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H. F. ...



John H. Gardner

TRANSACTIONS
OF THE
MISSISSIPPI VALLEY
HORTICULTURAL SOCIETY,

FOR THE YEAR 1884

Compliments of

W. H. RAGAN,

Sec'y Miss. Val. Hort. Society,

GREENCASTLE,

INDIANA.

Please acknowledge.

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ALPHONSE, 1884.

INDIANAPOLIS:
CARLON & HOLLENBECK, PRINTERS AND BINDERS.
1884.



TRANSACTIONS

OF THE

MISSISSIPPI VALLEY

HORTICULTURAL SOCIETY,

FOR THE YEAR 1884.

BEING A REPORT OF THE FIFTH ANNUAL MEETING, HELD AT
KANSAS CITY, MO., JANUARY 22, 23, 24 AND 25, 1884.

TOGETHER WITH

A FULL LIST OF PAPERS READ, WITH ACCOMPANYING DISCUSSIONS; ALSO, LIST
OF MEMBERS, ROSTER OF OFFICERS OF HORTICULTURAL SOCIETIES, BUSINESS
DIRECTORY, AND SKETCH OF THE HORTICULTURAL DEPARTMENT
OF THE WORLD'S⁴ INDUSTRIAL AND COTTON CENTENNIAL
EXPOSITION, AT NEW ORLEANS, LOUISIANA.

VOL. II.

By W. H. RAGAN, SECRETARY.

*Professor of Horticulture and Superintendent of Parks, DePauw University,
Greencastle, Ind.*

INDIANAPOLIS:
CARLON & HOLLENBECK, PRINTERS AND BINDERS.
1884.

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INTRODUCTORY.

Two principal causes have conspired to delay the publication of this volume. First, the unavoidable detention of the cuts that so well illustrate Prof. Forbes's paper on Insects affecting the Strawberry, by the State Printers of Illinois, who had them in use in the publication of the Professor's Report as Entomologist of that State; and second, the delay incident to the preparation, by a Philadelphia artist, of the elegant and life-like engraving of the late Dr. Warder, with which the volume is now so handsomely adorned.

Trusting that members and others interested will accept the above explanation as satisfactory, and that errors and defects may be chargeable to an incompetent and overworked Secretary, this, the second volume of Transactions of the Mississippi Valley Horticultural Society, is "turned adrift" to receive such commendation and criticism as it may deserve.

SECRETARY.

OFFICERS

OF THE

MISSISSIPPI VALLEY HORTICULTURAL SOCIETY

FOR 1884.

PARKER EARLE, PRESIDENT.....Cobden, Illinois.
 E. M. HUDSON, FIRST VICE PRESIDENT.....New Orleans, Louisiana.
 W. H. RAGAN, SECRETARY.....Greencastle, Indiana.
 J. C. EVANS, TREASURER.....Harlem, Missouri.

STATE VICE PRESIDENTS.

N. OHMER, Dayton, Ohio.
 T. T. LYON, South Haven, Michigan.
 E. Y. TEAS, Dunreith, Indiana.
 PROF. T. J. BURRILL, Champaign, Illinois.
 GEO. P. PEPPER, Pewaukee, Wisconsin.
 W. PIERCE, Minneapolis, Minnesota.
 GOV. R. W. FURNAS, Brownville, Nebraska.
 PROF. E. A. POPENOE, Manhattan, Kansas.
 D. S. GRIMES, Denver, Colorado.
 PROF. J. L. BUDD, Ames, Iowa.
 Z. S. RAGAN, Independence, Missouri.
 S. H. NOWLIN, Little Rock, Arkansas.
 T. V. MUNSON, Denison, Texas.
 R. S. WILLETS, Miller, Dakota.
 JOHN T. HARDIE, New Orleans, Louisiana.
 PROF. J. J. COLMANT, Agricultural College, Mississippi.
 DR. CHARLES MOHR, Mobile, Alabama.
 *J. E. PORTER, Humboldt, Tennessee.
 A. D. WEBB, Bowling Green, Kentucky.
 A. W. CAMPBELL, Wheeling, West Virginia.
 DR. SAMUEL HAFE, Atlanta, Georgia.
 DR. THOMAS MEHAN, Philadelphia, Pennsylvania.
 E. H. HART, Federal Point, Florida.
 E. MOODY, Lockport, New York.

* Deceased.

CORRESPONDENTS.

-
- Allan, J. T., Sec'y State Hort. Society, Omaha, Nebraska.
- Beadle, D. W., Sec'y Fruit Growers' Association, St. Catharines, Ontario.
- Beal, Prof. W. J., Sec'y American Pom. Soc'y, Lansing, Michigan.
- Burrill, Prof. T. J., Champaign, Illinois.
- Berkmans, P. J., Pres. State Hort. Society, Augusta, Georgia.
- Budd, Prof. J. L., Sec'y State Hort. Soc'y, Ames, Iowa.
- Brackett, G. C., Sec'y State Hort. Soc'y, Lawrence, Kansas.
- Brackett, G. B., Denmark, Iowa.
- Bush, Isador, St. Louis, Missouri.
- Brayton, Prof. A. W., Indianapolis, Indiana.
- Bryant, Arthur, Princeton, Illinois.
- Beatty, J. S., Pres. State Hort. Society, Simpsonville, Kentucky.
- Barry, Patrick, Rochester, New York.
- Cassell, W. H., Canton, Mississippi.
- Colman, Col. N. J., St. Louis, Missouri.
- Colmant, Prof. J. J., Agricultural College, Mississippi.
- Campbell, G. W., Sec'y State Hort. Society, Delaware, Ohio.
- Cowing, Granville, Muncie, Indiana.
- Downing, Charles, Newburg, New York.
- Evans, J. C., Harlem, Missouri.
- Furnas, Gov. R. W., Brownville, Nebraska.
- Forbes, Prof. S. A., State Entomologist, Normal, Illinois.
- Grimes, J. T., Minneapolis, Minnesota.
- Grimes, D. S., Denver, Colorado.
- Goodman, L. A., Sec'y State Hort. Society, Westport, Missouri.
- Gibbs, Oliver, Jr., Sec'y State Hort. Society, Lake City, Minnesota.
- Garfield, C. W., Sec'y State Hort. Society, Grand Rapids, Michigan.
- Gibb Charles, Abbotsford, Province of Quebec.
- Gale, Prof. E., Pres. State Hort. Society, Manhattan, Kansas.
- Galusha, O. B., Peoria, Illinois.
- Hale, J. H., South Glastonbury, Connecticut.
- Hape, Dr. Samuel, Atlanta, Georgia.
- Hudson, E. M., New Orleans, Louisiana.

- Hollister, E. T., St. Louis, Missouri.
Hollister, Capt. E., Alton, Illinois.
Holsinger, F., Rosedale, Kansas.
Hammond, A. C., Warsaw, Illinois.
Ingersoll, Prof. C. L., Pres. State Agricultural College, Fort Collins, Colorado.
Johnson, S., Pres. State Hort. Society, Irvington, Indiana.
Johnson, George Y., Sec'y State Agricultural Society, Lawrence, Kansas.
Loring, Dr. George B., U. S. Comm'r of Agriculture, Washington, D. C.
Lyon, T. T., Pres. State Hort. Society, South Haven, Michigan.
Lazenby, Prof. W. R., Columbus, Ohio.
Lovett, J. T., Little Silver, New Jersey.
Latta, Prof. W. C., Purdue University, Lafayette, Indiana.
Merwin, C. M., Medina, Tennessee.
Manning, Robert, Sec'y State Hort. Society, Salem, Massachusetts.
Morton, Dr. J. W., Nashville, Tennessee.
Mohr, Dr. Charles, Mobile, Alabama.
McKay, Dr. E. H., Pres. State Hort. Society, Madison, Mississippi.
McWhorter, Tyler, Aledo, Illinois.
Munson, T. V., Pres. North Texas Hort. Society, Denison, Texas.
Minier, George W., Minier, Illinois.
Nowlin, S. H., Little Rock, Arkansas.
Ohmer, N., Pres. State Hort. Society, Dayton, Ohio.
Plumb, J. C., Milton, Wisconsin.
Parry, William, Parry Postoffice, New Jersey.
Pierce, L. B., Talmadge, Ohio.
Rosaman, J. W., Gadsden, Tennessee.
Roy, William, Owen Sound, Ontario.
Riley, Prof. C. V., United States Entomologist, Washington, D. C.
Ragan, Z. S., Independence, Missouri.
Roe, Rev. E. P., Cornwall-on-the-Hudson, New York.
Stuart, W. R., Ocean Springs, Mississippi.
Smith, J. M., Pres. State Hort. Society, Green Bay, Wisconsin.
Scott, D. Wilmot, Sec'y Nurserymen's Association, Galena, Illinois.
Samuels, William M., Clinton, Kentucky.
Stayman, Dr. J., Leavenworth, Kansas.
Thomas, J. J. Union Springs, New York.
Teas, E. Y., Dunreith, Indiana.
Tracy, Prof. S. M., Pres. State Horticultural Society, Columbia, Missouri.

Vick, James, Rochester, New York.

Webber, A. W., Nashville, Tennessee.

Weltz, Leo, Treasurer State Horticultural Society, Wilmington, Ohio.

Webb, A. D., Bowling Green, Kentucky.

Wilder, Col. Marshall P., Pres. A. P. S., Dorchester, Massachusetts.

STANDING COMMITTEES FOR 1884.

On Fruit Packages—E. T. Hollister, of Missouri; N. Ohmer, of Ohio; W. Pierce, of Minnesota; E. H. Williams, of Indiana; and C. C. Wright, of Illinois.

