fultz" wheat, a new and promising variety, originated by Mr. Abram Fultz, of Mifflin county, Pennsylvania, the seed of which has been distributed this year by the Government Department of Agriculture.

The question whether winter wheat may be grown in Wisconsin with profit is still unsettled. The experience of the past year would lead to the belief that it may; but a more rigorous winter and less favorable spring may bring as strong evidence to prove that the climate is too severe. Mr. A. G. Tuttle, of Baraboo, says that after twenty years' experience, he regards it as sure a crop in the Baraboo valley as is spring wheat. The very fine sample from that vicinity on exhibition at the state fair last fall, shows at least, that as excellent wheat may be grown there, as can be grown anywhere in the same latitude. The greater value of winter wheat demands for it a thorough trial of all hardy varieties, before deciding that spring wheat alone can be relied upon for a sure crop.

SPRING WHEAT.—To test the comparative values of different amounts of seed to the acre, six plats, each containing one-fourth acre, were sown to mammoth variety April 4. The seed was raised upon the University farm in 1870. One bushel weighed sixty and three-fourths pounds. The plats were all adjacent, and cultivation was the same on all.

Plat 1,—Three-fourths bushel to the acre.—Harvested July 24.

Drawn July 28. Threshed October 26. Weight of straw and grain, 820 pounds. Weight of grain, 263 pounds. One bushel weighs 60 1-3 pounds. Yield per acre, 17 1-2 bushels Per cent. of grain to weight of straw and grain, 32. One pound of seed yields 23.1 pounds.

Plat 2.—*One bushel to the acre.*—Harvested July 24. Drawn July 28. Weight of straw and grain, 899 pounds. Threshed October 27. Weight of grain, 297 1-2 pounds. One bushel weighs 60.6 pounds. Yield per acre, 19.83 bushels. Per cent. of grain to weight of straw and grain, 33. One pound seed yields 19.59 pounds.

Plat 3.—*One and one-fourth bushels seed to the acre.*—Harvested July 24. Drawn July 28. Threshed November 4. Weight of straw and grain, 1,146 pounds. Weight of grain, 332 3-4 pounds. One bushel weighs 60 pounds. Yield per acre, 22.18 bushels. Per cent. of grain to weight of straw and grain, 29. One pound seed yields 17-53 pounds.

Plat 4.—*One and one half bushels seed to the acre.*—Harvested July 24. Drawn July 28. Threshed November 1. Weight of straw and grain, 1,340 pounds. Weight of grain, 396 1-2 pounds. One bushel weighs 60.36 pounds. Yield per acre 26.16 bushels. Per cent. of grain to weight of straw and grain, 29. One pound seed yields 17.4 pounds.

Plat 5.—*One and three-fourths bushels seed to the acre.*—Harvested July 22. Drawn July 29. Threshed October 31. Weight of straw and grain, 1,330 pounds. Weight of grain, 375 3-4 pounds. One bushel weighs sixty pounds. Yield per acre, 24 3-4 bushels. Per cent. of grain to gross weight, 28. One pound seed yields 14 1-7.

Plat 6.—*Two bushels seed to the acre.*—Harvested July 22. Drawn July 29. Threshed October 5. Weight of straw and grain, 1,412 pounds. Weight of grain, 455 1-4 pounds. One bushel weighs 60 1-8 pounds. Yield per acre 30 1-3 bushels. Per cent. of grain to weight of straw and grain, 32. One pound seed yields 14.98 pounds.

TABLE *showing the results of experiments with different amounts of seed wheat to the acre.*

B'shels of seed to the acre.	Time of harvesting.	Weight of straw & grain.	Weight of grain.	Yield per acre.	Weight per bus.	Per cent. of grain to weig't of straw & grain.	A Pound of seed yields.
		lbs.	*lbs.*	*bushels.*	*lbs.*		*lbs.*
3/4	July 24	820	263	17.53	60.35	32	22.11
1	July 24	899	297 1/2	19.83	60.6	33	19.59
1 1/4	July 24	1,146	332 3/4	22.18	60	29	17.53
1 1/2	July 24	1,340	396 1/2	26.16	60.36	29	17.4
1 3/4	July 22	1,330	375 3/4	24.75	60	28	14 1-7
2	July 22	1,412	455 1/4	30.33	60 1/2	32	14.98

This table, with the exception of plat five, shows an increase in yield as the amount of seed is increased. The plats upon which these experiments were tried were adjacent, and to all appearance equally fertile. The variation in the yield of plat five may, doubtless, be attributed to the fact that it was in a more exposed situation and more badly laid by the wind; for in both four and six the weight of straw and grain and the weight of grain are greater than in it. The table also shows that the yield of one pound of seed decreases as the amount of seed and yield per acre increase. The increased yield of one seed was plainly visible before the grain was harvested in the greater amount of "stooling" of that which was thinly seeded. The uniformity in the weight of a bushel of the grain from each plat is quite remarkable, while the variation in the per cent. of grain to the weight of the straw and grain, is such as to show that it does not depend upon the amount of seed. Some English agriculturists claim to get better results upon land in high culture, with thin, than with thick seeding. So far as we may judge from a single experiment, thick seeding is best upon our lands which are in but an indifferent state of cultivation.

COMPARATIVE VALUE OF DRILLING AND BROADCAST SOWING.—One-half acre was sowed by each method to Mammoth wheat, weighing 60 3-4 pounds per bushel, April 13, two bushels to the acre.

1.—*Broadcast.* Harvested July 24. Weight of straw and grain, 1,370 pounds. Threshed Sept. 18. Weight of grain, 482 3-4 pounds. One bushel weighs 61 1-2 pounds. Yield per acre, 16.09 bushels. One pound seed yields 7.94 pounds. Per cent. of grain to weight of straw and grain, 35.

This plat was adjacent to a grove, and was very badly injured by blackbirds.

2.—*Drilled.* Harvested July 24. Threshed September 27. Weight of straw and grain 1,590 pounds. Weight of grain 658 1-2 pounds. One bushel weighs 62 1-2 pounds. Yield per acre 21.95 bushels. Per cent. of grain to weight of straw and grain 41. One pound seed yields 10.97 pounds.

The drill did not distribute the seed evenly. Some portions were too thick and others too thin.

To try the effect of double breaking, one half acre of heavy blue grass sward was broken with two plows, April 11. The first plow turned a furrow three inches in depth, the second turning a furrow three inches deeper from the bottom of first furrow, entirely out and upon the top of that turned by the first plow. Sowed to two bushels per acre of mammoth wheat, April 13. Harvested July 26. Straw short. Threshed August 2. Weight of straw and grain 1,054 pounds. Weight of grain, 387 1-4 pounds. One bushel weighs 57 1-2 pounds. Yield per acre, 12.9 bushels. Per cent. of grain to weight of straw and grain, 37. One pound of seed yields 6.4 pounds. This wheat was partially destroyed by blackbirds.

COMPARISON OF DIFFERENT VARIETIES OF OATS.—Six one-fourth acre plats were sown broadcast, April 18, to three-quarters of a bushel of each of the following varieties:

White Norway.—Weight of one bushel of seed, 33 pounds. Harvested July 20. Weight of straw and grain, 1,106 pounds. Threshed October 14. Weight of grain, 402 3-4 pounds. One bushel weighs 33.49 pounds. Yield per acre, 50.32 bushels. Per cent. of grain to weight of straw and grain, 36. One pound of seed yields 16.27 pounds.

Black or Ramsdell Norway.—Weight of one bushel of seed, 30 1-2 pounds. Harvested July 25. Threshed August 21. Weight of straw and grain, 1,248 pounds. Weight of grain, 522 pounds. Weight of one bushel, 32 pounds. Yield per acre, 65 1-4 bushels. Per cent. of grain to weight of straw and grain, 41.8. One pound of seed yields 22.6 pounds.

Surprise.—Weight of one bushel seed, 32 pounds. Harvested July 17. Threshed September 14. Weight of straw and grain, 1,171 pounds. Weight of grain, 601 pounds. One bushel weighs 38 pounds. Yield per acre, 75 1-8 bushels. Per cent. of grain to weight of straw and grain, 51. One pound of seed yields 25 pounds.

Common.—One bushel of seed weighed 30 pounds. Harvested July 25. Threshed July 31. Weight of straw and grain, 1,248 pounds. Weight of grain, 498 1–4 pounds. One bushel weighs 34 3-4 pounds. Yield per acre, 62 1-4 bushels. Per cent. of grain to weight of straw and grain, 40. One pound of seed yields 22.1 pounds.

Probsteir.—Weight of one bushel of seed, 34 3-4 pounds. Harvested July 25. Threshed September 13. Weight of straw and grain, 1,418 pounds. Weight of grain, 587 pounds. One bushel weighs 37 pounds. Yield per acre, 73 1-3 bushels. Per cent. of grain to weight of straw and grain, 40.7. One pound of seed yields 22.5 pounds.

Potato.—One bushel of seed weighed 29 pounds. Harvested July 26. Threshed September 9. Weight of straw and grain, 1,276 pounds. Weight of grain, 376 1-2 pounds. One bushel weighs 34 1-2 pounds. Yield per acre, 47 1-6 bushels. Per cent. of grain to weight of straw and grain, 29. One pound of seed yields 17.3 pounds.

Of the following varieties smaller areas were sown at the same time:

White Schonen.—Seed from Department of Agriculture at Washington. 774 square feet sown with 1 pound 5 ounces of seed. Harvested July 24. Treshed July 29. Weight of grain, 44 3-4 pounds. One bushel weighs 30 1-2 pounds.

Yield per acre, 79.7 bushels. Per cent. of grain to weight of straw and grain, 36.6. One pound of seed yields 34 pounds. The grain was badly lodged, which probably accounts for the light weight.

Bohemian.—A variety without hulls, donated by Morrow & Brother, of the *Western Farmer.* 1,078 square feet sown with 17 ounces of seed. Harvested July 24. Badly lodged and rusted where down. Threshed July 29. Weight of straw and grain, 150 pounds. Weight of grain, 24 pounds. One bushel weighs 40 1-2 pounds. Yield per acre, 30.8 bushels. One pound seed yields 22.6 pounds. Per cent. of grain to weight of straw and grain, 16.

TABLE *showing the result of the experiment with the different varieties of Oats.*

VARIETY.	Time of harvesting.	Weight of straw and grain.	Weight of grain.	Yield per acre.	Yield per bushel.	Per cent. of grain to gross wt.	One lb. of seed yields.
		lbs.	*lbs.*	*bus.*	*lbs.*		*lbs.*
White Norway.	July 20	1,106	402¾	50.32	33.49	36	16.27
Black Norway.	July 25	1,248	522	65.25	32	41.8	22.6
Surprise......	July 17	1,171	601	75.12	38	51	25
Common......	July 25	1,248	498¼	62.25	34¾	40	22.1
Probstier.....	July 25	1,418	587	73.33	37	40.7	22.5
Potato........	July 26	1,276	376½	47.16	34½	29	17.3
White Schonen	July 24	122	44¾	79.70	30½	36.6	34
Bohemian	July 24	150	24	30.80	40½	16	22.6

Placing the common oats at 100, as a standard of comparison in yield per acre, gives the following comparative yield:

White Norway	81
Black Norway	104
Surprise	120
Common	100
Probstier	118
Potato	76
White Schonen	128
Bohemian	51

DRILLING AND BROADCAST SEEDING.—One-half acre of ground was sowed April 14, to common oats, by each method, giving the following results:

No. 1.—*Broadcast.*—Harvested July 24. Weight of straw and grain, 1,444 pounds. Weight of grain, 705 pounds. One bushel weighs 34 2-3 pounds. Yield per acre, 44.06 bushels. One pound seed yields 18.8 pounds. Per cent. of grain to weight of straw and grain, 48.

No. 3.—*Drilled.*—Harvested July 21. Weight of straw and grain, 1,414 pounds. Weight of grain, 709 3-4 pounds. One bushel weighs 36 1-2 pounds. Yield per acre, 44.35 bushels. One pound seed yields 18.92 pounds. Per cent. of grain to weight of straw and grain, 50.

TABLE *comparing results of broadcast seeding, and drilling oats.*

How sowed.	Time of harvesting.	Wt. of straw and grain.	Weight of grain.	Yield per acre.	Weight per bushel.	Pr ct. grain to gr's w't.	One pound seed yields
		lbs.	*lbs.*	*bushels.*	*lbs.*		*lbs.*
Broadcast.........	July 24	1,444	705	44	34⅔	48	18.8
Drilled	July 21	1,414	709¾	44.35	36¼	50	18.92

Both plats were injured by the innumerable hosts of blackbirds that attacked all of our crops.

EXPERIMENTS WITH DIFFERENT AMOUNTS OF SEED.—Four adjoining plats of one-half acre each were sown broadcast, April 4, to common oats as follows:

No. 1.—*One and one-half bushels of seed per acre.* Harvested July 25. Weight of straw and grain, 1,456 pounds. Weight of grain, 788 1-2 pounds. One bushel weighs 24 2-3 pounds. Yield per acre, 49.28 bushels. Per cent. of grain to weight of straw and grain, 53. One pound seed yields 35 pounds.

No. 2.—*Two bushels of seed per acre.* Harvested July 25. Weight of straw and grain, 1,338 pounds. Weight of grain, 707 1-2 pounds. One bushel weighs 33 1-4 pounds. Yield per acre, 44 1-4 bushels. One pound seed yields 23 1-2 pounds. Per cent. of grain to weight of straw and grain, 52.8.

No. 3.—*Two and one-half bushels of seed to the acre.* Harvested July 25. Weight of straw and grain, 1,592 pounds.

Weight of grain, 709 1-2 pounds. One bushel weighs 32 1-2 pounds. Yield per acre, 44.34 bushels. Per cent. of grain to weight of straw and grain, 44. One pound of seed yields 15 3-4 pounds.

No. 4.—*Three bushels of seed to the acre.* Harvested July 17. Weight of straw and grain, 1,628 pounds. Weight of grain, 827 2-3 pounds. One bushel weighs 35 1-2 pounds. Yield per acre, 51.72 bushels. Per cent. of grain to weight of straw and grain, 50. One pound of seed yields 18.39 pounds.

TABLE *showing results of experiment with different amounts of seed oats to the acre.*

Bushels of seed pr acre.	Weight of straw and grain.	Weight of grain.	Yield per acre.	Weight per bushel.	Per cent. of gr'n to gr'ss weight.	One lb. of seed yields.
1½	1,456 lbs.	788½ lbs	49.28 lbs.	34⅔ lbs.	53	35 lbs.
2	1,338 lbs.	707½ lbs	44¼ lbs.	33¼ lbs.	52.8	23½ lbs.
2½	1,592 lbs.	709½ lbs	44⅓ lbs.	32½ lbs.	44	15¾ lbs.
3	1,628 lbs.	827⅔ lbs	51¾ lbs.	35½ lbs.	50	18 2-5

The discordant result shown by this experiment is owing to the different conditions of the soil, a part of which had been in cultivation with corn the previous year, and a part with wheat. The experiment shows how difficult it is to get all the conditions of the soil such as to give uniform results, when cultivated by the same method. In order that experiments may be reliable, everything must be uniform but the one point which the experiment is intended to establish. For example, in the above experiment, the only variable element that should exist is the amount of seed per acre; all other conditions must be the same. It is very difficult to get two adjoining plats that have the same degree of fertility, which necessitates the testing of land to ascertain its comparative fertility before using it for experimental purposes.

VALUE OF WELL CLEANED SEED.—The following experiment was tried for the purpose of comparing the value of well cleaned seed with seed as commonly sowed:

One-fourth of an acre of ground was sown to three-fourths bushel by measure of common oats (*as taken from the bin* April 22. One bushel of seed weighed 27 1-4 pounds. Harvested July 25. Threshed August 18. Weight of straw and grain, 864 pounds. Weight of grain, 350 pounds. One bushel weighs 33 1-2. Yield per acre, 43 3-4 bushels. One pound seed yields 17.2 pounds. Per cent. of grain to weight of straw and grain, 40.5.

An equal area was sown at the same time to three-fourths bushel by measure of common oats, *well cleaned*. One bushel of seed weighed 30 pounds. Harvested July 25. Threshed August 18. Weight of straw and grain, 910 pounds. Weight of grain, 386 1-4 pounds. Weight of one bushel, 35 1-2 pounds. Yield per acre, 48 1-4 bushels. One pound of seed yields 17.1 pounds. Per cent. of grain to weight of straw and grain, 42.4.

The only difference in the cultivation of these two plats, was cleaning the seed of the latter of all chaff and light grain. The effect of cleaning, as shown by this experiment, amounts to 4 1-2 bushels of grain per acre, a measured bushel of which weighs two pounds more than that of the uncleaned. Had heavier oats been used, the difference would probably have been less.

A plat of one-fourth of an acre adjoining the above plats was sown at the same time to three-fourths bushel by measure of a mixture of equal parts of White and Black Norway, Surprise, Potato and common oats, weighing thirty-two pounds per bushel. Harvested July 25. Threshed August 18. Weight of straw and grain, 964 pounds. Weight of grain, 357 pounds. Weight of one bushel, 34 1-2 pounds. Yield per acre, 44.7 bushels. One pound seed yields 14.9 pounds. Per cent. of grain to weight of straw and grain, 37.

TABLE *showing at a glance the results obtained from these experiments.*

Kind of Seeds.	Weight of seed per bushel.	Weight of product per bush.	Yield per acre.	Yield of one lb. seed.	Per ct. of grain to ent. prod.
Uncleaned	27¼	33½	43¾	17 1-5	40½
Cleaned	30	35½	48¼	17 1-10	42 2-5
Mixed	32	34½	44 7-10	14 9-10	37

Two adjoining plats of equal area were sown at the same time with seed of the same variety. Upon one of these plats well rotted muck was spread as uniformly as possible, to the depth of half an inch. The other had no fertilizer applied. The yield of these plats was as follows:

	Yield per acre.	Weight of product per bushel.	Yield of one lb. seed.
No. 1 with muck	52 bu.	35⅞ lbs.	19.4 lb.
No. 2 without fertilizer	49.4	34¼ lbs.	18.4 lb.

Giving a yield of 2.1 bushels per acre of heavier grain to the fertilized plat.

BARLEY—*Chevalier.*—One half acre sowed broadcast, April, 18, to one one-half bushels, which weighed 46 pounds per bushel. Harvested July 28. Weight of straw and grain, 3,559 pounds. Weight of grain, 1,043 pounds. One bushel weighs 48.63 pounds. Yield per acre, 43.45 bushels. Per cent. of grain to weight of straw and grain, 29. One pound seed yields 15.1 pounds.

Probsteir.—Seed from Department of Agriculture at Washington. Two pounds and 11 ounces sowed April 18, upon 1,375 square feet of ground. Harvested July 24. Weight of straw and grain, 334 pounds. Weight of grain, 76 1-2 pounds. One bushel weighs 48 1-2 pounds. Yield per acre, 51.4 bushels. One pound seed yields 28.4 pounds. Per cent. of grain to weight of straw and grain, 23.

Saxonian.—Seed from Department of Agriculture at Washington; 2 pounds and 10 ounces sowed April 18, upon 1,651 square feet. Harvested July 24. Weight of straw and grain, 285 pounds. Weight of grain, 78 1-2 pounds. One bushel weighs 47 1-2 pounds. Yield per acre, 45.9 bushels. One pound seed yields 29.9 pounds.

These varieties of two-rowed barley were imported from Europe by the Government Department of Agriculture, on account of their valuable malting properties. They promise to be valuable varieties for general cultivation, although further trial is needed to fully prove their value. The quantity of seed at our disposal of Probstier and Saxonian varieties, was too small for an accurate test-experiment of their yield. The amount of seed that we now have will enable us to obtain more definite results another year.

COMPARISON OF DIFFERENT VARIETIES OF CORN.—The following table gives the results of an experiment with five varieties that were planted May 12; distance apart 3 1-2 feet by 3 1-2 feet three grains to the hill. Cultivation the same with all varieties. Of the White Australian, about one dozen hills were accidently destroyed in July:

VARIETIES.	First ripe ears.	Time of harvesting.	Yield per acre.	Per cent. of ears to gross weight.
Early Dent	Aug. 5	Aug. 25	49.58 bu.	43
Dutton	Aug. 11	Aug. 25	47.12 bu.	33
Sanford	Sept. 5	Sept. 5	45.69 bu.	22
Cherokee	Aug. 28	Sept. 5	56.58 bu.	32
White Austalian	Aug. 17	....	72.49 bu.	42

The yield per acre is given in bushels of ears weighing 75 pounds each, and was taken as the corn was drawn from the field. The White Australian corn is a new variety, not yet introduced into general cultivation. The following quotation pertaining to its history is from the Transactions of the Colorado Agricultural Society for 1868:

"The White Australian Corn is a new variety of flint corn, brought to this Territory from Salt Lake about two years since. We are told it came originally from Australia, * * and is said to be peculiarly adapted to high, dry climates."

Seed was obtained of the secretary of the Colorado Agricultural Society and taken to northern Illinois in 1870, where it ripened in 96 days. It yields abundantly, as will be seen by the above experiments. It has the appearance of being a new variety, as its characteristics seem to be hardly fixed, a part of it being 8-rowed and a part 12-rowed. It is a very soft corn, the kernels crushing more easily than the common yellow dent. My impressions of it after a single year's trial are very favorable.

The Cherokee corn also promises well, although the past year's experience proves much less for it than was claimed by its more ardent admirers. But I believe it to be a valuable addition to the list of varieties that are worthy of cultivation.

The following varieties were planted May 16, three grains to the hill; distance apart four feet by four feet:

VARIETY.	First ripe ears.	Time of harvesting.	Days from planti'g to ripening.	Yield per acre.
				bush.
Cherokee	Aug. 28	Aug. 31	107	44
Dutton	Aug. 14	Aug. 26	102	31.53
Sanford	Sept. 7	Sept. 27	134	32.23
Blue Australian	Aug. 22	Aug. 27	103	36.43
Pearl Pop Corn	....	Sept. 15	122	37.32
Early Yellow Pop Corn	....	July 15	60	9.24
Joint Pop Corn	....	Sept. 15	122	14.62

The smaller yield of Cherokee, Dutton and Sanford varieties, in this than the preceding experiment, is owing partly to the greater distance apart, and partly to the situation, which, in this, was a steep northern exposure, and in the preceding was southern.

"Blue" Australian is the product of bluish kernels that were selected from White Australian.

In all these experiments, a bushel is taken as 75 pounds at the time of drawing from the field. The moisture and weight of cobs being estimated at 15 pounds. The amount of shrinkage that corn will undergo will depend greatly on the season, and will be much less in as dry a year as the past, than in a wet year.