On Forestry and Pomology—J. Sterling Morton and R. W. Furnas, of Nebraska; G. H. Wright, of Iowa; S. H. Nowlin, of Arkansas; N. J. Colman, of Missouri; E. Y. Teas, of Indiana; J. B. Schlichter, of Kansas; S. M. Tracy, of Missouri; and T. V. Munson, of Texas.

On Transportation—F. A. Thomas and John Buck, of Illinois; F. Wellhouse, of Kansas; L. A. Goodman, of Missouri; and E. Y. Teas, of Indiana.

On Nomenclature of Fruits—S. Johnson, of Indiana; T. J. Burrill, of Illinois; J. H. Hale, of Connecticut; J. H. Masters, of Nebraska; and L. B. Pierce, of Ohio.

On New Orleans Exhibition—R. W. Furnas, of Nebraska; Oliver Gibbs, Jr., of Minnesota; J. C. Evans, of Missouri; S. H. Nowlin, of Arkansas; D. S. Grimes, of Colorado; George Y. Johnson, of Kansas; P. J. Berekmans, of Georgia; L. A. Williams, of Iowa; N. Ohmer, of Ohio; C. W. Garfield, of Michigan; S. Johnson, of Indiana; A. D. Webb, of Kentucky; D. W. Beadle, of Ontario; J. M. Smith, of Wisconsin; T. V. Munson, of Texas; W. C. Barry of New York; A. C. Hammond, of Illinois; J. E. Porter, of Tennessee; S. M. Wiggins, of Louisiana; J. J. Colmant, of Mississippi; Major Gaines, of Alabama; and E. H. Hart, of Florida.

CONSTITUTION
OF THE
MISSISSIPPI VALLEY HORTICULTURAL SOCIETY.

ARTICLE I. The organization shall be known as the Mississippi Valley Horticultural Society. Its object shall be the promotion of horticulture.

ARTICLE II. Any person may become a member upon the payment of two dollars, and membership shall continue upon the payment of two dollars annually.

ARTICLE III. Its officers shall consist of a President, First Vice President, Secretary and Treasurer, and one Vice President from each State, who shall be elected by ballot at each annual meeting. The term of office of the President, Vice President, Secretary and Treasurer shall begin on the first day of July following their election. No person can act as an officer of this Society who does not maintain his membership by the payment of the annual membership fee.

ARTICLE IV. The regular meetings of this Society shall be held annually on the first Tuesday of September, except when otherwise ordered by the Executive Committee, and continue for such time as the committee shall determine.

ARTICLE V. The officers of the Society shall constitute an Executive Committee, at any meeting of which a majority of the members present shall have power to transact business.

ARTICLE VI. Special meetings of the Society may be called by the Executive Committee, and meetings of the committee may be called by the President and Secretary.

ARTICLE VII. This Constitution may be amended by a two-thirds vote of the members present at any regular meeting.

LIST OF MEMBERS.

A

Abner Allen, Wabaunsee.....	Kansas.
A. Ambrose, Nevada.....	Missouri.
Agricultural College, Manhattan.....	Kansas.
L. F. Adams, Indianapolis.....	Indiana.
Benton Aldrich, Brock.....	Nebraska.
Daniel Abbott, Rosedale.....	Kansas.
Henry Avery, Burlington.....	Iowa.
C. B. Ayres, 89 South Water street, Chicago.....	Illinois.
B. F. Adams, Madison.....	Wisconsin.

B

Benjamin Buckman, Farmingdale.....	Illinois.
J. D. Baldwin, Ann Arbor.....	Michigan.
D. & H. Brown, Brandt.....	Ohio.
J. C. Blair, Kansas City.....	Missouri.
M. Butterfield, Lee's Summit.....	Missouri.
John Buck, Cobden.....	Illinois.
Samuel Barnard, Table Rock.....	Nebraska.
Giles C. Burnham, Detroit.....	Michigan.
Prof. T. J. Burrill, Champaign.....	Illinois.
James A. Bayles, Lee's Summit.....	Missouri.
H. P. Barbour, Chicago.....	Illinois.
George C. Brackett, Lawrence.....	Kansas.
William Byers, Kansas City.....	Missouri.
J. Bagby, New Haven.....	Missouri.
Arthur Bryant, Princeton.....	Illinois.
R. S. Brown, Box 1199, Kansas City.....	Missouri.

Blair & Kaufman, Kansas City.....	Missouri.
J. S. Beatty, Simpsonville.....	Kentucky.
Robert Butterworth, Trenton	New Jersey.
T. Bermingham, 131 South Water st., Chicago.....	Illinois.
Theo. F. Baker, Bridgeton	New Jersey.
Isador Bush, Bushberg	Missouri.
Prof. J. L. Budd, Ames	Iowa.
David Baird, Manalapan	New Jersey.
Moses Baker, 93 South Water st., Chicago.....	Illinois.
Amory Bigelow, 105 South Water st., Chicago.....	Illinois.
R. A. Burnett, 161 South Water st., Chicago	Illinois.
George W. Barnett, Chicago.....	Illinois.
Horace Y. Beebe, Ravenna	Ohio.
H. C. Bouton, Anna	Illinois.
P. J. Berekmans, Augusta.....	Georgia.
Alex. Benn, 183 South Water st., Chicago	Illinois.
C. S. Bell, Lexington ..	Kentucky.
Prof. C. J. Bell, Kenton	Tennessee.
J. H. Barnwell, Medina.....	Tennessee.
E. F. Babcock, Little Rock	Arkansas.
E. Burrows, Canton.....	Missouri.
S. M. Bayles, St. Louis	Missouri.

C

Prof. James Cassidy, Fort Collins.....	Colorado.
W. B. Clark, Beebe.....	Arkansas.
Mrs. Julia Ann Clark, Beebe.....	Arkansas.
Granville Cowing, Muncie	Indiana.
George Cairncross, Pewaukee	Wisconsin.
Prof. J. J. Colmant, Agricultural College.....	Mississippi.
Gov. N. J. Colman, St. Louis.....	Missouri.
R. A. Carmon, Denver	Colorado.
A. F. Cook, Gibbsville.....	Wisconsin.
E. F. Cadwallader, Louisburg ..	Kansas.
R. H. Cadwallader, Louisburg.....	Kansas.
B. O. Curtis, Paris	Illinois.
John M. Coulter, Gibson	Tennessee.
Clemens, Cloon & Co., Kansas City	Missouri.

Charles G. Comstock, Albany.....	Missouri.
Cook & Erwin, Blue Mound.....	Kansas.
Daniel Conger, Walcott.....	New York.
John S. Collins, Moorestown	New Jersey.
William Carmichael, Bellemore.....	Indiana.
W. H. Cassell, Canton	Mississippi.
Coe & Converse, Fort Atkinson.....	Wisconsin.
M. Crumrine, Junction City.. ..	Kansas.
W. H. Carson, 114 Chambers st., New York.....	New York.
George W. Campbell, Delaware.....	Ohio.
John K. Cravens, Kansas City	Missouri.
Matthew Crawford, Cuyahoga Falls.....	Ohio.
G. J. Carpenter, Bower.....	Nebraska.
Thomas H. Child, 420 Library st., Philadelphia.....	Pennsylvania.
J. V. Cotta, Lanark	Illinois.

D

H. M. Dunlap, Savoy.....	Illinois.
W. R. Dawson, Bainbridge.....	Indiana.
John B. Durand, Province City.....	Missouri.
R. N. Day, Tekamah.....	Nebraska.
J. H. Durkes, Weston.....	Missouri.
E. P. Diehl, Olathe.....	Kansas.
Miss Florence Davidson, Union.....	Indiana.
Dr. T. F. Dryden, Clayton.....	Indiana.
George Davies, 37 Prospect st., Cleveland.....	Ohio.
Charles Downing, Newburg.....	New York.
D. M. Dewey, Rochester	New York.
Franklin Davis, Balt. & Paca st., Baltimore.....	Maryland.
William Davis, 26 North Fifteenth st., Denver.....	Colorado.
C. Douglas, Tecumseh	Nebraska.
Robert Douglas, Waukegan	Illinois.
Dr. J. T. Deupree, Jackson.....	Tennessee.
C. N. Dennis, Hamilton.. ..	Illinois.

E

William Ent, Savannah	Missouri.
W. J. Edmonson, Perry.....	Iowa.

Samuel Edwards, Mendota	Illinois.
G. F. Espenlaub, Rosedale	Kansas.
J. C. Evans, Harlem	Missouri.
Parker Earle, Cobden	Illinois.
Mrs. Parker Earle, Cobden	Illinois.
Frank S. Earle, Cobden.....	Illinois.
Charles T. Earle, Cobden.....	Illinois.
Mary T. Earle, Cobden.....	Illinois.

F

Gov. R. W. Furnas, Brownville.....	Nebraska.
Mrs. R. W. Furnas, Brownville.....	Nebraska.
H. B. Francis, Mulberry.....	Missouri.
Prof. S. A. Forbes, Normal.....	Illinois.
Washington Folck, Marshall	Missouri.
C. H. Fink, Lamar.....	Missouri.
J. A. Foote, Terre Haute	Indiana.
Frank Ford, Ravenna	Ohio.
E. M. Fuller, Bismarck	Dakota.
C. H. Ferrell, Humboldt.....	Tennessee.
C. M. Forbes, Judsonia.....	Arkansas.
James N. Fitch, Cobden.....	Illinois.
Dr. A. D. Finch, Anna.....	Illinois.
J. E. Fisher, Rosedale	Kansas.
D. O. Frantz & Sons, Springfield.....	Ohio.
C. W. Faust, Canton.....	Ohio.