To ascertain the actual amount of shrinkage, 100 pounds (as weighed when drawn from the field) of several of the above varieties, have been stored away. When they are thoroughly dry they will be again weighed, and the weight of shelled corn taken as the true per cent. of corn for the past year. A repetition of this experiment for several years will give the average per cent. of shelled corn to corn in the ear as weighed at the time of husking.

INFLUENCE OF TIME OF SAVING SEED.—This experiment began in 1869, by selecting the earliest ripening ears from a field of Dutton corn, and at the time of husking, selecting seed in the ordinary manner of saving seed corn. Adjacent plats were planted in 1870 with seed saved by each method, and seed was again saved as before, from the product of seed saved by the same method. The seed of the second year was planted in two adjacent plats, May 6, 1870; distance apart three by four feet, three grains to a hill, giving the following results:

FROM SEED SAVED.	Time of ripening.	Yield per acre.
At time of husking	Aug. 14	42.54 bu.
From first ripe ears	Aug. 10	37.51 bu.

There is here a difference of four days in the time of ripening in favor of the seed of first ripe ears, but a difference in the yield of five bushels per acre in favor of the product of later ripening ears. The general appearance of the latter was also better.

EXPERIMENTS WITH EQUAL AMOUNTS OF SEED AT DIFFERENT DISTANCES APART.

Equal areas were planted April 28, to Sanford corn, as follows:

Plat 1.........hills 13 inches apart..........1 grain to the hill.
Plat 2.........hills 26 inches apart............2 grains to the hill.
Plat 3.........hills 52 inches apart..........4 grains to the hill.

The rows were four feet apart, and cultivation the same with all. The corn was ripe August 26, and gave the following yield per acre:

Plat 1....................................48.27 bushels.
Plat 2....................................45.00 bushels.
Plat 3....................................39.36 bushels.

The cost of cultivation of numbers one and two would be more than that of number four, as more of it must be done by hand, while the yield is greatly in favor of a less distance between the hills, and fewer stalks in a hill.

SEED FROM TIPS, MIDDLE AND BUTTS OF EARS.—Three plats of equal area were planted May 6, respectively from seed grown in the same manner in 1870. Distance apart 3x4 feet; three grains to the hill, of New England variety. Cultivation uniform in each.

The results are shown in the following table:

SEED FROM	Time of ripening.	Yield per acre.	Aver. length of 25 longest ears.	Average circumfer. at butts of 25 larg't ears.
Butts......................	Aug.21	62.66 bu	9 inch.	6⅓ inch.
Middle	Aug.21	60.95 bu	9.1 inch	6 inch.
Tips......................	Aug.21	58.11 bu	9.2 inch.	5.9 inch.

No difference was visible in time of ripening, but in the yield a perceptible difference was shown in favor of seed from the butts of the ear. The length of twenty-five of the longest ears, and the circumference at the butts of twenty-five of the largest ears of the three plats, were taken. The results of these measurements are quite curious, indicating that the average length of the ears was greatest in that raised from seed from the tips, while the average size around the butts was greatest in the product of seed from the butts of the ear. In each case, as well as in the yield per acre, the product of seed from the middle of the ear was a mean between the other two.

The ends of the ears were so badly eaten by blackbirds that it was impossible to tell whether the ears from either of these plats were filled out better than from the others. This trial indicates that in the second year of the experiment there is already a difference in the yield per acre, and an appreciable tendency to change the form of the ear in the product of seed taken from different parts of the ear. The tendency to change seems to be sudden, and gives an interest to the experiment that will make it well worthy of several years' further trial.

POTATOES.—The following varieties have been in cultivation for the purpose of comparison. Planted May 8, in rows 3 1-2 feet apart. Cultivation uniform:

VARIETY.	Dist. apart in rows.	Time of ripening.	Yield per acre in bushels.	Size, etc.
	Inches			
Early Goodrich	16	Aug. 1	176 1/8	Fair.
Seedling from Early Goodrich	16	Aug. 1	124 1/3	Fair.
Early Rose	14	Aug. 1	219 4-5	Fair.
Bresee's King of the Earlies	16	Aug. 1	171 1/8	Med., smooth.
Excelsior	16	Aug. 12	213 4-5	Fair, smooth,
Vandervere	16	Aug. 14	152 1/8	Small.
Titicaca	16	Aug. 15	135 1-9	Small, rough.
Philbrick's Early White	16	Aug. 18	191 5/8	Med., rough.
Andes	16	Aug. 20	127 1/8	Small.
White Chili	18	Aug. 20	86 1/2	Small.
Buckeye	18	Aug. 20	229	Large, rough.
Wisconsin seedling	16	Aug. 25	208 1/2	Small.
White Rose	16	Sep. 1	185 1-5	Med., smooth.
Harison	16	Sep. 1	322	Fair.
Kackelhoffer	18	Sep. 1	103 2/3	Large.
Shaker's Fancy	16	Sep. 1	142 2/3	Large.
Forfarshire red	16	Sep. 1	241 1/2	Med., rough.
Early Shaw	16	Sep. 1	302 1/3	Large,sm.fine.
White Peach Blow	18	Sep. 5	270	Med., rough.
Calico	16	Sep. 10	193 1/2	Large.
Jenny Lind	16	Sep. 10	259 1/8	Small, rough.
Alaska Blue	16	Sep. 14	138 1/4	Small.
Peerless	18	Sep. 14	246 1/8	Large, fine.
Peach Blow	20	Sep. 18	140 1/4	Medium.
Santo Domingo	16	Sep. 1	147 5/8	Large,smooth.
Strawberry Bloom	16	Aug. 18	344.38	Small, rough.

The last two varieties were cultivated under the above names the past year, the true names having been lost.

The distance apart in the row was varied to correspond as nearly as possible with the known habits of growth of the several varieties. Those with small tops that grow compact in the hill, like the Early Rose, being planted near together, while those with large tops, as the Peachblow, were planted further apart.

The Colorado potato beetles were more troublesome early in the season than ever before. The remedy that proves most successful with us has been hand-picking. With constant attention the potatoes upon the University farm have been injured very little, if any, although there were several gardens in the vicinity where no measures were taken to destroy them.

We did not use Paris green, the only common remedy used, for the reasons given in my report last year, that it is a poison, and should not be put upon the soil.

Many of the above varieties of potatoes are quite new, or at least little known among farmers.

The "Peerless" and "Bresee's King of the Earlies" are two varieties that were sold last spring at very high prices. The former bids fair to be a valuable late potato and a good yielder.

The King of the Earlies is no earlier than the Early Rose, but is of good quality, prolific, and doubtless will prove a valuable addition to the list of early potatoes. The "White Rose" will probably prove a good late variety, but instead of being "bug-proof," as advertised, it is as liable to attack by the potato beetle, as the Early Rose. The general value of the different varieties may be told by the remarks on size and appearance above.

IMPROVEMENT OF SOILS BY MECHANICAL MEANS.—For the purpose of testing the comparative value of different depths of plowing, an experiment has been begun upon four plats of an acre each, to be cultivated through several years as follows:

No. 1 to be plowed to the depth of five inches only.

No. 2 to be plowed to the depth of twelve inches.

No. 3 to be plowed twenty inches in depth, by trench-plowing.

No. 4 to be plowed twenty inches in depth, by subsoiling.

In all respects other than those named, the cultivation is to be uniform on all.

Ncs. 1 and 2 were cultivated the past summer in the prescribed manner.

No. 3 was plowed to the depth of twelve inches only.

No. 4 was plowed twelve inches in depth, and subsoiled four inches deeper.

The four plats were planted May 15th to Early Yellow Dent Corn, four feet apart each way, three grains to the hill.

The following table shows the results of the first year's trial:

Plat 1 yields	55.4	bushels.
Plat 2 yields	50.65	bushels.
Plat 3 yields	44.95	bushels.
Plat 4 yields	42.21	bushels.

The yield diminishes from one to four; a result that cannot be attributed entirely to the method of cultivation, as for want of a suitable trench plow it was found impossible to plow No. 3 more than twelve inches in depth, so that in all respects the cultivation of Nos. 2 and 3 have been the same, and the plats are adjacent. Plats 3 and 4 will be deepened as fast as is practicable.

I would acknowledge my indebtedness to Mr. H. H. McAfee, Farm Superintendent, for the careful and skillful manner in which he has attended to the carrying on of these experiments, even to the most minute particular. I have also obtained from Mr. McAfee the following particulars:

The average yield per acre of the different crops upon the University Farm has been as follows:

Winter wheat	22 1-2	bushels.
Spring wheat	22	bushels.
Oats	50 9-10	bushels.
Corn	53	bushels.
Barley	43 1-3	bushels.
Navy beans	17 2-5	bushels.
Potatoes	148	bushels.

Hoping that the results of these experiments may be alike interesting and beneficial to the farmers of the State, I remain,

Yours, respectfully,

W. W. DANIELLS.

PRACTICAL EXPERIENCE IN ORCHARDING.

DR. J. W. HOYT, *Secretary Wisconsin State Agricultural Society:*

DEAR SIR: In response to your request inviting contributions for the Transactions of the State Agricultural Society, being desirous to do anything in my power to aid in the advancement of the great cause in which the society is engaged, I have thought proper to send you an account of my experience of thirty years in the planting and management of an apple orchard.

My first experience in orcharding in this country was in 1842, when I prepared a piece of ground in the timber, on a southern exposure with clay soil; I dug the holes something after the fashion of post holes, two feet deep, and one foot square. Into these holes I crowded the roots of the trees, and put in the dirt nearly as close as if setting a gate post. The result was that nearly all the trees died. What remained of this orchard I pruned both thin and high, after the manner of pruning trees in the southern states, leaving long and slender bodies. This rendered them liable to be blown down, or broken off at the upper end of the body, and also to the permature rising of the sap in the spring, on the southwestern exposure of the tree, which freezing loosens the bark and kills the tree on that side.

Being thus unfortunate in this attempt at raising an orchard, I resolved in my second effort to adopt a different mode of setting out the trees, and a different method of treatment after they were set. In this instance I prepared my ground the same as before, with the same exposure, but dug the holes only eighteen inches deep and made them eighteen inches square; after setting, I mulched the trees heavily, and did but little pruning; the result was much more satisfactory.

Being much encouraged by the results of this change of method, I determined to test still further the policy of shallow setting and little pruning. Accordingly I ordered 500 more trees. In this trial the land was only slightly inclined to the south; the soil was black, prairie loam, just at the edge of the timber, exposed on the west, north and east to heavy storms and winds, but sheltered on the south side. The land was plowed thoroughly about nine inches deep, and harrowed until it was in good condition for any kind of small grain. The holes were then dug nine inches deep and about three feet in diameter, the trees put in carefully, with all the bruised portions of the roots trimmed off and the remainder carefully spread out in their natural position, then the tree was pressed down, until it rested firmly on the bottom of the hole, the dirt filled in and slightly compressed to a level with the surrounding surface. Immediately after setting these trees I mulched them well with coarse stable manure. This I consider of great importance for the preservation and growth of the trees; preventing injury from drouth the first season after setting, and excessive freezing in the severe winters of this climate, and also the premature starting of the sap in the spring—three of the greatest calamities that befall apple trees in this country.

In this test I did no pruning whatever, and my trees, in thrift and small per cent. of loss surpassed my most sanguine expectations. The common remark of all acquainted with the orchard from its setting until the present time is, that "it has done the best of any orchard they have seen in this country." It is now a fine bearing orchard of ten years old.

Being satisfied with these results, I have continued since to set trees upon the same method, and with similar satisfactory results.

These tests made by myself and many of my neighbors, all resulting satisfactorily, have fully established in my mind the following conclusions:

1st. That the proper situation for an orchard is on a high southern exposure, as the atmosphere in such a location is more mild and congenial, and thereby conducive to the more rapid and healthy growth of the trees. Our climate is too severe for the successful growing of apple trees, and hence we want to select our warmest locations for this purpose.

2d. The soil in which the trees are set needs to be prepared in the best manner; plowed deep, and thoroughly harrowed until it is in good condition for small grain. The holes should then be dug as before stated, in the third test, about nine or ten inches deep, and at least three feet in diameter and twenty-four feet apart each way, and the trees carefully set, as in the third test.

This distance is much to be preferred to a closer one, as it gives more room for the spreading of the limbs and the expansion of the top, thereby improving the fruit both in size and in flavor—while closer planting has precisely the contrary effect. Close planting has the same pernicious effects on fruit, that it has in any kind of grain or root crops. In orchards where the trees are set a good distance apart the convenience of cultivating the land is also an important advantage.

3d. That mulching is of vast importance and should not be neglected upon any account. It should be of coarse stable litter (the less manure in the straw the better) and should be put around the trees (six or eight inches deep and four or five feet in diameter) immediately after setting, to protect the young trees from drouth the first season. If it is very dry they should be well watered occasionally. With this mode of treatment but few if any trees need be lost on account of the dry weather which usually prevails after the season for setting. The mulching should be applied every season afterwards, early in the fall to prevent excessive freezing, which often kills the young trees—and at the same time to prevent the too early starting of the trees in the spring by keeping the frost in the ground.

4th, That pruning should be sparingly done, (if done at all) at least, until the trees are well into bearing, which of itself materially retards their growth; then they may be pruned to some extent for the improvement of the size and flavor of the fruit. But by no means prune excessively; in all cases confine it to the thinning out of the tops and branches, so that the sun and air may have better access to the fruit. The limbs should be allowed to grow out low down on the body in order that the shade may protect the trunks from injury by the rays of the sun and the drying winds. "Low-headers" are invariably the best in this windy climate, especially where the situation is very much exposed to the severity of the winds. A thick hedge of some kind of rapid growing timber should be planted around the orchard; an occasional row through it from east to west would not be objectionable. I find from my observation that the orchards most protected from the severe winds and storms of this country are much the most thrifty, and much the most prolific in fruit.

5th. That all fruit trees, of whatsoever kind, should be thoroughly cleansed, at least once in each year with some kind of good wash such as common soap-suds, weak lie, or common white-wash. I prefer the latter, well put on with a common white-wash brush, from the roots as high up as a man can reach among the limbs. Doing this twice a year will give the trees a fine, smooth and glossy bark, and entirely protect them from the devastating effects of the "bark louse," and from other insects that prey upon apple trees; even the *borer* is said to be kept off by this method.

6th. That in all cases, the soil in which apple trees are planted should be cultivated each year with some crop that requires frequent plowing and hoeing. Corn, I think, is the best, as it is not exhaustive to the land, and serves as a kind of wind-break or support to the trees. The trees should be well staked, and tied securely to the stakes with a piece of soft cloth, so wrapped around as to prevent its rubbing and chafing against the stake. This will keep them steady in the roots and very much facilitate their growth in an erect position. The greatest care should be taken in all cases in working among the trees not to bruise them in the least, as there is nothing more fatal to the prosperity of an orchard than a careless, reckless way of working among the trees.

The plowing in all cases should be done by a single horse with a short whiffletree, or a good steady yoke of oxen. Great care should be taken not to cut any of the roots with the plow.

The earth should generally be thrown towards the trees; but occasionally it may be thrown from them, so as to keep the ground nearly level.

Stock of no kind should be allowed to run in an orchard. I once knew a fine orchard ruined by fattening hogs in it, and have had my own very much injured by calves barking the trees. Hence the safest policy is to allow nothing to run in it, at least while the trees are small.

I am an advocate of a small number of varieties, for I can see no benefit in raising a great many kinds merely for the sake of variety, when most of them are entirely unsuited to the climate, and in many instances, entirely useless. It is much better to have the ground occupied by a few good varieties suited to the climate. One good apple is worth two poor ones any time. Respectfully yours,

PETER PARKINSON, Sr.

APPENDIX.

REPORT ON THE GEOLOGICAL SURVEY.

To his Excellency, LUCIUS FAIRCHILD, *Governor of the State of Wisconsin:*

SIR: The instructions accompanying my appointment as Commissioner of the Survey of the Lead District, namely, that nothing need be done that had been satisfactorily done already, and that the time and money spent in this survey should be to collect that kind of information that would be of the greatest practical benefit to the mining region, have been strictly adhered to in my work.

Your subsequent letter, however, representing the wishes of certain influential men in the lead district, namely, that the work provided for in the bill be prefaced by a careful and critical survey of the mineral veins of the lead district in their relation to the lower strata, with a report of the same, as early as possible, defined clearly the work to be done first. Although I saw at the time the importance of this, I did not realize it fully until I had entered upon the work.

The mines of the lead district, up to the present time, have been confined mostly to that portion of the strata above the water, where mining operations can be carried on at a trifling expense. But this portion is almost exhausted; most of the important mines are worked down to the water, and as they are finished to this point in depth, they are abandoned. This is all the present system of mining (by individual enterprise) can do, all it contemplates doing. To work these mines deeper, or to follow these fissures into strata below those into which they have been already worked, a new system of mining must be introduced; a system that combines capital and skill; a system like that by which mines are worked in other parts of the world. There are no mineral strata, or groups of mineral veins any where, that could be profitably worked many years with such a system as that by which mining operations have been carried on in the lead district of Wisconsin.

But before this system can be successfully introduced and established, the question of the origin and nature of our mineral veins, with their relation to the lower strata must be settled so far as it can be done in the present condition of our mines. Before any man, or any company of men, will be disposed to risk the amount of money necessary to unwater those mines to a greater depth, either by levels, or by pumping, they will want to know if the theory advocated in our last report is really founded on facts; if not, they will want to know what relation these mineral veins bear to mineral veins of other mining regions; whether or not they are connected with physical forces acting from beneath, and what the probabilities are of deposits of ore in the lower strata.

Besides this, the question of proving the lower magnesian limestone of the lead district by sinking a shaft into it has been before the legislature more than once; and should the state see fit at some future day to appropriate a sum of money for this purpose, nothing would be of more importance to the experiment than a knowledge of the origin of our ore deposits, and their relation to this lower formation, as far as the phenomena of the lead district will give it. Without this knowledge, a selection of the proper place cannot be made; and without a proper selection, the chances are a hundred to one that the money will be spent to no purpose. The general and pressing wants of the lead district seem to center here; and to meet these wants, so far as a survey of this kind can meet them, has been my object.

It must not be expected then, that my report will be a report of the lead district as a whole, but of only that class of information which has a bearing on this question. In presenting it, I shall, as far as possible, confine myself to the following order:

1. A description and classification of the phenomena of the lead district (that is, the observed features of the lead district as such), and their relation to the phenomena of other mining regions.

2. The nature of the underlying strata, and their adaptation to mineral veins.

3. Mineral veins in general, but those of the lead district in particular.

4. Scientific, practical and theoretical considerations.

But first of all, allow me to say that in order to get a clear and correct idea of the underlying rocks, and the relation of the mineral veins to those rocks, a vertical section was necessary. To obtain this there was no other way than by examining the different layers of rock as they were brought to the surface by the gradual rise of the strata to the north of the lead district. In traveling, from the southern state line northward, one hundred miles along the fourth principal meridian I found a chance to examine the different beds comprising the lower strata of the lead district, and have laid them down in a map that will accompany this report.

My object in collecting and carefully describing the phenomena of the lead district is to present in as clear a light as possible the physical causes of which our mineral veins and ore deposits are the results. Unless we ignore altogether the teachings of nature, we must admit that mineral veins and ore-deposits in the mineral kingdom are as much the results or fruits of well defined and unchangeable laws and physical conditions, as are the fruits and flowers in the vegetable kingdom, or animals in the animal kingdom.

But writing as a practical man for practical men, it may be well perhaps, to explain what I understand, and what I would have others understand by physical conditions, for in order to get a clear idea of the phenomena of mineral veins, and the characteristic features of mineral strata, nothing is of more importance than correct knowledge of the physical conditions and forces with which productive mineral veins always stand connected.

To do this, I will avail myself of the analogy that exists between the physical conditions of the mineral kingdom, and the physical conditions of the vegetable kingdom, for we are more familiar with the latter than with the former, and the illustrations which it furnishes will explain far better than any language that I can command.

In this process of vegetable production, we notice certain physical conditions that are essential. 1. There is a certain condition of the soil that is adapted to the nature of the plant. What this condition of the soil is, we know by observation and experience. 2. Heat, or a certain degree or range of temperature. What this degree, or range of temperature is, we have found out also by experience, and we look for vegetable productions accordingly. 3. Water in a humid condition of the atmosphere or in the form of rain, or applied by irrigation. Other minor conditions there may be, but these are essential. Along lines where these combine in certain proportions, we find productive zones of vegetation; where they do not, we find barren wastes. Thus the relation of vegetable products to well defined and unchangable physical conditions is so plain and simple that nobody doubts it.

In mineral strata and mineral veins, we find evidences of the same elements entering into and governing the physical conditions of the mineral kingdom. The experience of mining has demonstrated the fact that the deposition of ore in the fissure depends as much on certain conditions of the rock, as the vegetation of a plant does on a certain condition of the soil. The miner looks just as much to these conditions of the rock for the metals and their ores as the farmer does to the condition of the soil for his plants. And we hear the miner talk just as much about mineral-bearing rock, as we do the farmer about productive and barren soil.

In the formation and filling of mineral veins we recognize (and that very distinctly too) heat as one of the most efficient agencies. Nor can we possibly explain the phenomena of mineral veins with their deposits of ore without reference to water as the medium in which this material has been prepared, and through which it has been brought into the fissures, and held subject to the chemical conditions that have brought it into its present crystalline form.

Along these lines in the earth's crust where such conditions are known to have existed, and where evidences of their past activities still remain (although like fossils in the rock) are the lines in which our mines and productive mineral veins are found, and they are found only along such lines. They are, indeed, as much the isothermal lines of the past that mark the distribution of temperature, and conditions necessary to the production of mineral veins, as are the isothermal lines of the present, that mark the distribution of temperature and conditions necessary to vegetable production.

In our examinations of mineral strata then, or in explorations of the country for mineral regions, no surer guide can be furnished us than the evidences of the action of these physical forces and conditions. The disturbed and peculiar conditions of the strata along lines where these evidences are found furnish most, if not all, the material of our knowledge, from which all practical as well as scientific deductions are made. Hence the importance of presenting in my report, in as clear a light as possible, the phenomena of the lead district, that the physical conditions and forces of which they are the result may be apparent, and that deductions, both scientific and practical, may be made properly.

But, before I enter fully on the description of the phenomena of the lead district, allow me to trace a little further the analogy between these two departments of nature. It will enlarge our views, and clear our conceptions of natural phenomena, and enable us to recognize more distinctly the laws that underlie them as their cause.