G

A. H. Griesa, Lawrence.....	Kansas.
J. H. Gail, 153 Michigan st., Buffalo.....	New York.
Dr. C. H. Gregory, Van Buren	Arkansas.
Louis Guerineau, Malvern.....	Arkansas.
Dr. A. Goslin, Oregon.....	Missouri.
D. S. Grimes, Denver	Colorado.
Samuel Grondyke, Eugene	Indiana.
L. A. Goodman, Westport.....	Missouri.
Charles Gibb, Abbotsford.....	Province of Quebec.
Oliver Gibbs, Jr., Lake City	Minnesota.

G. W. Gordon, Memphis	Tennessee.
W. G. Gano, Parkville	Missouri.
R. V. Gray, Judsonia.....	Arkansas.
Charles W. Garfield, Grand Rapids	Michigan.
H. C. Graves, Sandwich.....	Illinois.
Milo George, 95 South Water st., Chicago	Illinois.
A. H. Gilkerson, Warrensburg	Missouri.

H

G. W. Hopkins, Kansas City	Missouri.
E. T. Hollister, St. Louis.....	Missouri.
E. Hollister, Alton.....	Illinois.
F. Holsinger, Rosedale.....	Kansas.
J. S. Harris, La Crescent.....	Minnesota.
Bennett Hole, Carthage.....	Missouri.
W. F. Heikes, Huntsville.....	Alabama.
J. H. Hale, South Glastonbury	Connecticut.
H. G. Hughes, Rosedale	Kansas.
D. C. Hawthorne, Leavenworth.....	Kansas.
John S. Hicks, Roslyn.....	New York.
E. J. Holman, Leavenworth.....	Kansas.
D. E. Hoffman, Winchester	Indiana.
George Hitz, Indianapolis	Indiana.
Miss Minnie Hargrove, Union	Indiana.
William S. Hubbard, Indianapolis.....	Indiana.
J. M. Howell, Dallas	Texas.
H. S. Hurd, Burlington.....	Ontario.
Heikes Nurseries Company, Dayton.....	Ohio.
David Hill, Dundee.....	Illinois.
M. A. Hunt, Wright's Grove, Chicago	Illinois.
A. C. Hammond, Warsaw.....	Illinois.
E. M. Hudson, New Orleans.....	Louisiana.
John T. Hardie, New Orleans.	Louisiana.
Edmond H. Hart, Federal Point	Florida.
Dr. T. H. Hoskins, Newport.....	Vermont.
Jacob Hileman, Anna	Illinois.
Dr. Samuel Hape, Atlanta	Georgia.

T. S. Hubbard, Fredonia	New York.
Peter Henderson, New York.....	New York.

J

Sylvester Johnson, Irvington.....	Indiana.
George Y. Johnson, Lawrence.....	Kansas.
Prof. J. W. Johnson, Leavenworth.....	Kansas.
Mrs. J. R. Johnson, Dallas.....	Texas.
F. C. Johnson, Kishwaukee... ..	Illinois.
B. F. Johnson, Champaign	Illinois.
Powell Jackson, Carthage.....	Missouri.
S. S. Jackson, Cincinnati.....	Ohio.
L. C. James, Gibson.....	Tennessee.
E. N. Jones, Covington.....	Tennessee.
H. A. Johns, Sioux City	Iowa.
Z. K. Jewett, Sparta	Wisconsin.

K

Levi Knowlton, Utica.....	Ohio.
A. T. Kelsey, St. Joseph.....	Missouri.
J. W. Kidwell, Kansas City.....	Missouri.
T. W. Kizer, Winchester.....	Indiana.
P. M. Kiely, 914 Broadway, St. Louis.....	Missouri.
John Kaufman, Kansas City.....	Missouri.
A. C. Kendel, Cleveland.....	Ohio.
Mrs. A. C. Kendel, Cleveland.....	Ohio.

L

S. W. Little, Los Angeles.....	California.
J. W. Latimer, Pleasanton.....	Kansas.
D. S. Lake, Shemandoah.....	Iowa.
John T. Lovett, Little Silver ..	New Jersey.
T. T. Lyon, South Haven.....	Michigan.
Wm. Lyons, Minneapolis	Minnesota.
Jas. Lippincott, Jr., Mount Holly.....	New Jersey.
H. M. Love, 113 S. Water St., Chicago.....	Illinois.
Willis Lamer, Cobden.....	Illinois.
Wm. Lewis, Box 1249, Kansas City	Missouri.

R. C. Lee, Canton	Mississippi.
J. Van. Lindley, Salem Junction	North Carolina.
Prof. W. C. Latta, Lafayette	Indiana.

M

J. H. Moonsees, Beaman	Missouri.
W. P. Mesler, Cobden.....	Illinois.
John McCaffrey, Cobden	Illinois.
S. G. Minkler, Oswego	Illinois.
Tyler McWhorter, Aledo	Illinois.
Gov. J. Sterling Morton, Nebraska City.. ..	Nebraska.
Dr. J. W. Morton, Nashville.....	Tennessee.
T. E. B. Mason, Shenandoah.....	Iowa.
Mrs. T. E. B. Mason, Shenandoah	Iowa.
J. H. Masters, Nebraska City	Nebraska.
T. V. Munson, Denison.....	Texas.
Mrs. Maria Munson, Denison	Texas.
J. N. Menifee, Oregon.....	Missouri.
W. Meixell, Parsons.....	Kansas.
Capt. E. P. Miller, Paola.	Kansas.
Jas. D. Meador, Independence.....	Missouri.
W. R. McKeen, Terre Haute.....	Indiana.
J. F. McCurdy, Marshall.....	Missouri.
J. F. Mendenhall, Indianapolis.....	Indiana.
Mann & Bradley, Indianapolis.....	Indiana.
J. T. Moss & Sons, Ashboro	Indiana.
Thos. Mason, 160 S. Water St., Chicago.....	Illinois.
J. C. Miller, Norwich	Ohio.
F. H. Miller, 922 N. 3d St., St. Louis.....	Missouri.
C. M. Merwin, Medina	Tennessee.
Mrs. H. R. Moore, Greencastle	Indiana.
J. D. Moor, Columbus	Indiana.
C. J. Morris, Beebe	Arkansas.
A. L. McClay, 85 S. Water St., Chicago.....	Illinois.
Dr. H. E. McKay, Madison.....	Mississippi.
Monroe Mattison, Englewood	New Jersey.
J. J. Measer, Hutchinson	Kansas.

N

S. H. Nowlin, Little Rock.....	Arkansas.
Ira N. Needles, Atlantic.....	Iowa.
W. B. Newman, Wyandotte.....	Kansas.
Dr. W. J. Newton, Ottawa.....	Kansas.
J. S. Newmeyer, Love Lake.....	Missouri.
F. Neibauer, Dongola.....	Illinois.

O

N. Ohmer, Dayton.....	Ohio.
C. B. Olin, Ottawa.....	Kansas.
Ewald Over, Indianapolis.....	Indiana.
Isaac Orwick, Harlem.....	Missouri.

P

W. S. Plummer, Leavenworth.....	Kansas.
S. C. Palmer, Kansas City.....	Missouri.
William Pierce, Minneapolis.....	Minnesota.
W. J. Parker, Carthage.....	Missouri.
Charles Patterson, Kirksville.....	Missouri.
George P. Peffer, Pewaukee.....	Wisconsin.
J. E. Porter, Humboldt.....	Tennessee.
W. P. Popenoe, Topeka.....	Kansas.
Prof. E. A. Popenoe, Lawrence.....	Kansas.
Amos Poole, Cobden.....	Illinois.
G. Poindexter, Blue Lick.....	Indiana.
J. C. Plumb, Milton.....	Wisconsin.
J. H. Priest, Greencastle.....	Indiana.
Alfred Plant, St. Louis.....	Missouri.
P. F. Peterson, Tekama.....	Nebraska.
L. B. Pierce, Talmadge.....	Ohio.
Charles F. Pierce, 92 Washington street, Chicago.....	Illinois.
William Parry, Parry P. O.....	New Jersey.
Bartlett Presley, Minneapolis.....	Minnesota.
W. H. Peacock, Chicago.....	Illinois.
Prof. D. P. Penhallow (McGill College), Montreal.....	Quebec.

Q

W. J. Quack, Columbus.....	Indiana.
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R

E. A. Riehl, Alton	Illinois.
William Radam, Austin	Texas.
J. W. Ragan, Fillmore	Indiana.
W. H. Ragan, Greencastle	Indiana.
Z. S. Ragan, Independence	Missouri.
H. H. Ragan, Salem	Oregon.
William Roy, Owen Sound	Ontario.
J. W. Robson, Cheever.....	Kansas.
J. W. Russell, Blue Springs.....	Nebraska.
J. B. Rogers, Milburn.....	New Jersey.
T. D. Randall, 219 S. Water street, Chicago.....	Illinois.
E. C. Reichwald, 165 S. Water street, Chicago..	Illinois.
W. E. Rosebro, Crawfordsville.....	Indiana.
J. W. Rosaman, Gadsden.....	Tennessee.
Rommel & Sobbe, Morrison.....	Missouri.
Dr. J. C. Ridpath, Greencastle	Indiana.

S

W. A. Stiles, New York.....	New York.
William M. Samuels, Clinton	Kentucky.
Rufus W. Smith, Elmer.....	New Jersey.
J. M. Samuels, Malisus	Tennessee.
Dr. J. Stayman, Leavenworth.....	Kansas.
J. F. Stewart, Blackburn.....	Missouri.
E. Ashley Smith, Lockport.....	New York.
J. J. Schardt, Hot Springs.....	Arkansas.
L. K. Schotfield, Fort Scott.....	Kansas.
J. T. Stark, Jackson.....	Tennessee.
W. P. Stark, Louisiana..	Missouri.
L. O. Stevens, Almoral.....	Iowa.
George H. Scott, Clear Lake.....	Iowa.
Mrs. George H. Scott, Clear Lake.....	Iowa.
R. A. Sneed, Jackson.....	Tennessee.
Henry Speer, Butler.....	Missouri.
D. Wilmot Scott, Galena	Illinois.
Henry Syerup, Indianapolis.....	Indiana.