We know that the vegetable and mineral kingdoms meet in the crust of the earth; the materials of which vegetables and minerals are composed are in many respects the same; both are the result of physical conditions; and in these conditions we find the same or similar elements. Yet there is a line of distinction sharply drawn between these kingdoms, their laws and their products, over which the one can never pass to the other.

In the economy of nature, as presented in the vegetable kingdom, we find heat and water among the physical conditions necessary to vegetable production. Where these conditions prevail, vegetable productions abound; where they do not, barrenness is the result. Hence the isothermal lines bounding the zones of mean annual temperature, and pointing out in the vegetable kingdom the comparatively barren and productive places. But these physical causes, in their adaptation to the vegetable kingdom, act upon it from above; the heat is evidently *solar*.

Among the varied and complicated phenomena of the mineral kingdom, we notice heat and water playing a very important part. In the conditions necessary to the formation and filling of mineral veins they seem to be essential. The mechanical disturbances of the crust of the earth that produced the fissures in which our mineral veins are found are evidently due to some form of heat. The metamorphic rocks, in the region of which our most productive mineral formations are found, have been changed from their original condition by heat. The modifications of other rocks not classed with the metamorphic, but more intimately connected with mineral veins afford strong evidences of the unequal distribution of heat. The ores of every kind, filling our mineral veins and other cavities in the rock have evidently been formed by the rigid laws of primeval chemistry, the fires of whose laboratories have been fed by internal heat. Thermal waters and boiling springs (the lingering traces of what was once a mighty host of physical force) remain to tell us that they had their origin in, and received their solvent powers from, heat. The systematic grouping of fissures in mineral strata, under the direction of magnetic or electro-magnetic action, is due, doubtless, to varying degrees of temperature, or the unequal distribution of mineral heat. Indeed, it is difficult to find anything in the mineral kingdom connected with mineral veins that is not due either directly or indirectly to heat.

Here too, as in the vegetable kingdom, we find certain conditions and forces uniting to produce certain results. And it is only when and where such conditions prevail, that such results are obtained. The lines that mark the course and action of these forces are as legible in the crust of the earth, as the lines that mark the zones of productive vegetation on the surface.

If we examine closely the physical conditions and forces of these two departments of nature, but few things will strike us with more force than the laws governing the absorption and radiation of heat. In the vegetable kingdom every tree, every plant, every flower, in fact every organism seems to possess different absorbing and radiating powers, by which it is adapted to receive the warming, life-giving rays of the sun; indeed it presents one of the most refined systems of order and adaptation. And yet, this beautiful system is made to depend upon the amount of heat received from the sun, and upon the position of the earth in reference to the sun.

No less distinct are the evidences of the relation of heat, and the laws governing its absorption and radiation to the varied forms of crystalline matter in the mineral kingdom. But between the phenomena of heat in the vegetable kingdom, and the phenomena of heat in the mineral kingdom, there is a marked, indeed an essential, difference. This difference arises, no doubt, not from an essential difference in the physical character of heat, but from an essential difference in the sources from whence it flows. We cannot fully comprehend the difference between minerals and vegetables—both of which are the products of nature, formed out of similar material, heat being one of the elements of their conditions—until we regard the line that separates the vegetable and mineral kingdoms, as being the line that separates between the products of *solar* and *terrestrial* heat. The evidences of this are strong and convincing, they appeal to our senses, and through them carry conviction to the mind.

The uneducated farmer feels, while moving amid the rich unfoldings of vegetable nature, that the heat to which these organisms are subjected flows from the sun as its source; while the miner, untutored as he may be, in his downward course in the mine feels that the increasing temperature he encounters is produced by heat arising from some internal source.

The convictions fastened on my mind in early life by such experiences in the deep mines of Cornwall, England, can never be changed by arguments to the contrary. It may not be so easy to convince others who have not been made acquainted with such evidences. It is natural for us without them to believe that the earth beneath our feet is a solid mass of rock. But even then, one would suppose that the first shock of an earthquake, or the first sight of a volcano in the act of pouring forth its molten lava would unsettle our faith in this, and prepare the mind for the reception of any evidence that would throw light on their origin.

The rapid advance of the natural sciences, however, and the careful experiments on the increasing temperature downwards of our deep mines are fast divesting this question of central heat of its hypothetical character, and causing it to be regarded as a settled fact.

The observations of Prof. Palmieri, made during the last eruption of Vesuvius, has brought to light the following startling fact, namely, that he noticed on that occasion distinct tidal phenomena, indicating that the moon's attraction occasioned tides in the central zone of molten lava very much as it causes them in the ocean. This would leave us to infer that volcanic phenomena are connected, at a certain depth beneath the surface, with a continuous sea of molten lava or rock.

Prof. David Forbes, in one of his recent lectures, sums up the evidences of deep mining on central heat, in the following language:

"A numerous set of experiments made in deep mines in various parts of the world, often far distant from one another, has conclusively proved that the temperature of the earth, at least as deep down from the surface as has been explored by man, increases in direct ratio as we descend towards the center.

Other observations on the temperature of the water from deep-seated and hot springs, and from artesian wells fully confirm the experiments made in mines, and show that the temperature of the water furnished by them also becomes higher in proportion to the depth of the source from which it is derived.

"As might naturally be expected, the interference of local causes renders it a matter of considerable difficulty to determine the true mean, general rate of such increase in temperature of the earth's substance downwards; still, in the main, observers all agree in placing it at somewhere between 1½° and 2½° F. for every hundred feet in depth, so that we cannot be far wrong, if for our purpose we estimate it at 2° F. for every hundred feet in depth, or a rate which amounts to 121° for each geographical mile nearer the earth's center. Since no facts are at the present time known which can in any way invalidate the supposition that this, or a somewhat similar rate of increase in temperature holds good in still greater depths, it is perfectly correct and justifiable reasoning to assume that such is actually the case, and therefore a simple calculation will show that at a depth of about twenty-five geographical miles from the surface downwards, a temperature of about 3,000° F. should be attained, which would represent a heat at which iron melts, or one sufficient to keep lava in a state of molten liquidity at the surface of the earth."

The distance of twenty-five miles between the source and phenomena of internal heat strikes us at first as being too great to be admitted as true. But this distance sinks into nothing when we reflect on the fact that twenty-six millions of miles separate the sun from the phenomena of the vegetable kingdom, known to be the results of it's heat.

We have reason to believe that it is this internal heat that produces earthquake action, volcanic action, metamorphic action, thermal waters, boiling springs, and the complicate phenomena of mineral strata, and mineral veins. If by the aid of science Sir John Herschel could thirty-eight years ago, say that "the sun's rays are the ultimate source of almost every motion which takes place on the surface of the earth," we may safely say to-day, that this central heat is the ultimate source of almost every motion which takes place, and has taken place in the crust of the earth; that it is to the mineral kingdom what the sun is to the vegetable kingdom, the ultimate source of physical forces and conditions.

This brief explanation of the nature of the physical condi tions and forces of the mineral kingdom will prepare us to understand them, and give us clearer conceptions of the phenomena of the lead district, as presented in my report.

PHENOMENA OF THE LEAD DISTRICT.—The history of mining in all parts of the world and the experience of all who have had much to do with this branch of industry testify, without exception, to the fact that mineral veins or ore districts are always associated with lines of physical disturbance in the earth's crust. They may be mountain ranges, or more gentle elevations. They may be dykes of igneous rocks, or lines of fracture in the earth's crust; but always lines of physical disturbance of less or greater intensity.

But of the lead district of Wisconsin it has been said that it is an exception to the general rule. The relation of its fissures and ore deposits to physical forces acting from below has been denied, and other conditions have been called in to explain their phenomena.

Although one may not endorse the theory fully, yet when it comes from high authority it is difficult not to be influenced by it in our investigations, to a certain extent, at least. But in entering upon the investigation of the phenomena of the lead district I resolved to rid myself of all theories, and follow only the light of facts, so far as I understood them.

I think it was Prof. Tyndall who said: "There is no discovery so limited as not to illuminate something beyond itself." Every investigator of nature knows how true this is; and furthermore, he knows that there is not a fact in nature but what possesses the power to bring within view another fact which lies beyond it; a fact we could not see but for the light reflected by the one in our possession. It is this that gives that charm and enchantment to original investigation, that comes not within the sphere of those who merely read science in books.

Free from theoretical bonds, and with a few facts to begin with, I entered upon the investigation of the phenomena of the lead district; commencing with the simple fact (with which all are familiar) that our ore deposits are invariably connected with fissures. Standing for a moment on this fact, and looking around the circle which it illuminates, I see another fact. This fissure is only one of a group of parallel fissures from five to ten feet apart, called by the miners a range. And within this illuminated circle there is still another fact, that there is an indisputable relation between this group of fissures and the ore deposit.

In the combined light of these facts our range of vision is considerably enlarged. We see now that this single group of fissures (or range) is only one of a group of ranges extending every way, and forming what is called a mining district. In the center of this district the ranges are near each other and rich, but as we extend away from the center the ranges become scarcer and not so rich. But now away on the horizon of our vision another fact appears, and in its light we can see that this group of ranges, or mining district, is bounded on the east, west, north and south by barren ground.

By the concentration of the light of these facts, the range of our vision is widening, and we see now coming into view beyond this barren ground other and apparently similar mining districts, as though they were arranged in an east and west line. If this is a fact, it is an important one, and a new discovery. But before we accept it as a *fact* let us submit it to a rigid test.

To do this let us go to the southwest corner of the state where these mining districts commence and drive down a stake at Fairplay, and another four or five miles to the north, at Jamestown. And now let us draw two lines from these stakes east, or a little to the north of east, to range seven, in Green county. Now let us carefully look along within these lines, and see what we can find. We have within these lines the mines of Fairplay, Jamestown, Hazel Green, Benton, New Diggings and Shullsburg. Extending east from Shullsburg, no very important deposit of ore is found until we reach the east side of the west Peccatonica, where we find Wyota, on the extreme north line, and the region about Monroe, the eastern extension of these mining districts.

While working out the details of this system or grouping along this range of country through nine ranges of townships, I was never more surprised in the results of a survey than to find when figuring up my notes and bearings, which had been taken by myself with great care, that within a breadth of six miles we have a belt of mining districts, along a belt of mineral land, extending in nearly an east and west direction for at least fifty miles.

As I stood one beautiful day on the high grounds above the village of Newdiggings, with my compass set to within a few degrees of east and west, and looked over this long range of mining districts, I felt confident that in all my experience in mining and mineral labors, I had not seen, to such an extent, a better defined belt of mineral land. Nor do I believe that another belt of equal extent and depth, either in this or any other country, has yielded more ore than this, or paid better for the capital invested. It is, however, one of the unfortunate mistakes of our state that no mining record has been kept, no clue even left as to the quantity of lead ore thus far obtained. We may form some idea of the amount, however, by putting together some scattered facts recorded concerning certain portions of these districts. Hazel Green furnishes the most reliable; and our thanks are due to the late Mr. Crawford for these.

Prof. Whitney (who by the way was very careful not to over-estimate our mineral resources) reported as reliable 127,000,000 pounds up to 1860, with an annual yield of about 2,000,000. We may, perhaps, safely set down for this mining district up to the present time, 150,000,000 pounds. And this amount of ore has been taken from a mining district not over four miles in length, and from fissures and openings mostly above the water level, at an average depth of not over 45 or 50 feet.

And this is only one of six or seven like districts along this belt. And then, the mines along this entire belt are worked in the Galena limestone, mostly in the upper portion of this formation, with the blue limestone underlying it all the way.

Shall we now abandon our mineral resources (as we are more than likely to do, unless some special effort be made to revive our drooping mining interests), and leave these half-developed mines to future generations? Will they not be apt to give us a place in the scale of civilization not much in advance of that race from whose hands we but a few years ago received these lands with the mines partially opened.

Putting together these simple facts, such as fissures and groups of fissures; ranges, and groups of ranges; districts, and groups of districts, all of which are related, we have this well-defined mineral belt as a *fact;* from which as a standpoint we are now prepared to examine a higher class of facts to which this belongs.

Looking north, we observe in the distance other mining districts apparently arranged along a similar line. On reaching town three, and following its south line west to where it intersects the Mississippi, we notice very similar phenomena to that described in the belt just referred to. Let us put down a stake here also, and measure four or five miles north and put down another, and from these two stakes draw two lines as before, east or a little to the north of east, and see what we include. We have the mines of Potosi, British Hollow, Rockville, Pin Hook, Red Dog, Whig and Platteville, in Grant county. In extending into La Fayette county, this mineral range encounters the elevated lands of the Platte Mounds, and but little is seen of it until we reach Calamine, Fayette and Argyle, where it may be seen as a mineral belt extending into Green county, where to, like the other, it is lost in range seven. What was said of the other belt may be said to a great extent of this; only that it is not quite so productive perhaps, as a whole.

With the additional light of this fact, it is not difficult now to see another belt near the south line of town five. A belt, which though well defined through three ranges of townships in Iowa county, and one in Grant, (including the mines of Mineral Point, Diamond Grove, Lost Grove and Mifflin, in

Iowa county, and New California and Crow Branch, in Grant county,) is nevertheless disturbed at the west end, as it comes in contact with the geological break along the valley of Grant river, where it seems to be borne down a little out of its course to Beetown, but there it again takes its regular course. Towards the east end it encounters a very heavy ridge, or elevation of land coming down from the northwest of Dodgeville, and extending in a southwest direction through the county. The belt, when coming in contact with this ridge, seems to follow its course; and groups of mineral ranges are found along its flanks for ten or fifteen miles.

The geological features of this belt are somewhat different from what we find in the other two. The strata are more broken; evidences of disturbance of the lower beds of the strata are seen in the undulations of the sandstone, and the protrusion of the lower magnesian limestone in several places through the sandstone. Owing to this, there has been greater denudation, consequently we have here, in many places, a large exposure of the blue limestone, affording a good chance to study the mineral bearing character of this formation along a line of physical disturbance. The mines at Mineral Point, Diamond Grove, Lost Grove, Mifflin and Crow Branch are now, and have been for several years past, confined mostly to this formation, establishing beyond doubt its mineral bearing character. To this I shall refer again.

North from the third belt we commence to ascend a gentle elevation which culminates about the middle of town six. Along the south flank or near the center is another well defined belt, extending through a large portion of Grant county, the whole of Iowa, and for several miles into Dane; and the mines of Fennimore, Wingville, Spring Valley, Dodgeville, Ridgeway, Porter's Grove, and Blue Mounds form a chain of mineral ranges, extending through nine ranges of townships; and their course is as distinctly marked as the lines of the town (six) in which they are found. The north side of this belt is said to be the extreme north side of the lead district, beyond which no ore has been found, and beyond which, it has been said, none will be found. We will pause here for a moment and gather up what facts we have discovered.

The phenomena presented in these belts of mineral land cannot fail to lead us to regard them as separate and distinct mineral belts. There may be places where strong north and south fissures carry the ore deposits out a little farther in one place than another, or where small deposits may be found along the north and south fissures between the belts. But these are exceptions seldom met with. The fact, however, of their persistent course, their parallelism, their eastern and western extension, establishes beyond doubt the fact that they are separate and distinct, although closely related, mineral belts.

In the report of 1862, the grouping of the fissures into ranges, and the ranges into districts was noticed, but no effort was made to show the relation of these facts to a higher generalization; consequently the lead district has been looked upon up to this time as a heterogeneous, unsystematized aggregation of mineral ranges.

But the above facts show that there is a systematic arrangement of the phenomena of the lead district under some natural law by which it forms itself into a perfect whole; that we have a group of fissures forming themselves into a range; a group of ranges forming themselves into belts, and a lead district composed of four well defined belts of mineral land, running parallel to each other with about the same eastern and western extension. Now the question for consideration is: Do these important and well defined relations end here, or is there a physical basis which they indicate, and on which they rest?

If in the light of the lesser facts with which we commenced we have been enabled to reduce the phenomena of the lead district to a system, let us see if in the light of this generalization we can find any evidences of such a basis.

In astronomy the slightest disturbance of a planet in any given point of its orbit is sufficient to turn all astronomical appliances to that point in the heavens to look for the cause. In geology the slightest disturbance of the strata along any given line ought to be sufficient to turn all geological observations to that spot for the same purpose.

I noticed in the third belt of mineral land slight disturbances of the strata, such as here and there protrusions of the lower magnesian limestone through the sandstone. This, to an unbiased geologist, would be sufficient evidence of the action of physical forces from below along the line of this belt, but to a man who will dispute every inch of progress science makes, it will weigh but little. I will therefore use it only as a guide to more important phenomena.

The fourth and last belt is, as before stated, along the south flank of a well-defined elevation of land running parallel with the belt, with about the same eastern and western extension. I will not stop to describe this elevation or to show its relation to forces acting from below. The following quotation from the report of 1862 wlll be sufficient for this purpose.

"The line of water-shed as represented on the above diagram, between the streams flowing north and those running to the south, is almost exactly a straight east and west line from the Blue Mounds to Prairie du Chien, and for a distance of almost sixty miles. * * * * * No one observing the position of this line could fail to recognize the fact that its origin was due to some general, geological cause, as will be explained further on." Page 103.

On page 387 we have the following reference to the same elevation.

"As a proof or at least a strong indication that the axis of elevation was an east and west one, the fact may be here again alluded to which was stated in a preceding chapter in regard to the water-shed of the district being an exact east and west line through the whole extent of the lead region."

Now the fact that the fourth belt is along a well defined elevation of land of the same bearing and extension, produced by the same general, geological cause acting from below as an elevatory force, proves beyond all doubt that the slight disturbances referred to in the next belt south, must be the result of the same, or a similar cause. And what can be a more logical inference, than that the other belts have the same origin, and that the phenomena of the whole district are the results of the same geological cause.

Here we have a new fact, and a very important one, namely, a mechanical force acting beneath the strata of the lead district, and giving character to its phenomena. This fact sheds new light on our investigations, and enables us to take higher and more intelligent grounds from which we can see a continuation of parallel elevations, such as the Baraboo Hills and other ridges, and foldings of the strata extending away into the far north. These facts indicate strongly another fact, namely, the presence of a north and south axis of elevation to which these east and west elevations and belts of mineral land belong as subordinate features, crossing it at right angles, limited to it in its eastern and western extension. If this be a fact, we shall doubtless find here not only the physical basis that underlies the phenomena of the lead district as its cause, but a line of physical disturbance along which other, and perhaps more important ore districts may be found. But before we accept it as a fact let us submit it also to a rigid test.

In order to put this in a tangible form so as to examine the facts to the best advantage, let us take the length of these belts as the width of the lead district, and from each end draw a line north. Within these lines we shall find the following facts, which of themselves are sufficient to prove the existence of the north and south axis above referred to.

(1.) If we take a narrow strip of land near the center of the belt within these lines, say three ranges on the east, and one on the west of the fourth principal meridian, four ranges in all, we shall find in this little narrow strip more mines, and mines from which more ore has been raised than from all the lead districts outside of it, notwithstanding it includes in width fourteen or fifteen ranges or townships; I should be within the bounds of truth if I were to say three times the amount. Within these four ranges of townships the ore deposits are near each other, and often very extensive, but as we extend east or west from them they become few and far between, and often, though not always, small. In connection with this I will notice the fact that within this narrow strip of land all of our zinc deposits are found. Indeed, we may strike off the range to the west and narrow the strip to three ranges, and we shall include all the zinc deposits of any amount. This may be accounted for from the fact that along this line north and south the blue limestone is brought up a great many feet above where it is on either side of it.

(2.) Both to the east and west of these lines, we find heavy deposits of drift, and following close on the lines, both to the north and the south; while within the lines no portion of this formation is found in the lead district, or as far north of it as I have examined. This fact alone is sufficient to prove that this little strip of land, along which the mines and mineral veins of southern Wisconsin are found, and that continue to extend north beyond them, was a well defined elevation at the time of the drift formation. It must have stood then as an island surrounded with the waters of that period, as it stands now an island in the midst of boulders and gravel.

(3.) And the most important fact is, that this driftless strip of land within these lines is an anticlinal, or crest line from which the strata dip to the east and to the west. To prove this has taken a large amount of time, and close observation, as you will see by the vast amount of country I have examined.

The importance of this fact to the lead district and to the mineral resources of the state is such, that I will present here some of the details of my observations; for if this fact be well established, the fact of a north and south axis must follow; and with this comes the fact of the relation of our mineral veins to the same physical forces acting from below; and then the fact that this north and south axis extending through the state will be the physical basis of our mineral wealth, and along its line other, and perhaps, more important ore districts may be found.

We must not expect the features of this anticlinal or crest line to be very distinct on the surface. The disintegrating and abrading agencies, which through vast cycles of the past have been leveling down and leveling up the surface of the lead district, have almost obliterated them; and to find them unimpaired we must examine the lower and undisturbed beds of the strata.

To do this, let us take our stand at a point on the Mississippi where we have a good exposure of the lower rocks; we will commence at a point just west of Potosi, where we find the blue limestone down even with the water level. If from this point we draw a line east, or parallel with the mineral belts before referred to, we shall find the lower beds of this formation gradually rising as we approach the center of the district. A little east of Potosi, for instance, on a branch of the Platte river, we find the sandstone rising from the bed of the stream and forming a ledge of rock along its banks, bringing up the blue limestone at least fifty feet above its level at our starting point on the Mississippi. In following this line across the Platte we find the lower beds of the formation still rising. Not only do we find the sandstone, but the lower magnesian limestone that underlies it, forming ledges from fifty to seventy-five feet high, bringing up the sandstone and blue limestone not less than two hundred feet above its level on the Mississippi. Further east on this line the lower beds of rock are not sufficiently exposed to enable us to determine just where the summit of this anticlinal is reached, or just where it commences to dip on the other side.

If, however, we take our stand on the Mississippi, a little further north, about where the Wisconsin river enters it, and follow along the line of the Milwaukee and St. Paul Railroad, we shall find a section across this elevation that will bring out to a great extent its outlines.

At this point the lower magnesian limestone extends down to the water level, or below it, the Potsdam sandstone forming the bed of the river. In extending our examinations east from this point, we find in a very short distance the sandstone emerging from beneath the valleys, and gradually rising until it reaches a point near the fourth principal meridian. Here we find an elevation of the Potsdam sandstone from 200 to 250 feet above the valley of the Wisconsin river, and not much less than 300 feet above its level at the Mississippi. After extending along for several miles at about the same level, a very preceptible dip sets in to the east, and it soon disappears beneath the deepest valleys. This section not only brings out the fact than we are crossing an elevation, or a north and south anticlinal axis, but shows us just where the summit is.