Dr. H. Schroeder, Bloomington.....	Illinois.
F. W. Strachan, Keysville	Florida.
Secretary Horticultural Society, Leavenworth	Kansas.
S. C. Spaulding, Villa Ridge.....	Illinois.
Dr. W. W. Stell, Paris	Texas.
Dr. J. F. Simonds, Fayetteville.....	Arkansas.
Henry Shepley, Nevada.....	Missouri.
I. N. Stone, Fort Atkinson.....	Wisconsin.
J. S. Stickney, Wauwatosa ..	Wisconsin.
Jacob Schopp, St. Louis.....	Missouri.
Ott Segessmann, Amazonia ..	Missouri.
D. J. Signaigo, 818 N. East street, St. Louis.....	Missouri.
J. M. Smith, Green Bay ..	Wisconsin.
M. H. Simpson, Vincennes.....	Indiana.
Joseph Spies, 101 S. Water street, Chicago.....	Illinois.
G. W. Stoner, Shreveport.....	Louisiana.
Dr. A. L. Small, Kankakee.....	Illinois.
Gus O. L. Sauer, Kansas City.....	Missouri.
W. R. Stuart, Ocean Springs	Mississippi.

T

Marshall Thatcher, Scireleville.....	Indiana.
Prof. Wm. Trelease, Madison.....	Wisconsin.
Prof. S. M. Tracy, Columbia.....	Missouri.
Dr. W. Thompson, Effingham ..	Illinois.
Mrs. Dr. Thompson, Effingham	Illinois.
George A. Tryon, Galesburg.....	Illinois.
Mrs. George A. Tryon, Galesburg.....	Illinois.
L. Traber, Kansas City.....	Missouri.
W. B. Turman, Waldron	Missouri.
E. Y. Teas, Dunreith.....	Indiana.
J. C. Tharp, Gibson.....	Tennessee.
L. E. Tyler, 115 Canal street, New Orleans	Louisiana.
A. Thomas, Box 901, New Orleans	Louisiana.
F. A. Thomas, 101 S. Water street, Chicago ..	Illinois.
A. L. Tucker, 167 S. Water street, Chicago	Illinois.
Treasurer Horticultural Society, Leavenworth.....	Kansas.
R. B. Thrapp, Talula.....	Illinois.

T. F. Tunison, Pana Illinois.
 Franklin Taylor, 370 W. Washington street, Indianapolis.....Indiana.

U

Underwood & Emery, Lake CityMinnesota.

V

J. C. Vaughan, 42 La Salle St., Chicago..... Illinois.
 J. C. Vickery, Fort Scott.....Kansas.
 Voorhees & Co., Detroit.....Michigan.

W

E. E. White, L.L. D., Cincinnati Ohio.
 R. H. Warder, North Bend... Ohio.
 Dr. R. J. Williams, Gadsden.....Tennessee.
 E. H. Williams, Indianapolis Indiana.
 Judson Williams, Ottawa.....Kansas.
 L. A. Williams, Glenwood..... Iowa.
 E. Williams, Montclair..... New Jersey.
 Prof. R. B. Warder, Lafayette.....Indiana.
 J. K. Williamson, Edwardsville.....Kansas.
 J. T. Williamson, EdwardsvilleKansas.
 Geo. H. Wright, Sioux City.....Iowa.
 C. C. Wright, Cobden..... Illinois.
 D. H. Wright, MinneapolisMinnesota.
 A. D. Webb, Bowling Green.....Kentucky.
 A. W. Webber (Rosebank) Nashville..... Tennessee.
 Dr. J. R. Walker, Bay St. Louis.....Mississippi.
 Mrs. Nevie Woods, Stilesville.....Indiana.
 Silas Wilson, Atlantic.....Iowa.
 James B. Wild, SarcoxieMissouri.
 W. R. Wagstaff, PaolaKansas.
 F. Wellhouse, FairmountKansas.
 A. W. Wells, St. Joseph.....Michigan.
 C. L. Watrous, Des MoinesIowa.
 Wm. Wesselhoft, 306 N. Broadway, St. Louis.Missouri.
 Chas. H. Weaver, 129 S. Water St., Chicago..... Illinois.

Y

J. H. York, Fort Scott Kansas.
 J. B. Yellowly, Madison.....Mississippi.

PROCEEDINGS
OF THE
FIFTH ANNUAL MEETING
OF THE
MISSISSIPPI VALLEY HORTICULTURAL SOCIETY.

Of the fifth annual meeting of the Mississippi Valley Horticultural Society, held in Kansas City, Missouri, January 22, 23, 24, and 25, 1884, the *Prairie Farmer* says :

“The personnel of this body was excellent ; it was a convention of practical, brainy men, alive to the interests of one of the most important pursuits in range of the rural industries. The essays, and the discussions they provoked, were full of interest, and highly instructive. We have attended scores of such assemblies during the last quarter of a century ; none of them equaled this, all things considered, and we think this opinion was shared by the oldest and most prominent among those in attendance.”

A similar high compliment is bestowed by that veteran agricultural journal of the West, *Colman's Rural World*, in the following brief extract :

“We have, during the last third of a century, attended many horticultural meetings, but have never attended so good a one as that which was held at Kansas City last week.”

This Society had its birth in Missouri, and it is but fitting that it should have held its most successful meeting within her borders, and as the guest of her State Society and its prosperous adjunct, the Missouri Valley Horticultural Society.

Delegates were in attendance from seventeen different States, and the leading agricultural and horticultural journals of the country had representatives at the meeting.

First Day—Tuesday.

AFTERNOON SESSION, January 22, 1884.

At 2 o'clock on Tuesday, January 22, 1884, President Parker Earle, of Cobden, Illinois, called the Society to order in the tastefully arranged Philharmonic Hall, which had been provided for the occasion by the Missouri State and the Missouri Valley Horticultural Societies.

L. A. Goodman, Secretary of the Missouri State Horticultural Society, was appointed to assist the Secretary until the arrival of F. R. Albertson, of Indiana, who had been selected by that official to assist him during the meeting.

Maj. J. C. Evans, of Missouri, Oliver Gibbs, Jr., of Minnesota, and ex-Gov. R. W. Furnas, of Nebraska, were appointed a committee on order of business.

Pending the report of the Committee on Order of Business, Secretary Ragan, of Indiana, presented the following report:

SECRETARY'S ANNUAL REPORT.

Our good President has so completely occupied the whole field by suggestions and recommendations, in his most excellent address to be delivered in your hearing, that it happily relieves me of all effort in this direction.

I may be pardoned, however, for a few personal allusions to myself and the work you have intrusted to my care during the year just closing.

In assuming the very responsible and highly honorable position you so generously conferred upon me at New Orleans, I realized, to the fullest extent, my unfitness for the place and your mistake in urging me into it. Once accepted, however, I fully determined to atone for my lack of ability in a faithful compliance with the duties involved.

Another year in the history of our Society has passed, and I now return that trust and ask, at least, that you cover my shortcomings with the mantle of charity.

Those of you who have not had personal experience in performing the duties of secretary to an association like this, can hardly realize the magnitude of the work required.

The volume of Transactions that has gone out from this office is on its mission: let us trust of good. Its publication was undertaken under financial discouragements, but, acting under the pledge of our good Treasurer and other true friends of the Society, I made myself individually responsible to the publishers and proceeded with the work.

Slowly, and by dint of hard work and much correspondence, the list of members and directory patrons grew, until, by comparison of receipts and expenses, the volume was paid for, distributed to members, and a few dollars (less than \$25.00) remained. In addition, there remains of the edition of Transactions of 1883 near three hundred and fifty copies.

This result was quite satisfactory, if not unexpected, on the part of the friends of the Society.

Regarding the valuable paper of Prof. Forbes, on Insects Affecting the Strawberry, as too valuable to lose on so small an edition, I ordered, after getting the President's consent, seven hundred copies in paper covers, printed separately. The expense of publication has already been covered by receipts from copies sold, and a few yet remain in my hands.

With regard to the future of the Mississippi Valley Horticultural Society, I would say that at least one important problem remains for solution, viz: HOW SHALL A MORE GENERAL AND GENEROUS SUPPORT BE SECURED?

The publications of this Society may be made almost invaluable in their character. By a judicious selection of topics and contributors, each succeeding volume of Transactions may be made more and more valuable. The preparation, publication and distribution of a large edition may be performed at a much less price per volume than a small edition. The one thing desirable, therefore, is to secure a large demand for our reports. The States within the Mississippi valley, almost without exception, have State societies. These generally enjoy a share of public patronage, and exist by legal authority. Let such, in their official capacity, take an interest in the welfare of this Society: let them aid in extending its usefulness and the circulation of its reports. This may be done by taking a number of its reports at prices covering cost of publication, and distributing them to *bona fide* members of such societies, along with the membership fee, at such prices as would at once stimulate and increase the membership in State and local societies. The reports of this Society might also be offered by State societies as prizes to be awarded on fruits and other horticultural products at exhibitions held under the auspices of the various State societies.

The agricultural and horticultural press could also greatly aid in the distribution of the Transactions of this Society, by clubbing arrangements that

might be made of mutual interest, alike to the paper making the offer and to this Society. Another means of extending the circulation of the reports of this Society would be to offer each regular member additional copies at a rate that would cover cost.