To settle, however, a question involving general principles by a few local observations was not safe, and to place it beyond doubt, a knowledge of the geological position of the rocks across this strip of land, was essential further to the north. The center of this strip from the southern state line to the middle of Wood county, I explored several years ago at my own expense, when I first brought to light the fact of a bed of kaolin at Grand Rapids, and also others not far from Stevens Point, that are found along the flanks of granite ridges. For information on this part I can draw on my old notes. And moreover by your kind permission I visited the east side of our state last spring as far north as the upper peninsula of Michigan, and this fall, the western side as far north as lake Superior, and I am now prepared to state the facts obtained in those several visits.

On the east side of the line running north from the lead district and close to it, I find heavy deposits of drift extending from Illinois on the south to the upper peninsula of Michigan on the north. The strata do not rise so fast to the north along the eastern side of the state as through the center; for we find the blue limestone as far north as Green Bay.

On the west side of the state, that is to the west of the Missisipi, I find the same drift phenomena close to the river, and extending north the entire length of the state. On the west side of the state, as well as on the east the rise of the strata toward the north is little or nothing compared to the rise of the strata along the center.

But let us put these facts and figures together and see what the result will be; or rather before we do this let us get a clear idea of the strata and their geological order. Taking the azoic formation as a basis, we invariably find the Potsdam sandstone, a layer of rock about 450 or 500 feet thick, resting on it; the lower magnesian limestone about 300 feet thick resting on the Potsdam; the St. Peters' sandstone, about 80 or 100 feet thick, resting on the lower magnesian; and the blue limestone resting on the St. Peter's. This is the geological order; and the thickness of these strata when every bed is in its place, is from 800 to 900 feet.

Now let us see what our facts prove. We have the blue limestone on the east side of the state as far north as Green Bay; on the west side as far as St. Paul, while within our lines (or the width of the lead district) it extends no further than town seven in Iowa county. Thus we see that the blue limestone extends north along the flanks of this elevation one hundred and twenty miles further than it does along the center. But let us put these facts in another form. At Green Bay we find the blue limestone about on a level with the water; near St. Paul it occupies about the same relative position to the Mississippi; but through Wood and Clark counties the azoic is in many places above where the blue limestone would have been if there had been no elevation there.

If now we draw a line on a horizontal plane from the water level at the Mississippi to the water level at Green Bay, we shall find at each end of the line there will be at least 800 feet of sandstone and limestone between the ends of our line and the azoic formation below; while through Wood and Clark counties the azoic will stand not less than 200 feet above the line. Now if we sink our line down to a horizontal plane with the azoic on each end of it, we shall find the height of our elevation above it in the above named counties to be not less than a thousand feet. Here one hundred and twenty-five miles to the north of the lead district, we find a continuation of the same north and south elevation, and gaining in height as we extend north.

While on this trip, I made a hasty visit to Lake Superior by way of Duluth and Bayfield, to where this north and south elevation would intersect the lake. Reaching the shore at Ashland, I extended my observations south about twenty miles, near the west line of range four west. This is near our west line of the lead district. From this point I extended my observations east toward the fourth principal meridian, through an almost impenetrable forest.

I found here the same geological arrangement of parallel ridges, with just the same bearings as those in the lead district, and all dipping down and dying out as they extended west. Here we are altogether in the azoic formation, with the strata very much disturbed; consequently it is impossible to judge as accurately as where we have undisturbed rocks for our guide; and furthermore, at this point the axis we have been following north forms a junction with an east and west axis of elevation known to extend from Labrador to the sources of the Mississippi.

My object in going to this place was not so much to find out the evidences of this axis of elevation, as to find out if there are any lines of fracture, or systems of dykes traversing the azoic formations here, and if so, what their bearings are. South of Ashland the country is covered with a very thick bed of marl, forming a basis for agriculture such as we seldom meet with, and supporting a forest of which the state may well be proud, but hiding mostly her mineral treasures and their phenomena. It was not until I reached the base of the Péno-kee elevation, along the Bad Ax river country, that I could get a good exposure of the rocks. But along this region, and to the east of it, good exposures of the strata are occasionally met with.

In but few places where the azoic rocks are exposed as the surface rock do we find stronger evidences of mechanical disturbance and long continued exposure to heat, than here. The mechanical forces, however, by which these strata have been brought up to such an angle, do not seem to have acted with great violence, but to have acted through long periods of time. The rocks are not fractured as in many places, and the systems of dykes are mostly (as far as they came under my observation) running with the strata, and between the different beds, crossed by smaller veins cutting the strata at right angles.

At one of the falls on Bad river there is a beautiful exposure of trap, conglomerate and other members of the azoic formation. These different beds are almost perpendicular, and have a bearing almost north and south. Where I could get a good sight with the compass the bearing was about north, ten degrees east. Between the trap here (which is a beautiful amygdaloid) and the conglomerate, there is what a Cornish miner would call a great cross course. It is from thirty to forty feet wide, and the order of its formation and filling is as follows: The trap presents a regular, smooth wall, as fine a specimen of slicken wall-rock as we usually find in a true fissure vein. On this wall is a very fine grained fluccan from four to six inches wide. Next to this fluccan is a soft blue and reddish clay, passing into a soft clay slate, with bunches of calc spar, laumonite, prehnite, and other materials of this character.

I give this as a specimen of the lines of fracture that traverse the azoic here; and certainly this is one of the places where nature permits us to look upon the results of mechanical and chemical forces in their normal condition; where she draws back, as it were, the covering that hides them from our view in the lead district, and invites us to examine the forces and conditions that resemble, (if not the same) those that underlie the phenomena there. The details of my observations on this trip are now being published in the Darlington *Republican* and the Dodgeville *Chronicle*, and I will only add, that the geological position, physical conditions, and various other indications of mineral strata found here, are such as would lead us to suppose that this is one of the most likely places in the state for large and extensive ore deposits. At the Penokee elevation, vast and almost inexhaustible beds of magnetic iron ore stand exposed. Along the belts between this and the lake, good specimens of both lead and copper have been found, although the country is almost inaccessible to explorers, and I have no doubt that when a systematic investigation is made, either by the state or private enterprise, other minerals will be found, especially on the south side of the Penokee elevation, such as graphite, gypsum, apatite, or the native phosphate of lime, and other minerals of this class, now so much needed by the state for agricultural and other purposes.

Having followed out this class of phenomena to such an extent, I will return to the lead district. But before I do, I would like to say that these phenomena, such as an axis of elevation across which belts of mineral land are found at right angles, are no new features in mineral strata, but are the common, though very important features of old and long established mining regions. As an evidence of this I will introduce one or two examples here.

In Van Cotta's Treatise on Ore Deposits, page 427, we have the mining district of Cardiganshire, Wales, presented in the following language: "Cambrian clay slates and related rocks predominate on the west coast of Wales. These slates are not disturbed by igneous rocks, and contain numerous lodes at the boundaries of Cardiganshire and Montgomeryshire. The district containing them is about forty miles long by five to twenty-two miles broad, extending north, north-west to south, southeast; and lodes as a rule strike east, northeast; west, southwest; consequently almost at right angles to the longest axis of the entire belt." In another place in the same report the writer has classified these lodes into six groups or belts.

In the geological arrangement of this mining district, and the lead district of this state, it is impossible not to notice a striking similarity. Along this axis (which is nearly north and south) there is no disturbance of the strata by igneous rocks, and yet a persistent course is maintained for forty miles with belts of mineral veins crossing it at right angles. It is impossible also, not to notice that such geological arrangement is the result of some general law affecting mineral strata. I will here introduce another example, on a more extended scale.

I have before me a geological map of England, and Wales, by Bakewell. If on this map, we look along the western coast of England and Wales, and from thence into Scotland, we observe a tract of land along which the mines of these countries are found. Along this tract we have some of the oldest mines in the world. Mines that were worked over three thousand years ago, and were visited by the first commercial nations of antiquity. We have here also, some of the best defined fissures and mineral veins in the world; fissures and veins that have been fully developed, and their characteristic features marked and distinct. In no other mining region are these systems of grouping into belts and districts, more distinctly marked.

Suppose now, we go, to the western part of England and drive down a stake at the extreme northwestern part of Lands End, in Cornwall, and from that take measure about seventy or eighty miles east, and drive down another, (that will be about the width of the lead district of Wisconsin.) Now let us draw two lines from these stakes north to Scotland, a distance of three hundred miles or more, and then see what will be included within these boundaries. We have all the mines of Cornwall, Wales, Anglesea, and the Isle of Man on the north. South from Lands End, our lines cross the English channel and strike a belt of mineral land on the western portion of France. "This is a belt," says Von Cotta, "lying north and south, whose northern prolongation touches these lines still further south." If we are curious enough to follow these lines further south by taking a good map we can see that they, after crossing the Bay of Biscay, strike the north coast of Spain in the province of Santander, between the western portion of the Pyrenees and the sea, and include the extensive lead and zinc mines of that province.

I refer to these facts, (1.) Because they are plain and open for inspection; any man with a good map can trace them for himself. (2.) Because they prove beyond doubt that this system of grouping is not a mere accidental occurrance in nature, but the result of some general law with which mineral veins are always connected. (3.) To show that this law is not limited in its operations to one ore-district, to one province, or to one island, but is operative throughout this vast belt of mineral districts from Spain to Scotland. (4.) To show that its seat of action is *too deep* to be disturbed by the waters of the ocean, or to be reached by the arts of mining.

Having now satisfied myself fully of the evidence of an elevation of land running north, and that this elevation was a line of physical disturbance along which the belts of mineral land in the lead district were arranged, I felt confident that the northern boundary of the lead district had not been reached; hence I commenced a systematic investigation of the strata north of the last belt of mineral land in town six. Two important considerations led me to do this.

(1.) It is usual for mineral districts formed like this, with east and west belts crossing a north and south axis, to taper out gradually, that is the ranges become smaller, the ore-deposits scarcer or the ore more mixed up with other material. Having noticed instances of this kind before in well developed mineral districts, along well defined axes, and knowing that these things are governed by general laws I looked with a great deal of confidence for a mineral belt of some kind north of the old boundaries of the lead district. (2.) The strata of the lead district crop out here, and if another belt is found it must be in the sandstone or below it. It is no easy matter, however, to discover a belt of mineral land where no excavations have been made. Those in the lead district were not noticed as belts until the present survey; and it is a question whether they would be noticed now, but for the mining excavations made along their course.

In this my report on the region directly north of what was supposed to be the boundary line of the lead district, I will call attention to a class of phenomena somewhat different from that already described in the report of the lead district proper.

The well defined belt of mineral land in town six (supposed to be the last belt of the lead district north,) is found along the southern flank and (in some instances) near the summit of an elevation or ridge of land running from near Prairie du Chien on the west to Blue Mounds on the east, a distance of sixty miles or more. This ridge of land, as before remarked, runs parallel with the belts of mineral land in the lead district, and has the same eastern and western extension. And, what is also very remarkable here, the Wisconsin river about ten miles north of it follows the course of this ridge along its whole length, but coming against the north and south line on the extreme east side of the lead district where the mineral belts and this ridge give out, it bends around to the north of east for a short distance, then turns nearly west until it reaches the same line, and from this place continues its course north through the state along the east side of this north and south axis. Now whether we must regard this fact, (that is the course of this river, now along the north side of this east and west elevation, and then turning at the line at which this elevation gives out and following along the east side of this north and south axis) as a coincidence, or a part of the same system of physical disturbance is a question for the future to decide. That the east and west elevation is a part of the same system of physical disturbance to which the lead district belongs will hardly admit of doubt.

When I speak of physical disturbance, I do not mean active volcanic disturbance, nor active earthquake disturbance in the ordinary meaning of these terms, but a line along the earth's crust where we have evidences of the action of mechanical and chemical forces that have been gently (imperceptibly it may be) lifting, disturbing and fissuring the rocks through vast periods of time, and filling those fissures with chemically deposited material. These, rather than active volcanic forces, are what we usually find in connection with mineral strata. To these forces we shall refer again in connection with mineral veins.

Commencing my examinations to the north of the lead district, along this east and west elevation, my attention was first directed to various basin-shaped depressions, or what are usually called by the miners, sink holes. If the rocks were of volcanic origin I should not hesitate to call them vents; or if they were in the organic formation I should pass them by as chimney like perforations peculiar to that period; but in sandstone and limestones their origin is not so easily accounted for, but that they bear some relation to this system of physical disturbance I have no doubt.

These sink holes do not appear to be confined to any one part of this elevation, or any one geological formation. I have noticed them through almost its entire length. In one place where a branch of the East Peccatonica cuts back into this elevation in town six, range four east, I counted as many as ten of these sink holes on about a section of land, some of them ten, others fifteen feet deep. Mr. Thomas Strutt, a farmer living in the neighborhood, told me that in the spring, when considerable water falls and flows into these places, he has known the bottom to give out or sink down several feet. What is very interesting in connection with this place is, these sink holes are found about the center of the mineral belt on the south side of this elevation, and are cutting down into the lower magnesian limestone; and from the fact that the water passes freely through them they must be connected with the strata below. To the north of this place, and a little to the north of the center of the elevation we find sink holes in the upper sandstone, or the St. Peter's sandstone as it is called in the books; and where the strata thicken we find them in the Galena limestone also.

About sixteen miles to the west of this, in town six, range two east, and about four miles to the north of the village of Linden, on the summit of this elevation is a very noted sink hole. It is about 225 feet long, 125 feet wide, and from 25 to 30 feet deep. It is now a pond of water, the lower portion having been filled with clay soil and other material washed into it from the surrounding country. Mr. J. U. Baker, an old resident there, told me, some time since, that twenty-five years ago it was not filled as it is now, but was open to a great depth. He stated also that when water flowed into it from heavy rains, it would find its way in a very short time in a turbid state to his spring, a distance of nearly a mile to the north. There is a point here worthy of our attention. The place where the water enters the sink hole on the summit of this elevation is almost on the top of the galena limestone; where it comes out at the spring it is between the lower beds of the blue limestone and but a very few feet above the sandstone, giving at least a vertical depth of 250 feet. Unless this sink hole extends through the whole of these strata, we cannot conceive how water in a turbid state could possibly find its way in so short a time to such a depth; especially when we consider that the lower beds of galena limestone and the upper beds of the blue (strata equally favorable for the escape of water) crop out above the spring along the side of the same hill.

There are many other sink holes in this elevation of considerable interest, especially those at the West Blue Mounds. Approaching the mounds from the west, these sink holes seem to converge as though they would center in this elevation. Ascending the mound from the west side, we find, about half way from the base to the summit, two or three sink holes near each other; one of them of considerable depth showing a ledge of rock for at least twenty-five feet. On the north side and nearer the summit, instead of sink holes we find slight depressions with a damp, marshy surface, while on the east side, near the summit, and full four hundred feet above the surrounding country we find several never-failing springs of water.

The West Blue Mound is 1,150 feet above Lake Michigan, or nearly 1,800 feet above the sea, and is one of the highest, if not the highest point of land in the state of Wisconsin. To suppose that this large marsh on the north side near the summit from which are cut several tons of hay every year, and those springs on the east side, a little higher up are supplied with water from what falls on the summit of the mound, is absurd. To account for the water that supplies these springs and this marsh land at this altitude but two other ways are left us. One of these is hydrostatic pressure, the other is mechanical force acting from below.

If a body of water can be found at this altitude or above it, with a possible connection with these springs, then this body of water will be, in all probability, the source. But if such a body of water cannot be found, then our only chance is to accept the latter as the cause. This key will doubtless explain most of the phenomena along this elevation of land, and perhaps throw considerable light on our mineral veins; but I forbear using it for the present.

There is another class of phenomena that I would briefly refer to in connection with this topic, and which bears perhaps a closer relation to it than we may at first suppose, namely; the chimney-like perforations we sometimes observe in the sandstone. This class of phenomena is noticed only by a close observer; in fact the chances for observation are few, for this rock is exposed only at its out-crop along the streams. Where the rock is opened as a quarry, we sometimes meet with good examples. These perforations (or what were once holes in the sandstone made previous to its consolidation) resemble very much the perforations in the azoic formation with this difference; the former are filled with the same material, sand; while the latter are usually filled with foreign material, or matter in a different state of crystallization.

These perforations vary in size from a few inches to two or three feet in diameter. They are always filled with the same material, as the rock in which they are found, but when the rock is removed the filling sometimes remains like a pillar of sandstone cast in a mould. A good specimen was found some time ago at Mineral Point, and is now in the possession of E. J. Cooper, Esq., of that place, whose good nature will lead him, we hope, to make a donation of it to the Academy of Sciences, where it will find its place among other specimens from the lead district. Such specimens are seldom met with, for it is only where the sand rock has obtained a certain degree of hardness that they can be found. Where it is more friable the impression only is found, reminding one of some ancient volcanic vents that are not only extinct, but filled with, and buried in their own ashes.

Where the rock is sufficiently hard to retain its form, the filling separates easily from the mould, and the mould has the appearance of a channel or pipe through which water had been forced either from above downwards, or from below upward

The sides of these channels or pipes seem sometimes almost vitrified, as though the water passing through them had a very high temperature, and continued passing through for a great length of time. All things considered it would seem that the passage of this water (if it was water) was from below upward in the shape of thermal waters.

It may be premature, with the limited information in our possession, to attempt to explain the origin of this class of phenomena, or its relation to other classes of phenomena connected with our mineral veins; but it certainly justifies the presumption that it belongs to a class of phenomena which will, when the details are worked out and classified, establish the dependence of our mineral veins upon the physical forces that have acted upon these mineral strata from below. And certainly it justifies the conclusion that these are evidences and manifestations of mechanical forces (whatever may have been their form) that have caused the physical disturbance along those lines already referred to and with which our mineral strata are connected.

It may not be in just the right place, but I would like to introduce here two or three pages of theoretical considerations in connection with the phenomena already presented. It will enable us the better to understand this, and prepare our minds for further investigations.

The evidences of mechanical and chemical forces acting along these lines of elevation and belts of mineral land are so manifold and convincing, that no scientific man will question their existence. And though it may be difficult to demonstrate that these forces were generated by internal heat, yet all classes of phenomena point in this direction. In the absence of demonstration or positive proof, let us arrange the information in our possession with a view to the explanation of these phenomena.

The natural position or lay of the strata through this part of the state, as represented by my map, is a gentle elevation to the north, consequently a gentle dip or declivity to the south. Hence we find that the series of stratified rocks is gradually growing thinner from the south to the north, until the lowest bed (the Potsdam sandstone) which in the southern part of the state is covered with at least six hundred feet of lime rock, becomes the surface rock a little to the north of the lead district. And as we travel from the south to the north we see that the various beds of the different formations become the surface rock in regular succession. A few miles only to the north of the lead district, owing to the dip of the strata just alluded to, the azoic and plutonic formation become the surface rock. These in the southern part of the lead district are covered by at least a thousand feet of stratified rocks.

Not to notice the fissures in the rock, and the fact that water would find its way through them to the lower formations, water would certainly enter between the beds of these outcropping strata, and find its way down the gentle declivity as naturally as the waters of the Wisconsin and Mississippi flow toward the ocean. Especially would this be the case with the lower bed, the Potsdam sandstone, which, where not exposed to atmospheric action, is but little else than a bed of sand through which water passes freely.

Now let us suppose—and the facts will justify not only the supposition, but even the conclusion—that the elevation referred to, and the belts of mineral land in the lead district were formed over groups of fissures or faults in the plutonic and azoic rocks beneath, consequently over lines of fracture produced by mechanical force, evidently generated by internal heat. The water entering between the beds of the outcropping strata as above referred to, and following down its gentle declivity, would necessarily intersect these faults or fissures along the whole line. Here water would come in contact with intensely heated matter under a pressure of several hundred feet of rock. This would certainly be one of those places where chemical and mechanical forces would be generated, such as we know must have been active during the physical disturbance along the lines referred to, and the formation and filling of mineral veins. If the temperature along the lines of fracture in the plutonic rocks was sufficient, the water gradually or suddenly reaching the heated matter, as described, would be converted into steam or elastic vapor, whose mechanical power and properties we understand.

During the early formation of these stratified rocks—say for instance the Potsdam sandstone—the resistance would be comparatively small; vent would be easily found through the loosely accumulating sand. But as layer after layer was added, and the more compact limestone began to form and harden above it, resistance would increase, until, to overcome it, a general lifting of the strata would take place, by which escape would be effected through fissures in the rock along the line of those original faults in the plutonic rocks below. These fissures in the newly formed aqueous rocks we must regard as the result of the same mechanical force acting upon the strata from below, hence their conformity to directive influences hidden from our view.

When we take into consideration the great antiquity of the lower stratum of the lead district, and that it commenced at the closing of the azoic period when the temperature was supposed to be too high to admit of organic existence, and that its vast fissures were even then the outlets of radiant heat, nothing is more reasonable than to suppose, that for untold ages the strata above these foci of mechanical power, would be traversed by heated waters, forced by elastic pressure from below through every crack and fissure in the rock. This water would sometimes find its way through vertical fissures, at other times between the thin beds of the strata, seeking, as such power will always do, those places that give the least resistance, and bringing up doubtless at the same time in solution from depths unknown to us, the elements of that material that formed our ores. Chemical as well as mechanical activity and force would also be conspicuous and powerful along these lines. The solvent power of heated water, aided as it would be by material held in solution at various degrees of temperature, would become of itself a chemical agency of great force, and the result would be chemical action and reaction along its course.

What I would notice here especially is, that physical conditions, such as would seem to be produced in harmony with the above facts and considerations would not fail to produce the forces I have referred to; that such forces both chemical and mechanical, would not fail to produce physical disturbance along the line of strata in which and along which they act; that such disturbances would not fail to produce phenomena that would correspond to their action, and that would possess features by which we might possibly recognize their cause. It is now a well established fact that all natural phenomena possess and present more, or less distinctly, the evidences and material for their own explanation. If then, in the light furnished by the above facts and considerations, the phenomena of the lead district begin to assume forms and features by which we can recognize them as the result of physical conditions such as are described above, in the absence of other facts to explain them, it is perfectly legitimate and safe to follow this light as far as it will lead us.

After this momentary digression, I will return to pursue again our investigations along the north side of the mining region. On the north side of the elevation along which the sink holes are found, the surface is very much broken, and declines rapidly toward the valley of the Wisconsin River. The streams also flowing into this valley cut back into this elevation, in places almost to its centre.

This rapid declivity to the north, and the gradual dip of the strata to the south bring to the surface on the north side of this elevation the strata of the lead district, that is, the rocks in which the mines have been worked, and let us down on the lower rock, namely, that which underlies the mines of the lead district. Here we find ourselves on a platform at least 400 feet below the surface of the lead district, and on rocks that were formed long before the rocks of the lead district had any existence. This, too, places us back in the history of the past to a period when the temperature of the cooling crust of the earth, and other physical conditions were very different from what they were during the formation of the rocks of the lead district.

There are but few things in geological investigations of more importance than to be able to distinguish between physical conditions peculiar to one period of geological formation and those common to many, or to all. We cannot have too deeply impressed on our minds the fact, that in entering upon the examination of these strata, we have to investigate rocks of more ancient date, formed in a period vastly remote. We are no longer delighted with the fossil remains with which the limestones of the lead district are crowded. At this period, the waters of the primeval ocean rolled over our continent, save here and there a narrow strip of land on which life had not yet begun. And even the physical conditions of the sea were such that life had but just a beginning there. A lonely trilobite might now and then have been seen lingering near the shore, or a tiny little singlo clinging to the rock, but beyond this there was no sign of life. This was emphatically the age of crystallization and mineral formations; the highest and most beautiful forms of matter before organic forms appeared.

As we descend the northern dip of this elevation and commence our investigations in these lower and older formations, we find that the character of the rock is different, although very similar physical features mark the strata, as though they had been subjected to the same or very similar physical conditions. Before we get quite to the middle of town seven, the rock, clay and even the soil, in many places, begin to wear an ochrey appearance, which continues more or less for a distance of three or four miles.

When this first attracted my attention I treated it lightly, supposing it to be the outcropping of the north and south ranges of fissures in their northern extension, and regarded it more as an evidence of a north and south axis than anything else. But noticing it in several places to the east and west of where I first discovered it, I began to entertain hopes that these ochrey out-croppings were indications of another east and west belt, similar to those in the lead district. With this impression I commenced a systematic investigation of the surface indications both to the east and the west. But along a region of country covered mostly with timber and underbrush, where the tops of the ridges were covered with several feet of clay, and their sides hid from the summit to the base with broken, decomposed rock, it was not a very easy matter to obtain the necessary information to settle the question.

By marking on a map, however, these ochrey outcroppings and their surface indications, in a similar manner as we did those noticed in the lead district, I succeeded satisfactorily in making out a line of physical disturbance resembling very much the other mineral belts. By ochrey outcropping I mean those places along the surface that may be distinguished from all other places by a reddish, or a reddish-brown clay that is almost always found over productive mineral ranges in the lead district. Nor is this peculiar to the mineral strata of Wisconsin. This peculiar ferruginous feature of the clay is the result, no doubt, of the decomposition of the iron or iron pyrites found in the fissures of the rock decomposed to form the surface clay.

I found a belt of land strongly marked with these and other features peculiar to the surface indications of the belts of mineral land in the lead district extending through town seven, from the township of Hickory Grove, in Grant county, to the township of Cross Plains, in Dane county, a distance of about fifty-five miles east and west. This belt varies in width from four to six miles.

The mines of Highland and Centreville, which we have always looked upon as an exception to the general rule, are found on the western extension of this belt, in the townships of Highland and Blue River. But so far as we can judge from surface appearances, the mineral wealth of this belt will consist mainly in the large and rich deposits of the oxide of iron which it seems to contain throughout its entire length.

Where these deposits appear at the surface, we find the ore existing in different states or conditions. In some places we find the out-croppings of what seem to be large beds of very impure argillaceous or slaty iron ore; affording, however, in places, good specimens or purer varieties, which to me, look like indications of purer beds beneath these surface out-croppings. This slaty variety decomposes readily into a reddish brown clay, in which we sometimes find beds of ochre varying from a few inches in thickness to several feet. In these beds of ochre we sometimes meet with separate and distinct colors of brown, reddish brown, bright yellow, yellowish brown, and sometimes layers of pure white clay that look like chalk. It is certainly very difficult to account for this variety of form and color, unless it be by a process of seggregation, and aggregation, set up by strong chemical action. These argillaceous or slaty beds are found mostly either at or very near where the Potsdam sandstone below, and the St. Peter's sandstone above, unite with the lower magnesian limestone.

In the sandstone, both in the St. Peters and Potsdam, where it is free from foreign matter, (that is lime, clay and the like) this ore assumes other forms. Where there is a good exposure of this rock, and especially where it has been exposed to atmospheric agencies for a great length of time, it assumes a banded structure. These bands are not like seams of iron ore which we sometimes meet with, spread out between beds of sand as though they were the result of deposition from water, but they resemble more the banded structure of wood, shown in a transverse section of a tree. These bands are sometimes very much contorted, as though they were bent by heavy pressure, while the sandstone remains perfectly undisturbed. In the iron belts of Lake Superior a similar banded structure in the Potsdam sandstone was noticed by Foster and Whitney, and in their report on this peculiar feature of iron ore in sandstone there, they say, "We know of no theory which affords so probable an explanation of this structure as that by which the action of the seggregating forces is brought into play."

Another, and I think the most important form in which this oxide of iron is found along this belt, is that of a bright red powder. In this condition it is sometimes found in regular flat openings in the sand rock, mixed with a very pure, coarse grained sand, but oftener disseminated through the mass in the shape of a cement. In this condition it varies from a ferruginous or irony sandstone, to a sandy ochre. The richest deposits, however, are found along ranges of fissures, or more especially where ranges of different bearings intersect each other. These points of contact are the richest places, and seem to be centers from which this material diverges, gradually growing poorer as the distance from them increases. Where the oxide of iron in this form is most abundant, the sand-rock is very coarse and very friable, and easily reduced to its original grains.

This oxide of iron is not chemically deposited in the sandstone, that is, it has not a crystalline texture, it is easily separated from the sand by washing it in water. Water takes it up very readily when it is stirred, and allows it to settle readily when undisturbed. When separated in this way and dried, it is a very fine red powder, as fine as the oxide of zinc; and when mixed with or ground in oil, it will make a paint of a brilliant red color that gives as fine a finish on wood as either zinc or lead. Since I first discovered it in this form (that is since last July) I have been experimenting with it as a paint by exposing it to the extremes of climatic conditions. Thus far it does not seem to be effected by heat or cold, wet or dry, any more than the best qualities of lead or zinc paint under the same conditions. The brightness of its color, which I at first feared would not stand light and moisture, remains thus far unchanged, or if changed at all, it is a deeper red.

As a pigment this material is equal, if not superior, to anything we call ochre or mineral paint, and if its durability should prove to be, when tested by time, what it appears to be under experiment, it cannot fail to be valuable, for it will take the place of lead and zinc paint for most out-door work and common buildings. And if in this form it will furnish material for paint of a bright red color that will put on a finish as fine as lead, and that will be as durable or even approximately so, and can be furnished for less than one fourth of the cost of lead, it certainly must be as valuable to the state as lead itself.

What our state is most deficient in for manufacturing purposes is fuel; and any material that can be manufactured into useful commodities for commerce without coal is especially important to us. The cost of coal and the expense of getting it to our zinc mines consume a large portion of what the zinc is worth when prepared for the market, and consequently render our zinc deposits comparatively worthless.

This form of the oxide of iron can be obtained along this belt, and be prepared as a paint for the market at a very trifling expense, except for labor. It is found in ledges of sandstone, drained by deep valleys cutting back into this ridge, and exposed in places from 80 to 100 feet in vertical thickness. It can be obtained from the ledges without the ordinary expense of mining, and separated from the sandstone by water, which most of the valleys will supply. The process is simple, the expense is trifling, and cost in fuel, nothing. Labor, common labor, is all that is wanted to manufacture this into paint and prepare it for use. In view of these facts I am disposed to think that this belt of mineral land, along which these deposits of ochre and oxide of iron are found, will be equally valuable, perhaps more valuable, than if it had been another belt along which deposits of lead and, zinc were found, similar to those belts in the lead district already referred to in this report.

As to the origin of these deposits of iron ore along this belt there seems to be but one way of explanation open to us. The fact that they are found in the lower, as well as in the upper sandstone, and that too where it is covered with 150 or 200 feet of limestone, (as for instance at Mr. Ruggles' place on the road from Arena to Dodgeville,) cuts off all chance for explanation by surface agencies, such as is sometimes found in connection with deposits of bog iron ore. And again, the fact that it is found in connection with ranges of fissures and is especially rich at their points of contact would indicate a very different origin.

At Centreville, in the township of Blue River, there is a rich deposit found in connection with a range of fissures cutting through the bed of sandstone. These fissures may be seen at the head of a valley which is evidently formed along their line. One of these fissures has a regular wall with what is sometimes called a slicken side, it has a smooth, fine polish as though it had received a vitreous coating put on by a glazier. From this leading fissure the sandstone pitches to the south in thin friable layers that will crumble in the hand, and is highly impregnated with this oxide of iron for a great many feet each side of it, and as far down as the sandstone is exposed in the valley. This is one of many places along this belt, as well as through the lead district, that must settle forever the fact that the sandstone of the lead district has been acted upon and fissured by mechanical forces from below.

And when we take into consideration the fact that these deposits are found deep down in the Potsdam, (as well as in the sandstone above) and that too at a point not far above the azoic rocks; and when we consider further, that in similar and parallel elevations not far to the north, where the stratum is still thinner with but few feet of the sandstone left on the azoic, masses of iron ore are found protruding through the sandstone, as at Ironton in Sauk county, in the western extension of the Baraboo elevation—where we have unmistakable evidences of metamorphic action in the quartzites; and when we consider still further that to the north of the Baraboo elevation, where the azoic rocks come to the surface, they present parallel ridges, and that along the centre of some of them we find long ranges of iron ore conforming in their bearings and extension to these belts of ochre and oxide deposits, we see there is good reason, indeed every reason, to suppose they have their origin in physical causes acting from below.

This supposition becomes almost a demonstration when we consider, also, the peculiar adaptation of the azoic rocks, and the physical conditions that prevailed at the period of their formation favorable to the formation of iron deposits. This subject is presented in Foster and Whitney's report of Lake Superior, better than I can do it, consequently I will introduce a portion of their remarks in this connection:

"We may conceive that the various rocks of the azoic series were originally deposited in a nearly horizontal position, at a period prior to the appearance of organic life upon the earth; that these stratified deposits were composed, for the most part, of finely comminuted materials, principally silicious and argillaceous, in some cases consisting of almost pure silex, like the purest portion of the Potsdam sandstone which was afterwards deposited upon these strata.

"During the deposition of these strata, at various intervals sheets of plastic mineral matter were poured forth from below, and spread out upon the surface of the pre-existing strata. These igneous rocks are exceedingly compact and uniform in their texture, which would seem to indicate that they were under heavy pressure, probably at the bottom of a deep ocean. The same depth of water is also inferred from the comparative absence of ripple-marked surfaces throughout the whole series. During this period, the interior of the earth was the source of constant emanations of iron, which appeared at the surface in the form of a plastic mass in combination with oxygen, or rose in metallic vapor or as a sublimate, perhaps as a chloride; in the one case it covered over the surface like a lava sheet; in the other it was absorbed into the adjacent rocks."

In the closing remarks of the same report on the origin of the iron deposits in the azoic rocks of Lake Superior, we have the following conclusions:

"On the whole, we are disposed to regard the specular and magnetic oxides of iron as a purely igneous product, in some instances poured out, but in others sublimed from the interior of the earth. The supposition entertained by some that they may be a secondary product, resulting from decomposition of the pyritous ores, or from the metamorphism of bog-iron, is inadequate to account for the accumulation of such mountain masses, or to explain their relation to the associated rocks.

"Where these ores occur in a state of almost absolute purity, in the form of vast, irregular masses occupying pre-existing depressions; or, where the incumbent strata are metamorphosed and folded over them; or, where they are traversed by long lines of ferruginous matter in the form of dykes, there can be little doubt that these ores have risen up, in a plastic state from below.

"Where they are found impregnating metamorphic products, such as jasper, hornstone or chert, quartz, chlorite and talcos slate, not only interposed between the laminæ, but intimately incorporated with the mass, giving it a banded structure, we are disposed to regard it as the result of sublimation from the interior.

"Where they are included in the metamorphic strata in the form of beds of variable widths, with a conformable range and dip, and with minute particles of the associated rock mechanically mixed with the ore, we are disposed to regard them as the result of aqueous deposition, although the materials may have been derived from the ruins of purely igneous products." Part II. Pages 68 and 69.

What is true of the azoic formation at Lake Superior, is true of it the world over. During the deposition of these strata, the interior of the earth was not only the source of constant emanations of iron, but also of all the other metals. It was a period in nebular condensation when the crust of the earth had become too thick and dense to conduct its radiant heat into surrounding space, hence it was thrown into those lines of fracture peculiar to these strata, which were then the safety valves of a cooling world. Who among us that knows anything about mines or mineral strata but is aware of the fact that the lower silurian rocks are the mineral strata of the world. And why? Because its lower members are formed over the azoic rocks, and over their lines of fracture, and consequently must have received these metallic emanations, a large portion of which must have been thrown down by chemical deposition in their passage through the fissures of these rocks.

If these deposits of iron were found in rocks whose geological position was thousands of feet above the azoic, a man might be pardoned for looking for their origin in physical conditions or forces acting from above. But here in the lowest member of the Silurian series, within a few feet of the azoic rocks, and with the impress of their lines of fracture on the rocks before us, it is folly in the extreme to look for any other origin. I would ask pardon myself for dwelling so long on this subject, but for one thing, and that is the relations of these deposits to the deposits of lead and zinc in the lead district are so clearly defined as to make their common origin certain. It is in fact a continuation of the same ore district with iron ore predominating.

The outcroppings of these deposits of iron ore I have traced along a belt of land 55 miles long, east and west, and from four to six miles wide; consequently it will add nearly three hundred square miles to the ore district of southern Wisconsin.

Since attention was first called to this discovery in July last a company has been formed to manufacture these ochres at Blue River, their factory being now in working order; and they have, I understand, several hundred tons of this material ready for market. From a letter just received from the parties I find they are now arranging to run their factory by water power, which will enable them to manufacture six or seven tons per day.

A letter received from parties further east on this belt informs me that arrangements are being made to manufacture these ochres there also. I have no doubt but that an important branch of industry will spring up in connection with this, that will employ a great many men and be a source of profit to the state and to all concerned.

This is the first installment of the *practical* results of following out this system of grouping along this north and south axis—one that will I trust soon be followed by others. There are evidences of another parallel belt still farther north, in town nine. Good specimens of lead are found on it at Orion, in Richland county, and I have no doubt when the details of this belt are worked out important deposits of some kind will be found.

SANDSTONE.—The character of the rocks in which the mines of the lead district are found, and to which they have been confined is familiar to the miners, and needs no further description in this report. But the character of the strata that underlie the mines, and their adaptation to mineral veins is what is especially called for in the present stage of our mining operations. To this I would call particular attention.

Immediately underlying the strata in which the mines are being worked is a layer or bed of sandstone, varying from 80 to 100 feet in thickness, separating the limestone of the lead district from the lower magnesian limestone. This formation is known as the St. Peter's sandstone.

Few classes of rock require more care in determining their character than sand-rock. Sand, the world over, has the same general appearance, and to identify it as sand requires but little scientific or practical knowledge. But while there may be a very striking sameness in appearance, there is often an essential difference in origin and chemical composition. Sometimes we find sand to be the insoluble debris of disintegrated rock; in other cases it is largely composed of comminuted shells, ground to that state by the action of the water.

One peculiar feature of sandstone is, that when the cement by which the particles are held together is destroyed, we can examine the original particles or grains, and with a good microscope determine, to a great extent, their origin. The sandstone of the lead district, except where it has for a long time been exposed to the atmosphere, is very friable and in most cases can be crumbled between the fingers.

In noticing this sandstone at first, I was much interested in finding some very remarkable features that I had not noticed in the sandstone with which I was familiar in early life. There was such uniformity, not only in the structure of the rock, but in the grains composing it, that I was led to examine it carefully. In doing this with a small lens, I was surprised to find that the grains were pure quartz and very uniform in size. Not a pebble could I find, not a shell, nor any appearance of disintegrated rock; indeed, the grains of sand looked more like little crystals of quartz than anything else; and in submitting them afterwards to a closer microscopic examination I was more than ever satisfied that such is the case. I submitted this question to the Wisconsin Academy of Sciences, Arts, and Letters, in July, 1870, and have since called the attention of other scientific men to it, and thus far have found no objections.

But few things have interested me more than my microscopic examination of these grains of sand, or in other words, crystals of quartz. I have observed among them not only almost all the forms in which silica is known to crystallize, but some equal in beauty to those larger crystals which can be examined without the aid of a glass. Some of them are translucent, others almost transparent. They have plane faces and regular structure, and their lustre is often beautiful. If it is true—and I believe it is so considered—that these peculiarities are the known and established results of chemical deposition from solution, an important field of inquiry is opened up before us.

We would like to know—and it is important that we should know—how the water obtained the silica from which these crystals were formed. Was it dissolved out of disintegrating rocks above, and brought in solution in rivers and streams that emptied themselves into the primeval ocean; or did the free elements of silica, like certain other elementary substances, rise in gaseous emanations with escaping heat from below, and becoming subsequently condensed in the fissures, find their way in thermal waters to the ocean above, where entering into chemical combinations they were deposited in the form of small crystals as we find them?

Suppose Iceland should be submerged to a considerable depth beneath the ocean, and those plains, situated about thirty miles from that noted volcano, Hecla, now full of hot springs, steaming fissures and boiling geysers whose waters hold a large amount of silica in solution, were pouring their waters into the ocean above, should we not have there, on a small scale, what perhaps existed on a very large scale during our sandstone formation?

In studying either the sandstone or limestone formations that underlie the lead district, we do well always to remember their very great antiquity; and also the fact that very different physical conditions prevailed then from what we find now. If we look to my large map, we see the Potsdam sandstone—to which the layer that I have just been describing evidently belongs, although separated from it by over two hundred feet of limestone—is spread out over the upturned ridges of the azoic rocks, traversed as we know them to be where they become the surface rock with various faults and fissures and chimney-like perforations. This formation, according to the opinion of scientific men, belongs to the most ancient of the strata which form the crust of the earth, and was formed prior to the introduction of animal or vegetable life on our planet; from which it is inferred that the temperature of our planet at that time was too high to admit of organic life. If the absence of vegetable and animal life at that period be an evidence that the temperature was too high to admit of it, then the formation of our sandstone must have commenced under the same physical conditions; conditions marked by degrees of temperature vastly above what we find existing on the present surface of the earth. This view may also be strengthened by the fact that it is not until we rise to some distance in this formation that any evidence whatever of vegetable or animal life appears.

In studying the origin of the sandstone underlying the limestones of the lead district, or its relation to those strata, we should keep in view its great antiquity, and how, at that period, the crust of the earth must have been comparatively thin, the temperature very high, and communication between the interior and exterior more frequent and more abundant. Viewing it from this standpoint, it is a question of no little importance whether the evidence is in favor of its having been deposited by chemical or mechanical agencies; and whether the material entered the primeval ocean through streams traversing the elevated surface alone, or in thermal waters through fissures traversing the earth's crust beneath.

The Potsdam sandstone below the lower magnesian limestone, and the small layer above it, where it has not been changed by subsequent action, is only a loosely aggregated mass of quartz crystals, and as such is unfavorable for the formation of mineral veins. Because, in the first place, gases, steam or vapor, or water even, would pass through it without making a fissure; and secondly, if a fissure should be made through which heated water could pass, the water would soon dissolve the cement by which the particles are held together, and the result would be the filling of the fissure with sand.

If we put some of this sand on a piece of glass with a good reflector below it, and then examine it with a microscope, we can see how freely water even could pass through it, and how unfit it would be in this condition to present the necessary walls or wall-rock for a mineral vein. If mineral veins were fissures filled by injection, that is, with melted matter forced into them in a liquid state from below, and consequently formed and filled at the same time, there would be no reason why mineral veins or ore deposits might not be found in sandstone as well as in any other rock. But when we remember that the material forming mineral veins is chemically deposited, and that too, only where favorable conditions for chemical action are presented, such as a peculiar condition of the wall rock of a fissure, or the cap rock of an opening, we see how utterly unfit a loose quartzose sandstone is for the formation of mineral veins.

But there is a point here, too often overlooked, that we would do well to consider, namely, that mineral veins are seldom found in unaltered rocks, that is, rocks in their normal condition; but usually, if not always, in rocks that have been exposed to metamorphic agencies, and that have undergone important changes since their original formation.

Between the physical conditions producing the changes in the rock, and the physical conditions producing mineral veins, there are sometimes close relations. Like as the farmer prepares his soil before sowing his seed, so these conditions follow each other. And as the farmer furnishes the elements lacking in the soil, so nature often by metamorphic action furnishes the necessary qualifications lacking in the normal condition of rocks. Every miner and every man who has made mining his study knows that it is the metamorphic or altered condition of the rocks, not the normal, that furnishes the properties we call *mineral bearing.* Hence we find sandstone in many parts of the world, under varying forms of metamorphic action becoming metalliferous, or *mineral-bearing.* There are places, however, where sandstone in its normal condition and lacking the necessary qualifications for fissures and mineral veins proper is nevertheless, to a certain extent, and in a very peculiar form, metalliferous. The sandstone of the Bleiburg (Lead mountain), near Commern, in the Prussian Rheinish Province, furnishes an interesting example of this kind. Van Cotta, in his treatise on "Ore Deposits," gives us the following account of this formation:

"The sandstones contain ores for a distance of about two miles, but are less rich towards their outer limits; the same commence near the surface, and extend with the strata to a depth as yet unknown; it is stated that the metalliferous strata are at times more than 45 fathoms thick. The sandstone is filled throughout its whole mass with grains of galena, (varying in size from a pin head to that of an apple, the coarser grains being most rare,) which are distributed with most surprising regularity. Larger grains are extremely rare; more commonly they decrease in size so as to be barely visible. The interior of these grains nearly always contains fine sand cemented together by galena; from which it appears to me clear that the grains are not found in secondary deposits, which like a kind of alluvial deposit, have been only accidentally washed together with the sand; but that the ore was either formed contemporaneously with the sandstone, or penetrated it subsequently by a process of impregnation."

"C. Haber," says the same writer, "has very recently described this lead ore deposit. He explains its formation by impregnations, which have penetrated from numerous fissures traversing the sandstone. These fissures appear to be connected with true veins of galena, occurring in the Devonian strata beneath the sandstone."