This Society is not organized for the purpose of making money, but for the higher object of collecting and disseminating useful information; therefore, whatever will result in placing in the hands of an additional reader, a copy of its Transactions, even though it be at a price barely covering expense of publication, is to be desired.

In extending the demand for our reports, many desirable objects are to be accomplished. The cost per volume, of publication will be greatly reduced; those who patronize our business directory will be more largely benefited, the cause of horticulture will be promoted and a worthy Society will be supported and encouraged.

Below I present a brief statement of the business transactions of the office :

FINANCIAL STATEMENT.

Receipts for the Year Ending January 17, 1884.

From members for 1883.....	\$200 00
From patrons of Directory for 1883.....	192 00
From profits on boat excursion at Mobile.....	37 00
From sale of Prof. Forbes' Address	29 15
From sale of Transactions	79 39
	<hr/>
Total receipts from all sources	\$537 54

Disbursements for the Year Ending January 17, 1884.

Paid printing, stationary, receipt books, wrapping paper, etc....	\$75 50
Paid personal expenses in proof reading, office rent, etc.....	99 00
Paid express charges, freights and telegrams	25 05
Paid postage on letters, circulars and Transactions.....	87 70
	<hr/>
Total of expenses up to date.....	\$287 25
	<hr/>
Balance due Society.....	\$250 29

Transactions for 1883.

Whole number of volumes published	1,000
Distributed to members for 1883.....	375
Distributed to Directory patrons for 1883.....	105
Sold by Secretary since publication.....	60
Di-tributed by Secretary (complimentary and to members not en-rolled).....	21
With Greencastle (Indiana) <i>Banner</i> , for clubbing.....	10
With S. H. Nowlin, for sale.....	8
With Parker Earle, for sale.....	20
In hands of Treasurer J. C. Evans.....	126
	<hr/>

Total number of volumes disposed of.....	728
Remaining in hands of Secretary, January 17, 1884.....	<u>272</u>
Extra edition of Prof. Forbes' Address published.....	700
Disposed of by Secretary.....	<u>615</u>
Remaining in hands of Secretary.....	85

In the above statement it will be seen that I only report the transactions of my office, and do not include moneys received and disbursed by the President and Treasurer.

It will be the duty of the Finance Committee to determine, by a comparison of this report and those of the President and Treasurer, just the financial condition of our treasury.

This complication is the result of a lack of perfect organization at the beginning of the present year, rather than to carelessness or a lack of proper attention on the part of your officers. Such a condition should not, and doubtless will not, again occur.

Very respectfully,

W. H. RAGAN, *Secretary.*

Following which, Treasurer J. C. Evans, of Missouri, made his report :

TREASURER'S ANNUAL REPORT.

J. C. Evans, Treasurer, in account with The Mississippi Valley Horticultural Society. *Dr.*

1883		
Feb.	Received for twenty-two memberships at New Orleans.....	\$44 00
Feb.	Contributions from members as donation to ex-Secretary	57 00
Feb.	On boat excursion at Mobile.....	37 00
May.	From President Earle—Memberships.....	256 15
June.	From ex-Secretary Tracy—Memberships	76 70
July.	From Mo. Val. Horticultural Society—twenty copies of report	40 00
Dec.	For two memberships	4 00
		<u>\$514 85</u>

1883,		<i>Cr.</i>
Feb.	Paid for watch donated to ex-Secretary Tracy	\$52 05
Feb.	Paid for engraving same.....	2 50
Feb.	Paid to Secretary Ragan.	37 00
July.	Paid for printing Transactions.....	650 00
Aug.	Paid for freight on box of books from Indianapolis.	3 09
		<u>\$715 09</u>

Balance due the Treasurer.....\$230 24

Respectfully submitted,

J. C. EVANS, *Treasurer.*

The above reports were, on motion of Mr. McCaffrey, of Illinois, referred to a Committee of Finance and Ways and Means, consisting of Messrs. Wright, of Iowa, Furnas, of Nebraska, Munson, of Texas, Buck, of Illinois, and Evans, of Missouri.

A Committee on Constitutional Amendments, consisting of Messrs. Ragan, of Indiana, Grimes, of Colorado, and Holsinger, of Kansas, was appointed.

Mr. Johnson, of Indiana, having been added to the Committee on Order of Business, made the following report on behalf of said Committee :

REPORT OF COMMITTEE ON ORDER OF BUSINESS.

Your Committee on Order of Business respectfully recommend the hours of meeting to be as follows: Nine o'clock A. M., 2 o'clock and 7 o'clock P. M., and adjourn at pleasure of meeting. That all papers whose authors are not present shall go into our Proceedings without reading, unless specially called for. Papers whose authors are present may be read on the call of the President. That the hour of 2 o'clock to-morrow shall be fixed for the address of welcome, the President's address to follow.

Which was adopted.

Prof. J. W. Robson, of Kansas, then proceeded to read the following very interesting paper on

VEGETABLE PHYSIOLOGY—CIRCULATION OF THE SAP.

BY PROF. J. W. ROBSON, OF KANSAS.

The roots are those parts of a plant on which it is chiefly dependent for the supply of the moisture which its growth requires, and also serves to fix the plant in the soil.

That they absorb or *suck* up fluid with great rapidity, may be easily shown. Take any small plant that is growing in the soil, and immerse its roots in a tumbler of water; if the plant be exposed to the light of day, and especially if the sun shine brightly upon it, the water will disappear very much faster from the glass than from one exposing the same surface, placed in the same circumstances, but without the plant; and if the specimen continues to grow and flourish, it will take up many times its own weight of water in a short period.

Of the water thus absorbed, a small proportion only is retained within the plant. The greatest part of it is sent off again from the leaves by a process termed exhalation, and the rapidity of absorption is, in part, governed by the rapidity of the above process.

If the leaves of a peach tree are stripped off, the fruit amounts to nothing. This fact was exemplified twice in Kansas during the last decade by the grasshopper invasion of that period. When the leaves of the grape or the gooseberry have been devoured by caterpillars, the fruit remains small and sour, and entirely worthless for the food of man. If any healthy tree be persistently defoliated during the growing season, the tree will die. These facts led early botanists to form the opinion that leaves were merely "a clothing, or protection against colds and heats." Though this ancient theory is certainly true to a certain extent, still it is only a very small portion of the functions of the leaves. For it is in the leaves that those changes are effected by which the juices of the plant, relieved from the water—which is unnecessary for the functions of life—are rendered fitting for the nourishment and growth of the plant.

That leaves exhale moisture is proved also by the simple experiment of gathering the leafy branch of a tree, and immediately stopping the wound at its base with wax, or some other fit substance, to prevent the effusion of moisture in that direction. In a very short time the leaves droop, wither, and fade. If the branch in this condition be placed in a very damp cellar, or immersed in water, the leaves revive and assume their original appearance. This experiment also shows their power of absorption.

The chief office of the stem appears to be to elevate the leaves, the flowers and the fruit into the most favorable position for receiving the influence of light, heat and air, for it is upon these that their full development depends. But this is not its only function; in combination with the roots and leaves (nature's wonderful laboratory) the crude sap, in its ascent, is divested of its rawness and aqueous matter and converted into nutritious sap, capable not only of supplying to the different parts of the structure the materials necessary for the maintenance of their healthfulness, for the repair of injuries, and for the production of entirely new parts, but also of furnishing the ingredients of those several products which the various tribes of plants may be said almost to create from the elements around them, and which are so valuable to man as articles of diet, as medicines or as articles of use in his various manufactures. All these varied substances originate in the ascending *sap* in its passage through the sap wood (*alburnum*) and flowing sap (*cambium layer*) by the exhaling process, in which the leaves play the most conspicuous part, for by them it is concentrated by the loss of its water not only into solid matter, but into those secretions which almost every tribe of plants produces peculiar to itself. How remarkably these secretions of different plants vary from each other, frequently in the same plant! The peach tree affords a familiar example of this: the gum of this tree is mild and mucilaginous: the bark, leaves and flowers abound with a bitter secretion than which nothing can be more distinct from the gum: the fruit is replete not only with acid, mucilage and sugar, but with its own peculiar aromatic and highly volatile secretion, on which its delicious flavor depends; the pit also contains prussic acid to a certain extent. Can any one among the scientists tell us how the

peach tree can form, collect and keep separate such a number of distinct and discordant secretions?

In all exogenous trees the inner and older portion is much harder and dryer than the exterior. This change is due to the consolidation of the interior wood, by the deposition in its tissues of woody matter. The portion of the stem in which this has taken place thus acquires great toughness and durability, but it is no longer fit to perform any office in the living system save that of mechanically supporting the rest, since no sap can pass in any way through the now filled-up channels. This heart wood always displays a deposit of coloring matter not observable in the younger or outside layers. Thus in the wood of the apple or pear, the handsome orange color of the heart wood marks the period of rest, and as far as assisting growth is concerned, *it is at rest forevermore*. It is through the newer layers or sap-wood, therefore, that the larger portion of the sap ascends, and these in their turn become inclosed by others, and are at last consolidated like the more aged ones into heart-wood.

The sap-wood is enclosed by the bark, which, like it, is formed in regular layers: though these are much thinner, and can not be so plainly distinguished. The layers of bark are formed from the interior, so that the oldest ones are on the outside. These are gradually lost, either by decay or by falling off; so that it is seldom that the same number of rings can be traced in the bark as in the wood, although an additional one is formed each year. As the new layer of wood is formed on the outside of the previous one, at the point at which it was in contact with the bark, and as the new layer of bark is added to the inside of the previous one, at the point at which it was in contact with the wood, it is obvious that they are produced at the same spot, and that the newest layers of both will always be in contact with each other.