The writers above quoted are not only good authority, but perhaps our best authority on all questions relating to mineral veins and ore-deposits, and their opinions should be received with a great deal of confidence. If we adopt as a theory their views as expressed above in reference to the origin of that ore deposit in the sandstone, namely, that it extended by a process of impregnation through fissures receiving their material from older formations below, we shall find that it will explain very readily certain phenomena found in connection with a certain class of ore-deposits sometimes found in sandstone and limestone that have been but lightly disturbed.

If thermal water rising through fissures in older rocks below should penetrate a bed of loose quartzose sandstone resting upon them, nothing would be more reasonable than to suppose, that such water, holding mineral matter in solution—whether dissolved out of original veins below or obtained from sublimations at greater depths—would impregnate the sandstone along the line of those original fissures. And inasmuch as we find quartz and iron, quartz and galena, quartz and copper, and even quartz and gold in the same vein, there is no scientific reason why they may not—in the absence of proper conditions for forming veins—be associated in this way.

Such a theory is well adapted to explain the character of the sandstone of the lead district, and in but few places are the facts that support it better defined. If we follow along the line of the north and south axis already referred to, to the northern part of the state where these sandstones crop out, and the azoic formations become the surface rock, we shall find belts of iron ore crossing this axis at, or nearly at, right angles to it. The Penokee iron range is a good example. Coming south along this axis to where a thin layer of sandstone covers the azoic rocks, these belts of iron ore are seen in places protruding through the sandstone. The well known deposit of iron ore at Ironton, Sauk county, on the western extension of the Baraboo hills, is a good example of this. Still farther south where the sandstone has its full thickness, we find well defined belts of sandstone impregnated with iron ore in various forms. These impregnated belts conform to the bearing of the iron belts in the azoic, and cross the north and south axis in a very similar manner. The careful observer cannot fail to notice that there is a close relation between the belts of iron in the azoic formations and the impregnated belts of sandstone resting on those formations; nor can there be but little doubt that the sandstone has been impregnated by solutions penetrating and rising through it from fissures connected with these iron deposits in the older formations. In speaking of the sandstone here, I include the two members of the series, the St. Peter's and the Potsdam.

LOWER MAGNESIAN LIMESTONE.—Immediately below the St. Peters, and separating it from the Potsdam sandstone is a bed of limestone about 250 or 300 feet thick. It is known as the lower magnesian limestone, and is described in the report of 1862. I shall notice it here only in its relation to mineral veins.

"This formation," says Prof. Whitney in his report, "is almost entirely made up, everywhere in the valley of the Mississippi; of an almost chemically pure dolomite, or a mixture of carbonate of lime and carbonate of magnesia in the proportion of one atom, or equivalent of each." Chemically it is the same as the upper magnesian or galena limestone, for dolomite is the same the world over.

Dolomite, or magnesian limestone seems to present very favorable conditions for the deposits of lead and zinc. The rich, and extensive mines of Upper Silesia, Spain, France, Belgium, and various other places in Europe are found in this kind of rock. The Missouri lead and zinc mines are found in magnesian limestone, occupying the same, or similar position in the strata as the lower magnesian in this state.

We may not know fully, and consequently cannot explain why it is that dolomite, or magnesian limestone should present more favorable conditions than other rocks with which it is associated in the same strata. Nor can we explain fully why it is that any kind of rock should present more favorable conditions than other kinds; and yet we know it is so. Every miner is acquainted with the fact that a mineral vein is almost always affected more or less as it passes from one kind of rock into another. Sometimes a very rich vein, on entering a different class or kind of rock, is suddenly impoverished; while on the other hand a vein may be poor while traversing a certain kind of rock, but entering another kind, is suddenly enriched. This is a very common occurrance in mining operations, and the miner soon learns to distinguish between a rock that is favorable for mineral veins, and one that is not. It would save a vast amount of capital if this practical knowledge was more generally diffused among those who have charge of mining operations.

This fact, that certain kinds of rock present more favorable conditions for the formation and filling of mineral veins and ore deposits than others, has given rise to the idea that certain rocks are of themselves metalliferous or mineral bearing, while others are barren. An error has grown out of this idea that we would do well not only to notice, but to guard against with care. Many seem to think that if a certain kind of rock is metalliferous in one place, like soil, it is apt to be productive everywhere; or if it is barren in a certain place, it is apt to be barren everywhere. We often here men say "I have no confidence in the lower magnesian limestone from the fact that it is barren where it is exposed to view on the north of the lead district." I would like to put a nail in this error right here by saying, that while it is evident that certain kinds of rock present more favorable conditions for mineral veins than others, it is also evident that they are not the cause, but the conditions that favor the cause by which mineral veins are formed. It is safe perhaps to say that mineral veins are always found in connection with physical forces acting from below; forces, in their origin independent of the rock in which the veins are found. And if one class or kind of rock traversed by these veins is richer in minerals or ores than another, it is because in this class or kind of rock, these forces found more favorable conditions for ore deposits. It is only in the presence of these forces that any kind of rock is metalliferous, and apart from them every kind is alike barren. Suppose we apply the rules to the upper magnesian by which certain parties have condemned the lower magnesian, may we not with equal propriety condemn it with the same class of evidence?

If, previous to the discovery of our lead mines some one had been sent out to make a geological survey of what is now known as the lead district, and had commenced his work in Rock and Jefferson counties to the east of those heavy belts of mineral ranges extending through Grant, La Fayette and Iowa, into Green and Dane, where the same kind of rock—the upper magnesian—is the surface rock; or if he had extended his exploration, even into Green and Dane, confining his examination to the eastern side of these counties, he would not have found anything that would justify him in pronouncing it a metalliferous, or mineral bearing rock. And if from this standpoint, within two or three miles of what has since proved to be a very rich lead district, he had pronounced the upper magnesian limestone a barren rock from evidences afforded on the eastern side of the lead district, he would be entitled to as much credit for sound judgment as those who condemn the lower magnesian as a barren rock from evidences afforded on the north side of the lead district; for both are beyond the physical forces and conditions with which our mines and mineral veins are inseparably connected.

The unfavorable opinion of the lower magnesian recorded in Prof. Hall's report of 1862, I have no doubt grew out of the teachings of this error, as we can see by reference to the report. "The principal localities (says the writer, page 409) which have been quoted and relied on as affording evidence of the productiveness of the lower magnesian, are the Kickapoo and Olcking's diggings, near Franklin." These are the only places noticed by the writer, and only one of these did he visit personally. The Kickapoo diggings, visited by Dr Kimball, and from whose notes the writer obtained his information, are several miles to the north of the lead district proper; and whatever may be said in favor or otherwise, of the lower magnesian there can have no more bearing on the lower magnesian underlying the mines of the lead district, than the very rich mines of Missouri found in the same formation. The upper magnesian at the same distance from the known boundary lines of the lead district has in no instance shown more favorable conditions than what are presented at Kickapoo. But whatever may be the conditions presented by this formation at that distance from the mineral belts of the lead district, they furnish no rule by which we can determine what it may be in the lead district, under the influence of causes which have rendered the upper magnesian so productive.

The other place visited by the writer where mining had been done in the lower magnesian, and in fact the only place he had visited personally, was Olcking's diggings, near Franklin. These diggings are situated on the extreme north side of the lead district, and a little to the north of the belt of mineral land in town six, the last belt of the lead district in that direction but near enough, perhaps, to come somewhat, at least, under the influence of the physical forces of that belt.

"On visiting this locality in 1859," says the writer, page 412, "I found only one person at work there, from whom a very dismal account of the prospect of mining in the lower magnesian was obtained. He had sunk a shaft twenty-five feet deep from which he had raised about ten pounds of ore; but I was unable to detect any sign of crevice or opening in the excavation; and as no other was accessible, my impressions were necessarily very unfavorable in regard to the prospects of mining in this formation, especially after listening to the vehement objurgations of this solitary miner against his own stupidity in continuing to prospect in so barren a rock."

This is the only place near the lead district visited by the writer referred to where any information could be obtained in reference to the lower magnesian; and all the evidence by which this formation was condemned was obtained from this little hole, about twenty-five feet deep, sunk in the rock, as the writer says, without any signs of crevice or opening. Who, with the first elements of the knowledge of mining, would expect to find ore in such a place? It would be in conflict with every mode of deposit in the lead district, and with the laws governing mineral veins everywhere. I do not wonder at the man's upbraiding himself for his stupidity in spending his time looking for ore in rocks where there was no sign of a fissure or opening, I only wonder that such a man had sense enough to know that he was stupid.

Dr. Percival, who visited this place some years before, when the diggings were open and working, gives a very different account of this deposit of ore in the lower magnesian. He says that three successive openings occur there, one eight or ten feet below the sandstone, another just above the harder middle bed, and the third below the bottom of the ravine in that bed, and at the depth of seventy feet in the lower magnesian. He further adds: "The openings appeared partly narrow and vertical, partly wide and flat, with appearances of decomposition and stain in the rock, deposits of clay and ochre, and arrangement of mineral similar to those in the upper magnesian (galena limestone.) The mineral in these openings generally appeared in more or less detached masses, (chunk mineral,) often very large, weighing more than 100 lbs., a few, more than 500 lbs. After examining this locality, I could not doubt that the lower magnesian is a good mineral bearing rock."

These are the statements of a man who saw and studied the deposit, the mode of deposit, and the relation of the deposit to the kind of rock in which it was found; a man fully competent to judge.

I would call attention here to another error that enters into the belief of the inexperienced, and sometimes into the teachings of scientific men, namely; that mineral bearing rock or strata should always be productive at the surface; and unless it is, it should be condemned as barren. Such views occupy a very prominent place in the last report of the lead district.

If the physical forces and physical conditions necessary to produce mineral veins and ore-deposits acted on the strata from above, it would be reasonable to expect large deposits of ore on the surface, or in depressions on the surface, or in cracks and crevices extending downward into the rock from the surface, especially if we must look to the sea for our metallic solutions, and to vegetable and animal remains as the precipitating agents. But when we take into consideration the fact, or what is now acknowledged to be a fact by every intelligent practical man, and by every scientific man that has any practical knowledge of mining, that the forces of the mineral kingdom act from below, then the fallacy of such views becomes apparent.

It is true we do sometimes find rich deposits of ore at or near the surface. But the question is, were they formed there, or were they formed at great depths in the rock and subsequently exposed by the surface being brought down to them by denudation. I question very much if we can find an important and productive mineral district on the face of the earth, but that above it hundreds, and in some cases thousands of feet of rock have been removed by denudation since the deposit was formed. Let us apply these views to our own lead district.

According to the statement of Prof. Whitney in the last report, page 125, not less than 350 or 400 feet of vertical thickness of the strata of the lead district have been removed by denudation. Let us take our stand for a short time on the original surface of the lead district, say 350 feet above the present surface, near which a large portion of the ore in the lead district has been found. We are now separated from the upper magnesian limestone by at least 200 feet of what is called the Hudson river group, and the Niagara limestone.

Then nothing more could be known of the upper magnesian limestone from the original surface of the lead district, than can be known now of the lower magnesian from the present surface. The upper magnesian was then, as the lower is now, hid beneath two or three hundred feet of a different class of rock. Suppose, however, that the examinations were made at that time beyond the limits of the present lead district, where the upper magnesian would become the surface rock, that is, where it could be seen without any excavations being made, and finding it barren, as we know it is to-day where it can be seen, it was pronounced to be barren rock, and from what was seen of it there, it was pronounced to be barren rock everywhere else in the state. That is to say, because productive mineral veins or ore deposits were not found on the surface, where the rock might be seen, it must therefore of necessity be a barren rock. What would we think of the judgment of such parties to-day, when denudation has removed the overlying strata and brought to our view in the upper magnesian ore deposits at which the world has been astonished? And yet these are the very views and evidences by which the lower magnesian is now condemned, and for no better reasons than those assigned above. There is not a place in the lead district where the lower magnesian is seen, or can be seen (without deep mining) in connection with the physical conditions that have rendered the upper magnesian so productive. And to say it is a barren rock beneath the mines of the lead district, from what we can see of it *out of the lead district*, is the height of folly. Such views are unworthy either of practical or scientific men.

Now while I would guard against these errors, held by certain parties in their views of mineral strata, I would nevertheless call special attention to the fact that certain kinds of rock in the same series of rocks that have undergone certain changes by metamorphic action, do present to the causes producing mineral veins and ore deposits more favorable conditions for the precipitation of metallic solutions than others, and that we do, in our mining operations, find our richest deposits in rocks of this character, while rocks of a different character traversed by the same fissures are barren of ores.

Dolomites, or magnesian limestone, are classed with the rocks that present these conditions. And no matter whether they are the upper or lower ones in the strata, whether they are found in the United States, or in Europe, if they are traversed by fissures, through which mineral solutions are passing, especially lead, or zinc, they are almost certain to contain deposits of the ores of these metals.

The favorable condition presented by the limestones, especially the magnesian limestone, for the deposits of lead and zinc ores have been noticed by mining men everywhere, especially in Europe; and by the largest portion of them it is supposed to consist in the readiness with which they yield to the solvents traversing the fissures, and the favorable reaction of these rocks on the metals present in the solution. As evidence of this, our attention is called to the fact that it is only lead and zinc that are found in any abundance in this rock, and that the lead is never rich in silver. Is it—asks a noted writer—because a very small percentage of other metals were present in the solution, or because these rocks reacted less on them than on the lead and zinc?

MINERAL VEINS.—No class of natural phenomena of equal importance has received less attention from scientific men than that of mineral veins. Not because it is more refractory, or yields with stubborness to investigation, but because it is a class of phenomena inaccessible to that class of men, except on special occasions and for special purposes.

A knowledge of mineral veins and the laws governing their formation, filling and development cannot be obtained from hand specimens; nor can it be taught successfully on a blackboard, or from text books. Such information is obtained only by long continued practical observation. It is true that this question has been taken up by scientific men, and introduced into scientific schools, and theories have been formed and given to practical men as guides to direct them in their work, and to explain the natural phenomena with which they come in contact. But such theories, as a general thing, have been but little use to the miner; the principles they inculcate seem to have but little adaptation to the phenomena they are designed to explain; hence the miner has thrown them aside, trusting rather to his own judgment.

Certainly no branch of industry is more dependent on a knowledge of natural phenomena than mining. And it is a mistake that practical men do not study this phenomena, and from it form theories to guide them in their work. They are trained in this work almost from infancy, and their faculties or powers of observation are developed to such a degree that they recognize intuitively the features of good mineral-bearing strata or of fissures that are likely to be productive. Hence their ideas are not so much theories as a sort of instinct, formed by long continued observations in every-day life. The practical miner may not be able to tell us why these are the features of good mineral-bearing strata, or why these fissures are likely to be productive, but in his judgment they are, and this judgment well matured, like instinct, is in most cases infallible.

Between the theories formed by scientific men, in scientific schools (and as is often the case, from imperfect data, or a narrow range of observation), and the theories formed from the experience of ages and the closest observation of practical men, there has been and still is a conflict. And because of this conflict and want of adaptation in so-called scientific principles to explain natural phenomena, there has arisen also a feeling of hostility among practical men generally to all scientific teaching on these questions.

Nothing, perhaps, would have a greater tendency to promote mining interests throughout the world than for practical and scientific men to meet on common grounds, where their conflicting views can be reconciled, and where each can take their appropriate work in solving the problem. That there are scientific principles underlying the notions of practical men there can be no doubt, and if these principles were explained to them, it would be an incalculable benefit. If science, then, would content itself with explaining these principles of natural phenomena, leaving the application of them to practical men, the practical and scientific departments of mining might be harmonized and worked together for one common end; that is the development of the mineral resources of the earth.

It was my misfortune to be sent to the mines to earn my living when not quite ten years of age. I had to commence with the simplest forms of mining and work my way through a regular course of practical training for a miner's occupation and a miner's life. With but very little education, and no prospect of positions of honor or profit in this life but what were found in connection with this branch of industry, I resolved to master the art of mining, and gain if possible some of its rewards.

Inheriting the native instincts, and receiving as a legacy the experience of a long line of ancestry, whose origin dwindles out and is lost in the history of the Cornish mines, I entered upon this work, laying hold of anything that would aid me. It was here I first observed the conflict between scientific and practical theories. Prejudiced by early education and associations against the theories of scientific men, I shunned for some time all scientific books, and yielded slowly to the teachings of nature, not knowing then that science was nature properly interpreted. In the progress of this practical training, like every other miner I was brought in contact with the richest phenomena of the natural world. The harmony and order that pervaded these phenomena, and their conformity to some general principles unknown to practical men attracted my attention and called forth my admiration. From this time I became an ardent admirer of nature and a close observer of her phenomena. I commenced also to collect simple facts and to arrange them so that they would explain other things not so simple. In this course I was led on from one class of phenomena to another, gaining all the time a rich experience, and adding very much to my stock of practical knowledge. Before I was aware of the fact, I was forming theories, not altogether from practical observation and mining experience, but based on deductions made from certain classes of facts and on principles that I found underlying certain classes of natural phenomena.

In pursuing this course, I found that in all natural phenomena there is a chain of facts that leads unerringly, link by link, through the unfoldings of nature to some general laws that underlie them as their cause; and that it is the privilege of the practical miner, without a classical or scientific education to follow this unerring light, until he has become acquainted with these laws, and consequently is able to explain the phenomena for himself. From this stand-point, partly practical and partly scientific, let us take a view of mineral veins and ore deposits in general, and those of our own lead district in particular.

If from the same stand-point we could see all the mineral veins and ore deposits opened in the crust of the earth, two things would especially attract our attention. In the first place we should notice that there is a general unity that characterizes the deposits of ore in every part of the world, as though they were the results of the same general laws. In the next place we should notice that there is a general diversity; two places can hardly be found that are not distinguished from each other by local differences. This may seem strange to one unacquainted with mineral strata, but it is true, and its explanation can be found only in the following considerations.

Fissures and mineral veins are not one and the same thing. Fissures are openings or fractures in the rock, in which fractures or openings mineral veins or ore deposits may, or may not be found. Hence we find that fissures and mineral veins are two different things, formed at different periods by different forces, and should be considered as two separate and distinct classes of phenomena. In this light let us examine them separately.

Fissures (in connection with which mineral veins or ore deposits are found) are always found along lines of physical disturbance in the earth's crust, and are, beyond all doubt, the consequences of mechanical causes, or the results of mechanical forces acting from below. Every man who has made the subject of mineral veins his study will admit this to be true. But the character of fissures is made to depend on various causes, hence their diversity of form which gives diversity to mineral veins and ore deposits.

In examining the causes of which fissures are the consequences, we have to notice not only the intensity of the elevating force acting beneath a given line of strata, but the resistance opposed to this force by the cohesive power of the rocks or material thus acted upon.

If for instance the mass acted upon should be a homogeneous mass of crystalline matter, whose cohesive power varied but little, and this mechanical force steadily increased till the tension became sufficient to overcome the cohesive power of the mass, a rupture would be the consequence, and fissures would be produced that would extend evenly through the entire mass.

If on the other hand, the formation is a heterogeneous mass, composed of beds of rock of uneven thickness and cohesive force, such as alternate beds of friable sandstone and compact limestone, as is very often the case, the results would be very different. If this mechanical or elevatory force should be acting upon these beds of rock through the medium of some fluid, such as heated water or elastic vapor, it would meet with but little resistance in the sandstone, while the compact limestone would oppose it with considerable cohesive force, and would not yield until the tension became sufficient to produce a fracture in the limestone, which would be, of course, along the line of the greatest tension.

The effect, then, of such forces upon masses composed of such beds of rock would necessarily present itself to us in a variety of forms. It might pass through friable sandstone without leaving the sign of a fissure, while the same force opposed by the cohesion of the limestone would become an elevating force, gently lifting the thin beds of rock (in some places passing between them) while seeking to force a passage through. In this way, the fissures along a line of phyical disturbance would vary in form and character in proportion to the nature and degree of resistance opposed to the mechanical force in its passage through the different beds.

Another result of mechanical force acting upon such strata through a fluid medium, especially if it should be rising from fissures in a lower and older formation, would be as follows: Coming in contact with a bed of friable sandstone, this fluid medium (whether water or vapor) would be scattered through a large portion of the rock, reaching the beds of limestone above in a different condition. In such cases, instead of a single fissure over the centre of force, we should find groups of fissures scattered over a wide surface. Such phenomena are common in mineral strata.

Mechanical forces also differ in their character and mode of operation; consequently fissures that are produced by them are different. Hence to obtain a correct knowledge ot the different forms and systems of fissures it is important that we study these forces and their results in their separate forms. An illustration, perhaps, will place this subject in clearer light than any language that I can command.

Suppose the Blue Mounds, the Platte Mounds, Sinsinnewa Mounds and other elevations of land in the lead district were elevations of granite or any other plutonic rocks, that were elevated subsequent to the formation of the strata of that district; the result would be extensive displacement of the prior formed rocks; it could not be otherwise. Another result would be, the rocks into the midst of which this igneous or melted mass had been protruded, if not crystalline before, would now become metamorphic rock, and to a great extent, if not fully, homegeneous and crystalline. Our sandstone would be changed into quartzite or quartz rock; and our magnesian limestone into serpentine or some other form of metamorphic rock.

The fissures, faults and dislocations in the rock produced by this plutonic action (or form of mechanical force) would necessarily cut through the strata vertically, or nearly so, and to a great depth; thus permitting the rise of metalliferous vapor or fluids which may be generated in and by this heated mass below. Here we see distinctly the relation between this form of mechanical force acting through melted matter as a medium, and the peculiar phenomena presented in the strata in which and through which it has acted. The protruding of igneous masses, the metamorphic action, the displacement of prior-formed strata, the faults, dislocations and fissures in the disturbed and altered rocks are the known results of this form of force.

But suppose again, that this elevation of igneous matter had taken place beneath the waters of the ocean, where stratified rocks had commenced to form over these faults and dislocations in the earth's crust extending down and communicating with the heated region below, and through which metalliferous vapors and fluids were rising and would continue to rise, what would be the result? In the first place, there would be a change or transformation of mechanical force; it would be no longer plutonic, that is, acting through melted matter as a medium, but hydro-plutonic, acting through water. In the next place, a change in the form of the force would be followed by a change in the form of its result. Hence, between fissures produced in rocks by plutonic action, and those produced by hydro-plutonic action there would be a line of distinction, and we often find them presented to us in nature as two classes of fissures.

A moment's reflection on the conditions bringing about this change in the forms of force, and their results, will enable us better to understand the modifications and diversity in the forms of the two classes of fissures.

These masses of melted matter forced up through prior formed rocks beneath the waters of the sea, and over which stratified rocks have commenced to form, will part with their heat slowly. Radiation, nevertheless, will take place and continue until these igneous masses are brought down to the temperature of the strata into which they have been protruded. One of the effects of radiation here would be, to change slowly the character of those prior-formed aqueous rocks. Metamorphic action would be induced, and the result of this form of force would be the transformation of these rocks into rocks of a metamorphic character. Beautiful examples of such conditions are found in the strata of the Cornish mines. Several large masses of igneous or melted matter (now in the form of granite) have been thrust up through what was once fine sediment, or sedimentary material of aqueous origin. These sedimentary or stratified rocks are now transformed by the heat radiating from these igneous masses in their midst into various forms of slate rock, or as the miners call it there, kellas. The degrees of transformation, even, can be traced from the points of contact away for considerable distance into the slate rock.

In the gradual decline of the temperature of these igneous masses, there would come a time when they would fail to transmit a sufficient amount of heat to maintain the force of metamorphic action in the surrounding rocks. The heat, which at first was generally diffused through the adjacent rocks, from the entire igneous mass, will now be confined mostly to these lines of fracture and dislocation, extending down into these masses, and through them opening communication with the heated interior. At this point we may look for another tranformation of force; for below the point of temperature at which metamorphic action ceases, water will find its way into these fractures and dislocations by its own force of gravity, and yielding more readily to the action of heat than rock or solid matter, it becomes the medium through which radiant heat and mechanical force act.

At first water may be transformed into elastic vapor and wrought up to its highest tension. In this form its mechanical powers under pressure become such as will defy all calculation. It will not be very strange if at some future period, it should be demonstrated to the world that this form of mechanical force has played an important part in earthquake phenomena, and in lifting islands, and even continents from the ocean's bed. From the highest point of tension to which water in the form of vapor can be wrought by heat, down to mere thermal waters that bubble up through fissures in the rock, the mechanical and chemical powers of water under the influence of heat are beyond anything we know of, or even can conceive of, in connection with the formation and transformation of matter and force as presented in the crust of the earth.

Stratified rocks, then, forming over these fractures and dislocations will be acted upon only by this form of mechanical force, and the fissures produced in these rocks over these lines of mechanical disturbance will assume forms conforming to the action and reaction of this force with the force of cohesion that will oppose it in the heterogeneous mass of rock above. To generate this form of force, and to keep it active through vast periods of time, it is not always necessary that we should have a mass of cooling granite or trap as a source of heat. Stratified rocks, formed over similar fractures in older formations, such as the azoic, would be subject to similar conditions, and present similar phenomena.

I have already stated that fissures produced by the action of these forces, are sufficiently distinct to be divided into two classes of fissures; and have called one form of force plutonic, the other hydro-plutonic. These terms may not be such as a scientific man would use, but they will answer my purpose very well. I use them only as a mark of distinction between these forces and their results, or rather between these forms of forces and their results, for they are only modified forms of the same force; one being heat acting in, and through, igneous matter as a medium; the other, heat acting in and through water, as a medium.

Taking this as a basis of classification we shall have as a natural consequence, fissures that are produced by each of these forms of action; and also mineral veins and ore deposits peculiar to each class of fissures. This classification would result in (what is so clearly defined in the experience of every practical miner) two systems of mineral veins or mineral strata. In connection with these facts would come the question of relative value or productiveness of the two systems, a question in which all connected with mining are interested.

Now while it is evident that there is this diversity in the form of mineral veins, resulting from diversity in the forms of fissures in which they are found, which also results from a difference in the texture, cohesive and crystalline conditions of the strata acted upon by two or more forms of mechanical force, it is also evident that these forms of force are only modifications of one and the same force, *internal heat.* Upon no other hypothesis can we successfully unravel the complicated processes of mineral formations.

I have dwelt longer upon this question of fissures than would be necessary under ordinary circumstances, but I wish to bring this question out here, because there is a tendency on the part of a certain class of geological observers (especially in this country) to regard as mineral veins only such as are found in fissures of undoubted plutonic origin, regarding all other forms of mineral or ore-deposits, as mere surface deposits, produced by atmospheric agencies, or some other physical conditions acting on the surface. Such views are not only detrimental to all mining interests and the development of our mineral resources, but are in direct conflict with the phenomena of mineral strata generally.

Mineral veins (I have stated before), and the fissures in which they are found, are two different things, formed at different times, under different physical conditions. Practically considered, mineral veins are simply the filling up of fissures of all kinds with ore-deposits. The material differs widely from the rocks in which the fissures are found, hence we may safely call it foreign material. But whether this material has been brought into these fissures by physical causes, acting from *above*, or from *below* is the question that has divided the opinions of scientific men.

As long ago as 1546, theories were formed to explain the filling of fissures with mineral matter; and almost as long ago as that, scientific men were divided as to whether it was from above or below. In the seventeenth century, Werner's theory of descension was introduced to explain the formation and filling of mineral veins from above. "The vein-stuff" (said Werner) "arose from a wet precipitate which filled them from above; that is, from a wet and mostly chemical solution, which covered the region where the fissures existed, and at the same time filled the open fissures."

Such theories were introduced into scientific mining schools, and have tinged the belief of quite a number of professors, both in Europe and America, but they have never been adopted by practical men, having no adaptation whatever to the phenomena of mineral veins. And it is a great satisfaction to know that such theories have lost what little influence they may have had in these schools, and are now, not only obsolete, but are ranked among the follies of the past.

The royal school of mines at Freiberg, Saxony, in which Werner was a professor, and where he used all the influences and appliances at his command to develope his theory, has thrown it aside as unsound and worthless.

We may not be able to explain fully where this material filling the fissures came from, or by what process it was brought into them and formed into veins or lodes; but we have the following facts, which will afford some light on this question: A mineral vein is an aggregation of mineral matter in a fissure, no matter what is its angle or inclination, or the character of the rock it traverses. This material is highly crystalline, in many cases beautifully crystallized; and most of these forms of crystallization we know must be the result of chemical deposition from *water*. Not only the forms themselves, but everything around them forbid the supposition of crystallization from *fusion;* and even those we cannot prove to be chemical depositions from water, show no reason why they may not be.

I have carefully noticed the contents of mineral veins for many years, and in almost every class of rock and form of fissure, but have not yet seen a vein, the formation of which could be explained by plutonic or igneous action. Fissures may be, and no doubt are in many cases, the result of such conditions, but the filling of these fissures with mineral matter, I think never is.

The nature of this material, and its arrangement in the fissure show beyond doubt that it is the work of chemical forces, and that too, of chemical forces acting through water as a medium. Perhaps, it would be stating the fact in a simpler form, and be equally near the truth to say that mineral veins are the results of the mechanical and chemical powers of water under the influence of heat.

We are all familiar with the fact that water, when heated up to a certain point and under great pressure, generates a mechanical force of almost unlimited powers. Let me here notice another fact with which we are also familiar; that water, when heated, becomes a strong solvent, and stimulates chemical activity to a high degree. Aided by other solvents which it holds in solution, there is hardly any solid but will yield to it's power. At a high temperature under great pressure, it is capable of dissolving and holding in solution a vast amount of material, whether that material is brought under its influence in the shape of solid rock, or gaseous emanations. In this heated water, saturated with mineral matter, we find also another class of chemical forces, ready at the lowering of the temperature to aid, by their natural affinities and reactions, the work of molding this material into solid and symmetrical forms, such as we find in the filling of mineral fissures. And again, the point of temperature at which water is converted into steam (and consequently into mechanical force) is the point, or about the point, at which gases and fluids meet. At this point gaseous emanations and metallic sublimations rising through fissures from the heated interior must necessarily be condensed in water and driven up by mechanical force through fissures in the rocks above, to be deposited along their sides as aggregations of mineral matter, where the temperature and other conditions will admit of it.

I think there can be but little doubt, if any, that the mechanical and chemical powers of water, together with the forces which they generate under the influence of the varying degrees of heat form the essential elements in the physical conditions necessary to the production of mineral veins and ore deposits. Nor is it the action of these forces alone, but the beautiful system of force produced by their action and reaction upon each other that has given us the harmony and order that pervade mineral strata and mineral veins everywhere. The universal phenomena of mineral strata point to such conditions, and harmonize with such an origin; nor do I know of a single law of nature with which it conflicts.

Every practical miner knows well, that in the neighborhood of productive mineral veins, even the same formation presents different appearances, as though in certain places it had undergone a change from its original condition, while in others it remained unaltered. This altered condition of the rock runs in given lines or zones, conforming fully to some directive law. It appears also to have been exposed to peculiar physical conditions subsequent to its formation, as though an unequal distribution of heat or vapor, or solvents of some kind had produced a marked difference in the structure, while the chemical composition of the mass remained the same.

This altered rock presents more favorable conditions for fissures than the unaltered. It looks almost as if it had undergone a special preparation for this purpose. The whole mass seems to be traversed in all directions with fissures, filling it with ramifications not unlike veins in an animal, and like them circumscribed by natural law. They are of all sizes from a large dike down to a small thread-like seam, too small to be seen by the naked eye, but in a fine grained rock, with a magnifying power, they may be seen traversing it with all the regularity of the larger ones. And what is very strange, we have in this form of fissures and veins all the system and regularity, together with the same relations, action and re-action upon each other that we find in the larger fissures and veins that constitute our mineral strata. I obtained, some time ago, a beautiful specimen of this miniature form of mineral veins in a small slab of limestone, that represents very forcibly this feature of mineral strata. This slab of limestone is deposited with the mineral specimens of the lead district, and can be seen at the State Agricultural Rooms, Madison.

In this altered, or prepared rock, the larger fissures in which productive mineral veins are found occupy a central position, into which these minor fissures or seams seem to fall, or from which they seem to diverge. That there is a relation between these minor fissures and mineral veins proper, all intelligent miners agree, but what that relation is, is not so clear. It is the opinion of a certain class, that these small fissures or seams contribute in some way to the productiveness of the vein, hence they are called feeders. When a miner sees these little feeders, or as they are sometimes called, droppers, beginning to traverse the stratum through which he is drifting, especially if they contain ore, he feels that he is almost certain of a productive vein.

It was usual for us in our English mines to speak of a lode (or vein) and its branches, as though these little fissures were thrown off from the lode like branches from the trunk of a tree. This view would lead us to suppose that the vein was the source of the branches, instead of the branches being the feeders of the vein. This idea, perhaps, has grown out of the fact, that these little branches or seams are small, but well defined near the vein, and often filled with material similar to the vein itself, but as they recede from the vein they grow less distinct, and become lost in the joints and cleavage of the rocks.

These are some of the features of mineral strata as they are seen practically. They are not local, but general phenomena; are not confined to one class of rocks, fissures or mineral veins, but they are the results of general laws that underlie them all. They are also the practical miner's text-book, in which he studies, and from which he teaches his children the principles of practical mining. It is from a knowledge of these principles that his judgment is formed; a judgment sometimes so matured as to become almost unerring in the selection of mineral ground. But of the laws underlying these phenomena as their cause, he is ignorant. Not ignorant of their existence, for he is surrounded with their phenomena, and guided by their phenomenal teachings, but ignorant of their nature and their mode of operation.

Now if science can come forward with the laws governing mechanical and chemical disturbance in the earth's crust; the laws governing the direction of the lines within which these forces work; the laws governing the relation and correlation of forces combined to form this beautiful system of forces, the harmony and order of which is given in the beautiful system of fissures so apparent in the mineral strata, then this practical knowledge of mining may be placed upon a scientific basis, and the cause or causes of mineral formations be as logically and as safely deduced from phenomenal data, as the existence of Neptune was deduced from the disturbances of Uranus.

And if with this, we could banish from our mining creeds the elements of chance and caprice, and admit in their place the teachings of natural law, I can see no reason why the time may not come when from the combined knowledge of practical and scientific men, we may not be able to point with as much accuracy to the productive places in the earth's crust as the astronomer now points to the return of a comet in the heavens, or an approaching eclipse of the sun; for both are the results of natural laws. Nor will this time be long delayed if scientific men become more practical, and practical men more scientific. But let us turn now to the mineral veins and ore deposits of our own lead district.

In entering upon the consideration of the mineral veins and ore deposits of the lead district, we do well to bear in mind the phenomena of the district as a whole, and even its connection with phenomena outside of it, for the general laws underlying mineral formations as their cause, and especially mineral districts of large extent, can never be explained by local observations of limited extent.

On the character of the rocks in this district I need say but little; this, with their geological relations, is fully described in the report of 1862. I will state, however, for the benefit of those who have not seen that report, that the strata of the lead district, so far as exposed by mining, consists of a bed of limestone, known locally as the galena limestone, but chemically as a dolomite or magnesian limestone about 250 or 300 feet thick; and a bed of compact fossiliferous limestone, known locally as the blue limestone, but in its geological order as the Trenton limestone. These strata are of the lower silurian age, but are comparatively undisturbed by either plutonic or metamorphic action; that is, there are no elevations of granite or trap, or any other igneous rocks protruding through these strata.

The fissures traversing these strata are not like those in which we find what are called true fissure veins, such as are met with in crystalline rocks of plutonic or metamorphic origin, but fissures peculiar to this formation in similar lead and zinc districts in different parts of the world, and which belong to that class of fissures I have denominated hydro-plutonic.

The fissures traversing the galena limestone are usually vertical, or nearly so. The ore is sometimes found filling the fissure, where it is small, with little or no other matrix than the limestone walls against which it is formed. In this condition it forms a sheet of ore (as the miners call it) from 1 to 20 inches thick, enclosed firmly in the rock. When the fissure is wider, and its sides show evidence of decomposition, the ore is usually found in a clayey matrix lined with ochre.

The larger deposits, however, are found where the rocks between two or more fissures have been decomposed, and are called by the miners "crevice openings." This decomposition usually takes place beneath a harder portion of the rock, as though greater resistance had been offered here to mechanical forces acting from below, and a gentle lifting of the strata had taken place along the line of the fissures. As as an evidence of this, we always find beneath this cap-rock (as it is called) a seam extending from the sides of the opening horizontally, directly beneath the cap-rock; and it is where this horizontal seam intersects the vertical fissures, that the decomposition takes place, and the ore is deposited. As a consequence of this, we find these openings, not only along the same range of fissures, but along the same horizontal plane. This is a fact worthy of a moment's reflection, and its teachings should be heeded. These deposits of ore are always found *beneath* this cap-rock, and never *above* it. Query: *Was it introduced from above or below?* In openings like this, where the rock has been decomposed between two or more fissures running parallel to each other, we find not only clay and sandy material, the results of decomposition, but often large pieces of partially decomposed rock, which bear the appearance of having been acted upon by strong solvents. These openings vary in size, and are found from five to forty feet wide, and from ten to fifty deep, continuing from one hundred to several hundred feet in length, and they often yield from one to five million pounds of ore.

The material in these openings is not a disorderly, incoherent mass, but is arranged mechanically and chemically under some general law peculiar to this form of deposit. The finer, softer material, such as clay and ochre, is arranged along certain lines, while the carbonate of lime dissolved out of the decomposed rocks is re-deposited in the form of calcareous spar, to form with the finer part of this clay and ochre, a matrix in which these cres are deposited. In such openings, it looks as though the medium in which and through which, these solvents or dissolving agencies acted, furnished also the solutions from which these ores were formed; as though nature first prepared the place, and then deposited her treasure.

In the early history of our mines it was thought that where these openings closed in depth was the limit in vertical range of our ore deposits; but subsequent mining has shown that they succeed each other in the downward course of the fissures, and now not only the second but the third, and in some places the fourth opening in depth has been discovered, while the fissures continued their downward course.

Inasmuch as this irregular form of fissure, and consequently irregular form of ore deposit has been the cause of a wholesale and sweeping condemnation of this lead district, and has discouraged all enterprise in mining, it may be well for us to notice the relation that it bears to similar ore districts of known reputation that have passed through alternate periods of poverty and richness for ages, and yet supply the commercial demands of the world. Van Cotta, in his able work on ore-deposits, has arranged these districts for us, with the following description.

"Irregularly formed, more rarely vein-like, in part very massive aggregations of galena, blende, calamine, and smithsonite, occur in limestones and dolomites of very dissimilar age in upper Silesia, in Westphalia and Belgium, at Weslock in Baden, in the Corinthean Alps, near Anduze in France, in the Spanish province of Santander, as well as in the states of Wisconsin, Illinois, Iowa and Missouri; they are all of a similar, but by no means contemporaneous, origin. Great districts must have been penetrated by metalliferous solutions, from which the precipitation of the above ores took place; for the greater part only in dolomite or limestone, frequently at their expense.

"To be more clear, the solution traversed the considerably fissured rock, and this reacted in such a way on it that carbonate of lime and magnesia were dissolved, the ores being deposited in their place. * * *

"It is altogether inadmissible to suppose that the deposition of the ores occurred, in these cases, contemporaneously with those of the limestone or dolomite;-the whole manner in which the ore is distributed is opposed to this."

In the table of localities of this class of ore districts furnished by the writer, we find some of the most productive lead and zinc mines of Europe, such as the Derbyshire and Cumberland in England, those of Aix-la-Chapelle, Upper Silesia, with those of France and Spain.

In these forms of deposit, no feature is so prominent as that which points to a medium by which powerful solvents worked out places for their ores, widening the fissures in certain places, and leaving them almost closed in others. Heated water, with it's chemical forces, urged through these strata by mechanical force, is the only medium we can conceive of adequate to this work. And no doubt, one reason why these forms of fissures and ore-deposits are found oftener in dolomite or magnesian limestones than in other rocks, is its peculiar adaptation to this process of mineral formation. That Van Cotta entertained similar views is evident from his remarks on the different forms of ore-deposits, which are as follows:

"Thus the formation of lodes shows itself to be not only possibly, but also probably very manifold; and appears to have always stood in some connection with neighboring, and often shortly before, occurring eruptions of igneous rocks. The local re-action of the igneous fluid, interior of the earth created fissures; forced igneous fluid masses into many of the same; caused gaseous emanations and sublimations in others; and in addition, during long periods of time impelled the circulation of heated water, which acted, dissolving at one point, and again depositing the dissolved substances at another, dissolving new ores in their stead. The whole process is thus not confined to any particular geological period, or any particular locality, but recurs at all times, either in the same or new regions at the point where a re-action of the interior of the earth has taken place."

With these views, obtained from important ore districts similar in their origin to our own, it becomes us to scrutinize closely the phenomena of our fissures in their downward course, and to receive very cautiously, and with a certain amount of distrust any statement or statements made in reference to their closing in depth, since in these older districts actual tests have been made from which we may draw important information.

In the lower portion of the galena limestone, the fissures become more irregular in their course, resembling in many places a flight of stairs. Ore deposits found in connection with this form of fissures are called by the miners flats and pitches.

Where these fissures enter the blue limestone, the ore deposits are found mostly between the beds of the strata, but always in connection with the fissures, and are called by the miners *flat* openings. Here the ore deposits assume a different, although somewhat similar form, and come much nearer to that of a true fissure vein in the arrangement of their material. The ore is formed beneath a cap rock, a very hard, compact rock, forming a surface over the ore very similar to the hanging wall of a vein. Beneath this cap rock we find an aggregation of mineral matter, such as galena, blende, calamine, iron pyrites, calc, and sometimes heavy spar chemically deposited, arranged as in a true fissure vein. If these strata were tilted up to an acute angle, but few would be able to distinguish between this form of deposit and the forms of deposit in true fissure veins.

These flat openings are important forms of ore deposits; they extend sometimes to two or three hundred feet in width, and from one-half to one mile in length, along the course of the fissures; indeed, they seldom become fully exhausted of all their minerals; the lead may be replaced by zinc, or iron pyrites, or spar, so as not to pay expenses, but as a vein it continues, though poor.

A good example of this form of deposit is found at the Linden mines, in Iowa county. Here the ore deposit commences in the lower portion of the galena limestone, and following the fissures down through "flats and pitches" (the peculiar form these fissures take in this portion of the strata) into the blue limestone, it spreads out into broad horizontal sheets of ore for several hundred feet wide, and has been worked continuously for nearly a mile in length. The ore in this mine is not confined to "flat openings," (the usual form in the blue limestone,) but is often found filling the fissures as they extend from one bed of rock to another. In this way the deposit of ore that commenced in the galena limestone has worked its way down into, and almost through, the blue limestone; in fact, entirely through, if we regard the few feet resting on the sandstone to be magnesian limestone. In one or two places it has been followed down to the sandstone.

This mine has yielded not less than twelve million pounds of lead ore, and several million pounds of zinc ore, and if owned by an enterprising company and drained by an adit to its present depth, would no doubt yield many millions more. I refer to this only as an example of this class of fissures and form of ore-deposits, and to show that the same fissures vary in form in passing through the different beds of rock in the same formation, consequently the forms of ore-deposits vary also in the vertical range of the same fissures. One other feature of this class of fissures here, and everywhere else, is, the ore-deposits conform to the stratification, and instead of making a continuous vein along the wall of the fissures, they form a series of deposits along their vertical range. Hence we have in the galena limestone, the first, second and third openings, and sometimes the fourth. In the blue limestone beneath, we have the brown rock opening, the upper pipe-clay opening, the glass rock, or dry-bone opening, the lower pipe-clay opening, all following each other in succession along the vertical range of the fissures.

As each of these successive openings has been reached, and the fissures below them have again contracted and become poor, there has been reason to doubt the probability of ore being found below. For many years after the mines in the galena limestone were opened, not a man could be induced to spend a day in prospecting in the blue limestone; it was looked upon by both practical and scientific men, as a barren rock. But now, and for many years past, our best mines have been found in this formation. It has been by a series of accidents, almost, that we have stumbled upon these lower deposits, believing only when we saw them.

But now we are down upon a bed of sandstone about 80 or 100 feet thick, from beneath which there dawns no light. Scientific men are divided in their opinions in reference to it; some contend that it is only a temporary barrier, others that it is the bottom of our mineral formation. This certainly is one of the most important questions connected with our mining interests in the lead district; one upon which the future of these interests must depend. And while it is important that we approach this question with care, and avoid theories formed on imperfect data, it is likewise important to collect all the information we have, or can obtain on this point, to direct us in future operations.

We know but very little about the character of the fissures beneath our productive mines when they enter this sandstone; it has been reached in but two or three places, (and not near the principal fissures); in these places the fissures close up to a seam, but the seam continues as far as explored. Along the streams in the lead district, where this rock is exposed, no well defined fissures are noticed. Poorly defined, irregular fissures, however, traverse the rock in all directions, and in connection with them we sometimes find evidences of chimney-like perforations, such as those referred to before. In the belt of iron ore to the north of the lead district, we find fissures and ranges of fissures in this rock, with openings similar to what we find in the limestone. And from the fact that deposits of ochre and oxide of iron are found along this belt in connection with fissures, it is possible that deposits of ore of some kind may be found in the rocks below the mines in the lead district; but of this we have no evidence. The fact, however, that we cannot prove that these fissures will be productive in or below this rock, does not prove that they may not be. At this point let us examine the evidences furnished in similar ore districts where this has been tested.