Between these, always at the close of the season's growth, will be found a glutinous fluid composed of gum and sugar. The gumminess of this fluid is at once perceived by its mucilaginous properties, and that it contains sugar is known by the sweetness of its taste. This is the elaborated sap, ripened and prepared, after the wood growth has been perfected, for being converted into an organized tissue the succeeding year. This substance, called the *cambium layer*, can be readily seen by stripping the bark from almost any twig, in the early part of spring. Later in the season this layer is gradually organized into cells, and from these are formed the ducts and cellular portion of the season's woody layer. If a wound be made in the bark, and through to the sap-wood, a similar glutinous substance is thrown out from the cut edges, and by the conversion of this into woody tissue, the wound is gradually healed. Even if a complete ring be cut away from the wood and around the body of the tree, this substance will exude from the edges above and below, till the space fills up and the two edges reunite. This then is the material which the tree has matured and stored up within itself during autumn, to meet the exigences of the coming spring. The swelling buds and expanding leaves excite the rootlets, these begin to absorb the food within

their reach, and in the form of crude watery sap it ascends, mixed with the substance stored up from the previous year, and lays the foundations for a new layer of wood and bark.

This great motion which we call *flowing sap* is quite different from the circulation produced by the action of the foliage, and must not be mistaken for it. It can be detected principally in early spring, weeks before the snow has succumbed to the warm breath of southern winds, or the ice king has loosened his grip of the soil. It can be detected slightly also in the autumn, in some species, by cutting a branch or stem after a slight frost, yet, not during the frost. Again, it has always been observed to flow from the sap-wood and *cambium layer* of our trees, not from the heart-wood or bark. In early spring, if a shoot of a grape-vine, birch or maple tree, be cut through with a knife, they will yield a large amount of this fluid; but the close observer will notice even here that the *upward* flow is far more abundant than the *downward*. Indeed, the flow from the dismembered shoot soon ceases, while the flow from the wounded vine or tree continues for weeks, which proves that this *flowing-sap* is stored up in roots, stems, and branches, after the season's growth of the tree has ceased.

We were taught in early youth that this flowing of the sap in early spring demonstrated a continuous circulation, because, there being no leaves at the time to carry it upward by exhalation, it was evident that if it were at these periods running up the sap vessels, it must run down again by other channels. If this theory is correct, how is it,

1. That this motion can no longer be detected when the leaves expand?
2. It moves only when a wound is made, being naturally at rest till the leaves are developed; and,
3. The effusion of sap from trees, when cut or wounded, is, during the larger portion of the year, comparatively very small; therefore,
4. This flowing of the sap when the tree is wounded proves nothing more than a facility of the sap to move, owing to the peculiar irritability of the vegetable body during the period of early spring.

DOES SAP DESCEND?

Fifty years ago, our text-books on vegetable physiology taught us that the sap descended in the fall of the year with as much facility as it ascended in the heat of summer. To prove this theory, the following illustrations were given: "If a cord be tied tightly around the trunk of an *acogen*, it offers little impediment to the ascent of the sap, but will obstruct its diffusion through the bark in its descent. In consequence, there will be a deficiency of nourishment to the parts beneath, and a superfluity above; so that a protuberance will arise from the stem just at the point where the downward flow of the sap is checked. This protuberance will increase in progress of years (if the tree survive) so as to bury the cord beneath it; but most commonly the tree is destroyed ere long by an insufficient supply of nourishment."

Again: It is in the cells and woody tubes of the *alburnum* (*sap-wood*) that the fluid absorbed by the roots is transmitted to the opposite extremity of the stem, and these cells communicate with those of the leaves, which receive it from them. In the bark the woody tissue has a somewhat different form. Instead of the tubes (*cells*) lying side by side (as in the sap-wood), they branch horizontally from each other, and their function is that of conveying back from the leaves the juices of the plant which have been there elaborated out of the sap brought up by the vessels of the sap-wood." Thus they explained the theory called the descent of the sap.

The study of the grand text-book of Nature for the past fifty years has led us to believe that these theories, which we have quoted, have no foundation in fact. We, who are practical horticulturists, have often noticed those large protuberances close to and over the union between the scion and the stalk when we grafted the pear on the quince, the apple on the wild crab and the Heart varieties of the cherry upon the Morello stalk, producing in a few years larger protuberances than a cord would if tied tightly around the trunk of a healthy young exogen. Again, the amount of sap passing through the small cells of the bark must be very small, compared with the amount that passes through the sap-wood and cambium layer, in a season favorable to wood growth, when the tree adds one or two inches of solid woody matter to its diameter. Every observant mind who has made this delightful science a close study in the grove or orchard, must have received *ab extra* revelations from Nature, which are not imparted to the scientist in his cabinet, and which the text-books do not nor can not give.

Permit us to present a few illustrations in support of the theory that the sap does not descend, but is elaborated, retained, spread, ripened and compressed over the entire inner surface of the tree during its upward flow.

In the year 1832 we had charge of a large conservatory for the growth of palms, orchids, cacti, and other tropical plants. In front, planted in a rich artificial border, outside of the walls, grew twelve grape-vines of the Black Hamburg variety, one vine opposite each rafter; age of vines, twenty years; height of stems, three feet. At this point they branched into two limbs, each thirty feet long; one limb of each vine was introduced inside the house and trained up the rafter early in the month of February; the other limbs were trained upon a trellis outside of the glass roof, up the middle of the sash. The limbs inside, exposed to the regular heat of 70°, soon began to push their buds, expand their leaves, unfold their blossoms, and large bunches of ripening berries hung down from the rafters, while those limbs outside were just beginning to show signs of active life. The ripe clusters were all gathered, the new wood and new buds all ripened and matured, the leaves had performed their functions, and, sere and yellow, were beginning to fall from the vines inside, while the vines on the roof outside were making a vigorous and luxuriant growth. Query: How did the descending sap from the limbs inside flow down that three feet of stem through which was rushing a resistless *upward* flow of sap towards the vigorous growing

limb outside? We saw this experiment repeated for eight years in succession, and yet no protuberance was formed at the junction of the limbs.

In 1839 we superintended a long range of forcing houses for the production of early fruits. The house at the west end of the range was devoted to peach culture. On the wall outside of this structure a large Black-heart cherry tree was trained. The points of the branches next to the house had been introduced between the wall and wall plate, and were trained on the back trellis of the peach house, covering about twelve feet square of surface. The house was closed and the temperature raised to 50° about the middle of January. About the first of February the buds on the portion of the cherry tree inside of the house began to burst. Soon the whole surface was covered with snowy blossoms, while the large tree outside was dormant, the soil in which it grew frozen six inches deep and the ground covered with one foot of snow. In the month of May we were clipping off the large bunches of ripe, luscious fruit, while the tree outside was one mass of bloom. The new shoots on the branches inside had ripened their wood growth, and were as bare of foliage as the trees of the forest in winter, while the parent tree outside was making a vigorous growth. We pause to ask the question: How could the sap descend in the contracted sap vessels of the new bark to the points of the roots in opposition to the upward flow? or how far down the branches when that portion of the tree inside had completed its season's growth?

Again, the house at the east end of that range was set apart for the production of early grapes. On the wall outside of the house a large fig tree was trained. The extreme ends of the shoots had been introduced into the vinery and covered the whole of the trellis on the back wall of the house. In the month of June we were gathering large Brunswick figs, ripe, sweet and delicious, whilst the fruit on the parent tree outside was hard and green. Now, the upward flow of the sap of the fig tree is very abundant and rapid when in vigorous growth. How could the descending sap from these branches inside that were finishing up their season's growth and forming their embryo fruit, pass the resistless flow of the ascending sap in the branches outside?

The cottage homes of England are enshrined in story and in song because of their woodbine-covered porches and jasmine and rose-covered walls. A lady—a true flower lover—living in one of those quaint Elizabethan structures, in a freak of fancy, had introduced under the window sills of a large bay window, leading shoots of the above named plants, training them up and over every available space. At Christmas time, when the "yule log" was burning and the merry "waits" were singing their plaintive carols, this bay window inside was a "thing of beauty and a joy"—one mass of flowers and redolent with perfume, and yet the parent shrubs outside were leafless, shorn of their blossoms, and gone to rest for the winter. Where was the capillary attraction to cause a descent of the sap in those portions of the shrubs inside of that bay window?

These illustrations show conclusively, we think, that the doctrine of the "descent of the sap" is a fallacy. To cause an *upward flow*, light, moisture and heat are necessary, for if these be excluded, exhalation is entirely prevented. And we conclude that in the case of those portions of the grape-vine, cherry, fig and flowering shrubs growing inside of a hot-house and bay window, exposed to these three influences, these caused their buds to swell, unfold leaves and bear flowers and fruit, whilst the trees and shrubs outside, of which they were a part, were in a dormant state. These illustrations also prove that the "flowing sap" begins to move in the upper branches long before the *ascending sap* commences its upward flow from the roots.

Of all the many divisions of natural science, vegetable physiology is of incalculable value to the practical horticulturist. The principle upon which it rests point to every operation within his province, and show him, unerringly, as no other system can, the errors and mistakes of his daily practice; and as the finger-board by the roadside assists the benighted traveler, so does the study of plant life open up new ideas and suggest new modes of culture, based upon truths that can not be combatted.

The number of horticulturists are too few who to-day can explain the various functions which roots, stems, leaves and flowers have to perform, or what action or changes take place during the growth of these organs of vegetation; and yet, a perfect knowledge of these principles will render more valuable assistance to the diligent inquirer after truth than all else besides.

Botanical science, unapplied, is of no value whatever to the horticulturists of the Mississippi valley. But this science, applied for practical purposes, is the best science, the only science, that will afford us help in carrying forward the great work in which we are all engaged.

In pursuit of truth, the student must accept of Dame Nature as his teacher. Let him take her by the hand and enter her temple; there he will make the best of her and she of him. They will get on together rarely, she as his ever beneficent mother, he as her mouthpiece, her conscious self, her minister and interpreter.

DISCUSSION ON VEGETABLE PHYSIOLOGY.*

President Earle, of Illinois—I am pleased that our meeting should open with such an able and exceedingly interesting paper. A few minutes will now be devoted to the discussion of Prof. Robson's paper.

Mr. Munson, of Texas—It is a fatal mistake to trim off the young limbs, as they are a source of supply to the older portions of the

NOTE.—The Secretary regrets that he can not give a better report of the able discussions of this and the succeeding session. This is due to the absence of his assistant who did not arrive, owing to unavoidable detentions, until the following day.

SECRETARY.

tree. I do not agree with the professor's theory that the sap does not descend. The process of downward flow is caused by endosmos and exosmos of the fluids.

Mr. Gibbs, of Minnesota—The protuberance caused by girdling a branch with a wire or ring is proof of the downward flow of sap.

Mr. Pierce, of Minnesota—Our trees in Minnesota often die from starvation, when we think they are winter-killed. They fail to ripen their wood properly in the fall and starve out during our long, dry winters. They will withstand our winters if they are well supplied with starch, not otherwise.

Prof. Popenoe, of Kansas—Vegetation, to a certain extent, continues through the winter. Mr. Munson is doubtless correct in his views on this subject.

Prof. Robson—It is impossible for the people of the Western and Northwestern States to grow the Belgian pears. This has been tried to the great disappointment of many of our older horticulturists. This is owing to physiological conditions. We have not studied these subjects as we should have done, or we would not continue to try to grow these varieties that are not adapted to our peculiar climate. I have sometimes thought the live-stock men were ahead of us fruit-growers in this, that they are more fully educated in animal physiology. They understand pretty fully the laws of stock breeding; we very poorly the laws of cross fertilization, hybridization, etc., in the plant world. We must learn to produce varieties adapted to our soil and climate, and depend less upon *chance* to supply our demands.

Mr. Munson—Dr. Gray has told us many valuable things in regard to plant growth. We can not successfully combat his views on these subjects. I can not fully indorse the essayist's views in reference to the flow of sap. The facts are, the sap goes where it is wanted in the economy of the plant; let this be downward, upward, or even to one side, as the case may be. I think the professor is probably mistaken in regard to there being no visible interruption of growth, at the point where the branch entered the house. It is very injurious to trees to have their foliage stripped off, as we nurserymen sometimes do, in hurrying up our fall digging, before the season of growth closes.

Maj Ragan, of Missouri—The sap ascends through the wood cells until it reaches the leaves and comes in contact with the air and the chlorophyl of the leaves, forming a mucilaginous substance and returns downward through the bark and outer covering of the tree. Girdling the limb causes an increase of fruit, because the downward flow is checked and treasured up in the limb.

C. E. Reeves, of Kansas City, spoke of a Red Astrachan apple tree made to bear, by girdling, in June, causing it to bear fruit when other trees of the same variety failed.

Mr. Newby, of Kansas—My father's orchard was always plowed every other year, and on the alternate years, after plowing, nine-tenths of the fruit was borne. The trees made the greatest growth the years the plowing was done.

F. Holsinger, of Kansas—I have caused trees which have been barren for some time to become fruitful by girdling, cultivating, etc. I protest against trimming the tops of growing trees.

Mr. Munson—The sap is caused to ascend by chemical action and descends in the cambium layer. Trees are larger at the base because the wood absorbs moisture from the earth. The tree gets its fiber from the elongation of the cells.

Mr. Wright, of Iowa—The gentlemen who advocate the theory of trimming trees when transplanted, in the locality of a large rainfall, are right; while the gentlemen from the North and West are right in opposing the practice. The surrounding conditions must always be considered as a basis of operations.

On motion the Society adjourned to meet at 7 o'clock P. M.

First Day—Tuesday.

EVENING SESSION.

At 7 o'clock P. M. Pres. Earle called the Society to order and proceeded to introduce Pres. Sylvester Johnson, of Indiana, who read his paper:

SMALL FRUITS IN THE FAMILY—AND HOW TO HAVE THEM.

BY SYLVESTER JOHNSON, OF INDIANA.

One of the best farmers I ever knew, and his home now rises above the horizon of my memory, owned a farm, originally both rough and rocky, but which, by its owner's skill and industry, was made as smooth and beautiful as a prairie. Said he to me once, "I have packed sods to fill up hollows and dug out rocks to be hauled away till I am old long before my time; but you never can imagine how this ground looked when I began." He had the cleanest barn-yard, the fattest pigs, the best bred flocks of sheep, the happiest dumb brutes, the most plethoric barns, the strongest fences, the best working farm gates, with the neatest latches—well, everything was as nearly in perfect order as untiring watchfulness could attain. In a county where forty bushels of corn to the acre would be a yield to boast of, he never got less than seventy-five, and of hay two and a half or three tons per acre were but an average, while most of his neighbors were lucky if they obtained one-half that amount. A few beets, onions, cabbages, a little lettuce and sweet corn, and a small patch of small potatoes, all indifferently attended, made up the kitchen garden. The table set with potatoes and fried ham, the latter always very salt, seemed pretty dry and uninviting to a sweet-toothed youth fond of juice and sweetening. Yet this man and his family were as fond of fruit luxuries as any ever were, as was proved by the jealous guard they kept over a few straggling clumps of wild raspberries and blackberries which his scythe had thoughtfully spared along some inaccessible corners of the fence when the fruit was on them. The little crop of luxuries was husbanded during its brief period, and the evening tea table was garnished, for a time, with a hint of what nature, if a little encouraged, was willing and waiting to do. It is true there were a few red currants away off in the back yard, because somebody, at some time away back in the past, had set the example of tolerating this single variety of small fruit among civilized products. But the idea of setting out a strawberry plant, or any well known fruit-bearing plants, never entered any of our stupid heads in that day. When the season for wild strawberries came, we would tramp for miles to find the scarlet beds and lug home in triumph the baskets of fragrant and delicious fruit when the "year" was a good one. So of raspberries, blackberries, and even wild cherries. It would not be easy to exaggerate the high estimate everybody placed upon all these luxuries in their season. But the season was short, the supply uncertain, and the difficulty of obtaining the fruit great. Nature, unassisted, is apt to be capricious, and her hands were sometimes lavish and sometimes miserly. No way of prolonging the brief pleasure was thought of. The convenient fruit-can, full, neither adorned the store room shelves, nor, empty, disfigured the back yards. Drying, cooking into rich preserves were the only arts of saving for future use. And these were but sparingly brought into requisition for the small wild fruits. The fact is,

even long after some notable progress had been made in raising berries for the table, it was looked upon as a very difficult matter, enshrouded in a sort of mystery, to raise strawberries. Anybody could raise beans, but berries, that are really quite as docile under culture, were regarded with distrust. Indeed, this feeling has a strong hold on thousands yet. By many these provisions for family luxury are regarded as a sort of small business, unworthy of serious attention, or a silly disposition to be over-nice in self-indulgence. Green peas may be well enough, for everybody has them; but an abundance, enough of all the fragrant and palatable berries in their season, that is a little too fine. It savors of extra refinement. Well, it is a fact, there is in these exquisite gifts of nature an ennobling element that touches the character as well as the palate, at many points. In the first place, the cultivation, care and management of small fruits, in a small way for domestic use, awaken the best qualities of the mind. No study can bring a human soul into a closer sympathy with nature's gentle genius, her wondrous variety of operations and her rich beneficence, than work in this field. Its work is instructive, pure and elevating in every way. There is in it also the most intense pleasure in watching the miracles of transformation from bud to ripe fruitage. It is true these effects upon the mind are produced by all forms of agriculture. But the small fruits, with their delicate qualities, and refinements of odor, color and flavor, are the æsthetics of nature's laboratory. Think of the bloom upon a cluster of purple grapes. The slightest touch will mar it so that it can not be restored. Surely no one can dwell among these finer processes, directing, aiding them and controlling the results, without feeling the healthful touch of nature's soul which is divine. But the enjoyment of these fruits upon the table is elevating. A dish of berries, cherries or grapes is a silent rebuke to coarseness and vulgarity. Its beauty awakens pleasing emotions, and the subtle flavors invite the recognition of the finest distinctions.

But to come down to more practical views, the small fruits are provided not merely to minister to our pleasure, but also to health. Ripe and fresh fruits are exceedingly healthful, coming as they do just at that particular season of the year when the human system seems to require the peculiar kind of nutriment that such fruit imparts. In their natural succession they supply the alterative influences that promote health. They come to us in the proper order. First comes the strawberry to guard against the transition from cold to warmth; then, as heat intensifies, come the toothsome pulps of mingled sweet and sour in grateful proportions. Then cherry time never fails to call up the pretty couplet of Mrs. Barbould. Describing the seasons in personification of summer, she says:

"Cherries and every acid fruit she sips
To allay the fever of her parched lips."