"In Cumberland, [1] lodes of lead ore occur in carboniferous limestone, which alternates with sandstone and argillaceous shales. The lodes are only broad and productive when enclosed in the limestone, split up into branches and non-productive in the sandstone and shales."

"In Derbyshire, [2] the beds of the metalliferous limestones are separated by beds of Basaltic rock) called toadstone. When a vein of lead is worked through the first limestone down to the toadstone, it ceases to contain any ore, and often entirely disappears; on sinking through the toadstone to the second limestone, the ore is found again, but is cut off by a lower bed of toadstone, under which it appears again in the third limestone. In strong veins particles of lead occur in the toadstone, but in very small quantities."

I might multiply quotations here to show that ore districts similar to this of Wisconsin, and found in different parts of the world have had to contend with difficulties arising from the irregularity of their ore deposits, produced by beds of barren rock intervening, as great, and in many instances greater than those presented by the few feet of sandstone that divides the limestone beds of the lead district; difficulties which enterprise has overcome or accident has removed. How insignifi-

[1] Ore Deposits. Page 47.
[2] Bakewell's Introduction to Geology. Page 304.

cant these few feet of sandstone appear when compared with the hard crystalline bed of toadstone that cuts off the veins of the first bed of the Derbyshire limestone. And when the intelligence and enterprise of Wisconsin waver before such an obstacle, can we blame that of Derbyshire for confining her mining operations to the upper bed of limestone for centuries? If we are to look to the history of other lead districts, similar to our own for information, it is certainly in favor of the extension of our ore-deposits into the lower strata.

Before leaving the origin of our mineral veins, and the evidences of the action of forces from below, I would refer to one other class of phenomena noticed in connection with this north and south axis, both in the lead district and immediately to the north of it.

Every miner in the lead district is familiar with what are called *bars* of rock, sometimes called sulphur bars. These bars of rock form no distinct part in the series, but are the same rock locally changed. Where they are found in the galena limestone, (and we usually find them there,) the rock is changed from a comparatively soft, granular rock to a very hard, bluish gray, crystalline rock, as hard as any trap rock can be. I have known as high as one hundred dollars per foot paid for sinking a shaft in it. These bars are always found in connection with our best ore deposits, the ore often extending away from them into softer rock; or as the ore approached from the other way, it is said to give out in a bar, or is cut off by a bar. In some places this hard, crystalline rock appears to have been broken up subsequent to this hardening process and the angular fragments cemented together by the oxide of iron in a crystalline condition, forming, what the geologist would call, a breccia, or a conglomerate with angular fragments of rock.

These bars are not peculiar to any one locality in the lead district, but are found in almost every mining locality, and always near the center, or where the richest deposits are found. At New Diggings, beautiful specimens of this "bar" rock may be found with these angular fragments cemented together with iron pyrites. I found a very handsome specimen of this kind there, some time ago, which is now, with the other specimens of the survey, in the cabinet of the Academy of Sciences, at Madison.

To the north of the lead district, on the north side of the elevation of land running from Blue Mounds to Prairie du Chien, and in connection with the deposits of oxide of iron, I notice the same or very similar phenomena. Here, between the magnesian limestone and the Potsdam sandstone, we find, in places, beds of flinty hornstone which are occasionally broken up into fragments in the same way, and these fragments are cemented by the oxide of iron in a crystalline condition, representing exactly the form of the bars in the lead district, excepting that the fragments are flint or hornstone instead of lime rock, as in the lead district. Specimens of this, also, may be seen at Madison.

A little to the north of this, along the next elevation (the Baraboo hills) we find the same or very similar phenomena, only on a much larger scale, the result of exposure to more intense heat. Here we find not only bars but ridges of this altered rock. The ordinary rock is sandstone (Potsdam), but we find it gradually passing, sometimes into a fossiliferous sandstone, and from that into regular slate, at others into quartzite, and from that into the regular quartz rock. We find here, also, that beds of this quartzite from three to four hundred feet thick have been broken up into fragments varying in size from a man's head to a house, and thrown up in one mass around a center of force, as at Devil's Lake. Nothing is more evident than that the phenomena in these three places are the results of the same general cause, modified only by local conditions.

Now what is the change that this galena limestone in the lead district, and this sandstone at Devil's lake have undergone? Let us see if we can ascertain by putting a piece of each under the microscope. We will try the galena limestone first. In its normal condition, (that is its unchanged condition) it is made up of small grains like sand, cemented together with mortar. When this cement is dissolved, as in the case where it is exposed long to atmospheric agencies, these little grains fall apart from each other and look very much like sand. When we take one of these little grains alone on the slide, and put on a higher power, we see it is a little crystal of calcareous spar, or what the miners call tiff; its little face will sparkle in the light, and its angles lie almost as distinct as a piece of tiff that we hold in our hands.

But let us try now a piece of the bar-rock. We can see the same little crystals, but they are blended into one solid mass, as though they had been partially melted; they are no longer little grains or crystals, but a solid mass of crystals forming a rock of high crystalline texture. Now, what is true of this galena limestone and the bar-rock, is true also of the sandstone and the quartzite, except that in one the grains or crystals are lime or calcareous spar, in the other silica or quartz.

Now if we ask scientific men what such rocks are called when altered in this way, they will tell us metamorphic rocks. If we ask them what it is that has produced this change in sedimentary rocks, that they now assume this crystalline character, they tell us that it is either produced by igneous rocks thrown up into their midst, or by heat. If we ask under what form this heat was presented, they answer, "intensely heated water under great pressure;" either is sufficient to produce it.

Here we again meet with plutonic and hydro-plutonic forces in their endless round of rock and mineral formation and transformation; we meet them, and shall continue to meet them at every turn in the mineral strata, No one will be astonished if we state that quartzite is metamorphic sandstone; but if I should state that this bar-rock in the lead district is metamorphic limestone, the statement would be received with surprise, and with a certain degree of distrust. And yet one is just as much a metamorphic rock as the other; just as much the result of transformation by heat as the other. It is in these little details of the phenomena with which the lead district abounds that we find the evidences of the action of the physical forces from below.

I have stated before, and will repeat it here, that the phenomena of the lead district and of the formation north of it along the same axis, not only fully harmonize with the theory of the hydro-plutonic origin of our fissures and ore deposits, but readily explain them. By hydro-plutonic origin I mean, as explained before, the force of internal heat acting through water as a medium; a form that is related or rather correlated to plutonic force, as heat and motion, or electricity and magnetism are related to each other; or as Professor Tyndall would doubtless call it, a different mode of motion.

Unless we reject altogether the teachings of natural law, and regard our ore deposits as the result of chance, our choice of theory must be between this (or a similar one) and one that teaches their surface origin by atmospheric agencies. Before we adopt the latter, let us reflect for a moment upon what we shall be called upon to explain by it. It will not be the phenomena of our ore deposits merely, but also the fissures in connection with which they are found; the directive forces by which they were brought into belts of definite bearing; the axis of elevation to which these mineral belts, mineral fissures and ore-deposits belong; for they are all related by indissoluble bonds that we cannot sever. And should we succeed in explaining these phenomena in this way, we must also explain by the same theory, mountain ranges, lines of volcanic action, earthquakes, and indeed all the phenomena we call volcanic, plutonic, metamorphic and hydro-plutonic, for all these phenomena are the result of the different forms, or modified forms, of the same *force*, and that force we know to be *heat*.

This whole matter then, resolves itself into this: Is the source of this heat found in the centre of the solar system, or in the centre of the earth? We leave this question to the common sense of the people.

Although I regard the evidences furnished in the phenomena of the lead district ample to establish the relation of our mineral veins to physical forces and conditions acting from *below;* and believe that the results in other ore-districts similar to this favor the probability of their being productive in the lower strata, I do not, therefore, claim that they must necessarily be so. All I assert is, that there is no reason why they may not be. And this is all that can be said of unexplored mineral strata anywhere, under any circumstances. But whether these fissures will extend into the sandstone and magnesian limestone, and become productive or not, is still an unsettled question, one that can be determined only by a regular process of mining.

But one thing is now settled which was thought to be doubtful some years ago, and that is; these fissures are now known to traverse alike the different beds of the strata *above* the sandstone; and that they are sometimes productive in one, sometimes in another, sometimes in all, in the same mine. A great many examples of this can be furnished in mines that are now open. The Linden mines already referred to, and the Crow Branch mines, in Grant county, are good examples. In the latter, a rich deposit has been, and is now, being worked in the blue limestone. Where the mine is worked back into the hill to the east of the valley, there is from 80 to 100 feet of galena limestone, through which the fissures descend from the surface with but little indications of mineral until within a few feet of the blue limestone; but here the ore commences and extends through the different belts of the blue limestone to where the sandstone should be, as exposed to the south of the mine. This deposit, in connection with these fissures that can be traced through a large portion of the galena limestone (or the whole of that formation that is present there) and through the entire blue limestone, has yielded not less than six, perhaps seven million pounds of lead ore, besides a vast amount of zinc.

Now, a glance at my map will show that there is a large portion of the mineral formation in the lead district into which these fissures are *known* to extend, and in which they are *known* to be productive, that is yet untouched above the sandstone. Certainly not one mine in twenty, on an average, along the belts of mineral land has reached the blue limestone; not one in a hundred, along the two southern belts; and yet the blue limestone is known to extend beneath these mines worked in the galena limestone above. Whether the strata below the sandstone are productive or not, there is enough above it to last (with our present force of mining) for the next century. And from what we know of blue limestone and the lower portions of the galena limestone where they have been explored, we have reason to suppose that they will be equally as productive, if not more so, as that portion of the galena limestone which has been mined.

The zinc deposits are mostly confined to the blue limestone; there are a few instances where zinc is found in the lower portion of the galena limestone, but they are very rare. From discoveries recently made, it is evident that these zinc deposits are the richest in the lower portion of this formation. Good examples of this are furnished us in the mines that are now being worked at Highland and Centreville, in Iowa county. In these mines we find galena, blende and calamine uniting to form the same vein; sometimes one, sometimes the other predominating. There are places, however, where the calamine (or dry-bone) is separated from the galena and blende, and formed into large bodies by itself in beds from two to three feet thick.

But very few persons, either in or out of the lead district, seem to have any correct idea of the nature and extent of our zinc deposits. I speak advisedly when I say that there is zinc ore enough already discovered in the towns of Highland and Blue River to furnish (if proper encouragement was given to mining there) material for one zinc factory of large capacity for a great many years to come. And this is only one small place, within the limits of two townships along the line that separates the counties of Iowa and Grant.

Let me state here two or three facts, (1.) The blue limestone, wherever it has been reached in the mines or mining districts that have been more or less productive in lead, has been productive also in zinc. Not to the exclusion of the lead, but thrown in as it were an associate of lead, thus to add to the value of the veins in this formation; an advantage we do not find in the galena limestone above it. (2.) This zinc strata underlies the entire lead district. (3.) As before stated, it has been reached in but a very few places in the mines. The conclusion to be drawn from these facts is, that we have a large amount of undeveloped mineral deposits above the sandstone which offer peculiar inducements to mining, or will do so, as soon as a steady and reliable market for this ore is established by manufacturing it in our own state, and in close proximity to the mines.

The principal object of this survey has been to bring to light these facts that relate to the origin of our mineral veins; their relation to the lower strata, and to mineral veins in general. In presenting them in this report, I have made no effort at style or literary display, but to present them in as plain, simple language as their nature will admit. It must not be regarded as a scientific report, but a presentation of facts for practical purposes, and for the use of practical men.

Before closing I wish to make the following proposition: I have found it impossible under our present system of mining to collect material for a reliable statistical report. And, inasmuch, as a reliable record of the amount of ores raised in the different mines is important to the future success of these interests, I make the following suggestion, or rather proposition, namely, that if parties owning mines will furnish me annually the amount of ore raised in their individual mines, or any other item of information of importance, I will make a record of it, and from the different items, prepare and publish a report annually, without any expense to them or to the state. Another proposition.

Inasmuch as we have commenced a museum of practical geology, under the auspices of the Wisconsin Academy of Sciences, Arts and Letters, and have already quite a collection of minerals, fossils and other specimens, representing the practical and scientific interests of the lead district, and as such a museum will be an honor to our state, and is almost essential to the success of our mining interests, if parties in the mining region or in any other part of the state will collect and forward specimens suitable for such a collection, I will also, without expense, see that such specimens are properly arranged and credited. I would like to add also that there are but few things which the state can do to advance her mining interests more, than to provide a suitable place for such a museum, where her vast and varied mineral interests may be represented.

It will be seen that a portion of the information embodied in this report has been obtained beyond the limits of the lead district, and at considerable expense as well as time. But as this was not provided for by the law under which I am working, I have not charged the state with it. In fact, I have not charged the state with one dollar of expense during the survey; and although I have devoted my time faithfully to this work, yet, inasmuch as a portion of this work was outside the limits of the law, (although essential to my report), I have charged the state with only a portion of the time spent during the past summer.

With sincere thanks for your kindness and encouragement in this work,

I remain your obedient servant,

JOHN MURRISH,

Commissioner of the Survey of the Lead District.

AGRICULTURAL, HORTICULTURAL, INDUSTRIAL SOCIETIES AND FARMERS' CLUBS.

Names of Societies.	Secretary.	Post Office of Secretary
STATE SOCIETIES. — omit space		
State Agricultural Society	W. W. Field	Madison.
State Horticultural Society	O. S. Willey	Madison.
Wisconsin Dairymen's Associat'n	W. D. Hoard	Lake Mills.
Wisconsin Wool-grower's Ass'n.	Thomas Goodhue	Whitewater.
Wisconsin Woolen Manf'g Ass'n	W. G. Cutler	Milwaukee.
Wisconsin Bee-keeper's Ass'n	James Bullard	Evansville.
DISTRICT SOCIETIES. — omit space		
Southern Wisconsin Ag'l Society	R. J. Richardson	Janesville.
Northern Wisconsin Ag'l Society	R. D. Torry	Oshkosh.
Lodi Union Agricultural Society.	J. Van Ness	Lodi.
Southwestern Wisconsin Ag. Soc.	T. S. Ansley	Mineral Point.
Wisconsin Valley Ag'l Society	H. Z. Moulton	Mazomanie.
St. Croix Valley Ag'l Society	O. C. Hicks	River Falls.
Northwestern Dairymen's Ass'n.	G. E. Morrow	Madison.
COUNTY SOCIETIES.* Not the regular county agric. societies.		
Fond du Lac Co. Dairym's Ass'n.	H. C. Strong	Rosendale.
Jefferson Co. Dairymen's Ass'n.	W. D. Hoard	Lake Mills.
Kenosha Co. Dairymen's Ass'n.	J. H. Slosson	Kenosha.
Outagamie Co. Bee-keeper's As'n	A. H. Hart	Appleton.
Richland Co. Horticultural Soc.	A. L. Hatch	Ithaca.
Sheboygan Co. Horticult'l Soc.	J. E. Thomas	Sheboygan Falls.
Sheboygan Co. German Ag. Soc.	F. Stoesser	Sheboygan.
TOWNSHIP SOCIETIES AND CLUBS.		
Augusta Agricultural Society	H. Searls	Augusta.
Blake's Prairie Agricultural Soc.	Jesse Brooks	Bloomington.
Beef River Valley Farmer's Club	Jacob Wald	Alma.
Beloit Agricultural Association	D. Merrill	Beloit.
Blooming Grove Farmer's Club	Wm. M. Gay	Madison.
Dayton Farmer's Union Club	W. S. Eaton	Crystal Lake.
Door Creek Farmer's Club	M. E. Emerson	Door Creek.
Freedom Bee-keeper's Associat'n	C. P. Palmer	Freedom.
Glenbeulah Horticultural Soc.	E. Slade	Glenbeulah.
Green County Farmer's Club	J. J. Tschudy	Monroe.
Grand Chute Farmer's Club	D. Huntley	Appleton.
Grand Chute Horticultural Soc.	D. Huntley	Appleton.
Hazel Green Industrial Society	H. D. York	Hazel Green.
Helenville German Agricult' Soc.	O. Bullwinkle	Helenville.
Janesville Horticultural Society.	F. S. Lawrence	Janesville.

*For regular County Societies see pages 11-12.

List of Agricultural Societies, etc.—continued.

Names of Societies.	Secretary.	Post Office of Secretary
TOWNSHIP SOCIETIES—continued.		
Kenosha Horticultural Society ..	J. B. Jilsun	Kenosha.
Lake Superior Agricultural Soc.	W. Cranwell	Superior.
Madison Horticultural Society ..	G. E. Morrow	Madison.
Mazomanie Farmer's Club......	A. M. Bendict......	Mazomanie.
Markesan and Manchester, and Green Lake Farmer's Club..	W. Holbrook.......	Markesan.
Milton Far's' Ag. and Hort. Club.	J. C. Plumb........	Milton.
Newark Farmer's Club.........	V. S. Davis	Beloit.
Nelson Farmer's Club..........	J. Graff	Nelson.
New Holstein German Ag. Soc..	A. Mœller.........	New Holstein.
Omro Agricultural and Mech. As.	S. Simmons.........	Omro.
Oshkosh Horticultural Society..	Wm. P. Taylor.....	Oshkosh.
Platteville Joint Stock Ag. Soc.	H. S. Rountree.....	Platteville.
Portage Co. German Far's. Club	H. W. Hoffman	Amherst.
Poynette Farmer's Club........	D. C. Strong	Poynette.
Plymouth Agricultural Society..	E. Schlaich.........	Plymouth.
Racine Agricultural Society	....	....
Rio Farmer's Club............	L. Curtis...........	Rio.
Ripon Farmer's Club	T. Marshall........	Ripon.
River Falls Agricultural Society.	Osborn Strahl......	River Falls.
River Falls Farmer's Club......	Wm. Barker	River Falls.
Rock Grove Farmer's Club	J. M. Chambers	Rock Grove, Ill.
Rosendale Agricultural Society.	C. L. Hoyt	Rosendale.
Rock Hill Agricultural Society..	Wm. Rankin	Kingston.
Sun Prairie Farmer's Club......	R. K. Beecham.....	Sun Prairie.
Star Prairie Farmer's Club	John McClure......	Star Prairie.
Walsh Agricultural Society	W. E. Williams....	Kingston.
Washington Farmer's Club.....	L. Seltzer..........	Monroe.
Wauzeka Farmer's Club	L. C. Halstead	Wauzeka.
Willow Creek Farmer's Club....	A. S. Rogers	Spring Lake.
Windsor Farmer's Club........	E. P. Sherman	Windsor.
Whitewater Farmers' Club.....	W. J. McIntyre.....	Whitewater.

ABSTRACT OF RETURN OF STOCK FOR THE SEVERAL COUNTIES IN WISCONSIN FOR THE YEAR 1871.

COUNTIES.	No. of Horses.	No. of Neat Cattle.	No. of Mules and Asses.	No. of Sheep and Lambs.	No. of Swine.
Adams	1,847	6,901	35	7,574	3,746
Ashland.....	....	....	....	....	....
Barron	93	603	6	38	290
Bayfield	23	46	....	....	1
Brown.......	3,707	9,079	25	4,786	5,293
Buffalo	3,282	13,241	102	6,511	8,078
Burnett......	54	750	....	144	206
Calumet	3,123	9,026	41	8,171	5,948

Abstract of the returns of Stock—continued.

COUNTIES.	No. of Horses.	No. of Neat Cattle.	No. of Mules and Asses.	No. of Sheep Lambs.	No. of Swine.
Chippewa...	1,254	4,000	37	1,136	2,305
Clark.......	594	2,622	59	843	763
Columbia ...	10,602	21,412	147	44,488	14,108
Crawford ...	3,491	9,724	63	6,908	10,046
Dane	20,714	39,217	322	53,338	36,153
Dodge	14,187	30,939	155	55,370	21,439
Door	430	1,289	24	278	700
Douglas	51	71	1	12	....
Dunn.......	2,047	9,179	153	5,138	5,643
Eau Claire ..	2,142	5,598	56	1,794	2,354
Fond du Lac	11,550	27,299	140	60,260	14,279
Grant	16,268	36,623	389	20,574	58,656
Green	10,190	25,243	166	27,221	34,908
Green Lake .	4,865	11,000	38	31,242	6,565
Iowa	9,639	27,863	148	11,227	31,421
Jackson	2,191	7,012	91	4,091	3,144
Jefferson....	8,859	23,079	210	39,031	16,538
Juneau	2,799	8,730	48	8,749	6,639
Kenosha...	4,729	14,887	53	38,508	7,596
Kewaunee ..	890	5,127	13	692	2,156
La Crosse...	4,374	11,416	124	9,330	6,333
La Fayette..	10,886	27,056	384	13,075	38,225
Manitowoc ..	5,084	13,569	50	11,839	6,925
Marathon ...	680	5,099	7	1,669	1,693
Marquette ..	2,238	9,435	26	14,767	5,969
Milwaukee..	8,026	11,043	83	6,230	7,688
Monroe	4,025	12,395	152	12,766	9,162
Oconto	1,053	1,943	45	501	796
Outagamie..	3,648	10,652	45	9,742	6,829
Ozaukee....	3,869	10,371	25	5,953	7,344
Pepin	1,110	4,149	36	2,091	3,115
Pierce	2,583	9,192	56	2,743	5,549
Polk.	588	3,078	23	776	1,159
Portage.....	1,704	8,266	59	7,603	4,481
Racine......	6,079	14,583	68	31,190	8,134
Richland ...	4,583	13,289	149	23,949	17,072
Rock	15,971	29,322	260	43,564	32,104
St. Croix....	2,962	7,112	57	1,317	3,807
Sauk.......	7,482	21,000	166	22,114	19,445
Shawano ...	409	1,991	8	709	1,459
Sheboygan..	7,323	24,702	109	32,304	11,858
Trempealeau	3,053	11,534	90	9,796	3,638
Vernon	5,448	17,771	102	23,756	19,439
Walworth ..	10,830	21,861	174	76,491	23,581
Washington	7,095	17,708	62	20,134	16,786
Waukesha..	9,691	19,642	126	59,995	18,447
Waupaca ...	2,664	10,993	52	12,688	5,368
Waushara ..	2,916	10,762	102	13,948	6,592
Winnebago .	7,526	18,029	110	35,676	9,192
Wood	521	2,023	18	532	786
	284,042	731,146	5,290	974,372	591,860

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