Well put. In the heat of summer the lips are parched, and good, ripe cherries, taken fresh from the tree, have an agreeable effect upon the lips, and indeed all the way down. They come just at the right time, and are made to suit the season. There should be, and may be, fruit in every fam-

ily: not merely in scanty supply, a taste, but it should be piled up and followed up for a steady diet, till at last a surfeit compels the good housewife to say, as she often does in these latter days, especially about "canning time," "I wish I may not see another strawberry this year." In cities and towns the markets meet all demands for fruit of every sort, and in the country it has come to pass that hundreds of families have found out the happy secret, if it be a secret, of making home delightful with the gifts of the summer, as well as winter. Yet there are still thousands of other families who go without. The trouble, small as it is, is too much for them. It may be that this will always be so. But he who earnestly labors to increase and intensify the interest of the people in the cultivation of small fruits, and encourage all who can not buy in the market to produce for themselves, is a benefactor of his kind.

But we are not here to-day to listen to diatribes on the value of small fruits, or of the pleasure derived from their cultivation. It is, rather, the more practical part of the subject of this paper we are more interested in, which is

"HOW TO HAVE THEM."

There are a few things alike requisite in the successful cultivation of all small fruits, which will now be noticed.

The first one is a fertile soil. I mean such a soil as is commonly known as good garden soil. It is sometimes said of certain small fruits that they must not be grown in a soil too rich. I concede that it must not be *too* rich. The danger however is nearly always found in an opposite direction. An impoverished soil is the cause of vastly more failures than is a soil too fertile.

2d. If the ground is not naturally thoroughly underdrained it must be done artificially.

3d. The ground must be deeply subsoiled either by the plow or spade.

4th. The plants must be healthy, and such as have made a vigorous growth prior to transplanting.

5th. In removing the plants great care must be taken not to mangle or bruise the roots, nor to allow them to become dry or frozen.

6th. In planting the roots must be spread and placed as nearly in the position in which they grew as possible.

7th. Transplant in the evening, in dry weather, or at any time during the day just before a rain.

8th. If there is no immediate prospect for rain, water at the time of planting, and, if the sun shines, shade for three days.

9th. Use hoe and plow freely and frequently, and

10th. Exercise a vast amount of Thomas Jefferson's price of liberty, "Eternal vigilance." I will now notice a few special rules applicable to the cultivation of each kind of fruit.

For a small bed of

STRAWBERRIES

for family use I prefer planting in July or August. With proper care in

transplanting and thorough cultivation afterwards, two-thirds of a crop may in this way be obtained the next year; while if we wait till next spring to plant, no fruit at all will be realized that year. In order to get plants well rooted thus early, assistance must be given by placing a small portion of earth on the runner near its end, just at the time the leaves are put forth that are to become a part of the new plant; or a better plan is to pulverize the earth at this point and lay a small pebble on the runner. The pebble serves the double purpose of creating moisture around the new roots, and of preventing the moving of the runner by the wind. By this method vigorous plants may be had by 10th to 15th day of July. Plants may be taken from the ground with a garden trowel, with enough dirt around the roots to keep them from wilting when transplanted during the hottest weather. If ground is plentiful, I plant in rows two feet apart and fifteen inches apart in the row. If the variety planted is of a vigorous and luxuriant growth the plants may be placed two feet apart each way. Give frequent but shallow cultivation up to the time of frost. When the first freeze comes mulch lightly (I say lightly for this is very frequently overdone), with leaves, corn stalks or some other substance that will not seed the bed. I would say use clean straw, if it were possible to have straw in this condition. When danger of freezing is past in the spring, open the mulch above the plants, allowing it to remain on the bed until after the fruit is gathered, then remove it, and cultivate as last year; keeping all the runners off for two years. The third year allow the bed to become matted, plant a new bed, and the fourth year after the fruit is gathered spade or plow up the old bed.

VARIETIES.

Out of the multitude now claiming public favor I will name three, which will, I think, fill all the requirements of any family not too fastidious, to wit: *Crescent Seedling*, *Cumberland Triumph* and *Kentucky*.

To procure

RASPBERRY PLANTS

Of the black cap varieties, the tips of the canes must be inserted in the ground two or three inches, in the latter part of August or first part of September. If not placed deeply in the ground the winds or the freezing and thawing are apt to displace them. Plant as early in the spring as the condition of the ground will admit, in rows six feet apart and three feet apart in the row. Let but one cane grow the first year, and pinch back when at the height of twelve or fifteen inches. Stir the ground so frequently that no weeds or grass will grow. In the spring, with pruning shears, cut laterals back within two or three inches of main cane. The second and each succeeding year allow three or four canes to grow, being very careful to pinch back to twenty to twenty-four inches. Care must be taken that this pinching back be done just at the time the cane attains this height. If you allow it to grow to thirty inches, then cut back to twenty, you will have but few

fruit bearing laterals, but if done just at the time the cane reaches twenty inches, more fruit bearing laterals will be thrown out than if allowed to grow without pinching. The third and each succeeding spring the laterals must be cut back to within five to ten inches of the cane, and at the same time the canes that bore the fruit the previous year must be removed. Some fruit growers practice removing the old canes so soon as the fruit is gathered, but I think it better to allow them to remain until spring, that they may be a stay and protection against the winds, of the new growth. In the cultivation of the red varieties, the same rules may be observed as in that of black caps, excepting that they do not need to be pinched back quite so low. The disposition of these to sprout from the roots and to spread rapidly, must be met by a vigorous use of the hoe or plow, unless plants are wanted. Many object to raising red raspberries, for the reason, as they say, that they grow and spread so rapidly as to become a nuisance; not seeming to know that it takes no more labor to cut them down with a hoe when young, than to remove grass or weeds.

VARIETIES.

Of all the many varieties I have tried, I have had none equal to the Gregg and Thwack.

BLACKBERRIES

May be treated very much as raspberries, excepting that they are not to be pinched back until they reach thirty inches. Of the different varieties, I recommend the Snyder as the only one that will withstand a temperature such as we, in Indiana have had this winter, 25° below zero.

CURRANTS AND GOOSEBERRIES.

Were it not for the worms so fatal to these fruits any one, with skill enough to produce a hill of corn, could have them. But the worm: what shall we do with him? How shall we get rid of him? "Kill him," says one. Yes, that will do it. If you kill him you get rid of him. But how shall we kill him? "Aye, there's the rub." I know I shall be laughed at if I attempt to give a remedy for the injury done by the currant worm. But, knowing full well that no horticultural meeting can be rounded off successfully unless some one gives a "sure cure" for the "currant worm," or the "cabbage worm," or the "pear blight," I will attempt one. I imagine I already hear coming up from different parts of this audience, white hellebore, pyrethrum, ashes, soap suds, tar water, coal oil, salt, road dust, wheat bran, young ducks, and last, though not least, "English sparrows." My remedy is to make a new plantation in remote parts of the garden, every few years. The worm does not seem to attack the bushes until they reach the age of four or five years.

GRAPES.

In another part of this paper it is stated that all grounds, upon which small fruits are grown, if not naturally underdrained must be artificially un-

derdrained. I wish to emphasize this idea in its application to the cultivation of the grape. Thrifty vines or perfect fruit can not be produced unless this rule is observed. If the soil where the grape vine is grown has not its full share of lime, this ingredient should be used freely. In procuring vines for planting, select those two years old with good roots. If intended to be trained on trellis, plant eight feet apart in the row, and if more than one row is desired, make rows ten feet apart. Allow but one vine to grow from the roots. When the frost takes the leaves off cut back to two buds and cover with dirt. Next spring, if both the buds start, rub the weaker one off. Keep tied to trellis and pinch back all laterals. If the vine has made a good growth, after the leaves have again fallen, cut back to two feet and lay the vine down and cover with earth. If the growth has been feeble, not more than two or three feet, cut back as was done the first year, to two buds. The third year a healthy and vigorous vine may be allowed to throw out two branches from the uppermost two buds. With the exception of taking off the laterals of this year's growth I recommend no summer pruning, unless it may be a chance small and puny growth. Where it is desired to avoid the expense of a trellis, vines may be planted on the east or south side of the barn, wood house, or other out building, and trained to the sides of the same. Where convenient it is a good plan to train these vines under the eaves of the buildings, which protect the growing fruit from rain and dew, thereby averting the rot.

VARIETIES.

On taking a view of this part of my subject, a graveyard of blasted hopes and three dollar grape vines bursts upon my vision, and I am led to exclaim, "Gone, but not forgotten!" Hence I tread softly here, fearing I may awaken one whose epitaph may be that over the infant's grave—

"Since I am so soon done for,
The wonder is, what I was begun for."

In this dangerous sea of varieties I will keep my little bark close to shore and will only recommend Concord and Ives' Seedling for the family, not because either is a good grape, but because we can always have them, and because a poor grape is better than no grape. There are, however, many other grapes that may be recommended, and really promise well, to-wit: Champion, Delaware, Duchess, Telegraph, Salem, Brighton, Worden, Moore's Early, Rogers' No. 3, 4, 9 and 15.

DISCUSSION ON SMALL FRUITS.

Mr. Barnard, of Nebraska—I seldom fail to have good crops of strawberries. I practice mulching heavily with prairie hay. In the spring I uncover about one-third of my plants at a time at intervals of a week apart. In this way I continue the blooming season and thus often avoid injury from frosts, as well as extending the

ripening season. The Turner is a more valuable raspberry in Nebraska than the Thwack.

Mr. Hale, of Connecticut—I would ask, why remove the mulch at all? We allow the plants to grow through it, and, after the fruit is gone, burn it off, and thus kill off millions of noxious weeds and insects. We then cultivate and have the plants ready for another good crop of fruit the following year. We do not like the Champion. It is unfit to eat.

Mr. Barnard—I do not think Mr. Hale fully realizes what mulching out West means. The Crescent is a most valuable strawberry. For family use, only, I would take the Charles Downing.

Mr. Grimes, of Colorado—Jucunda is very fine with us. Crescent, Jucunda and Kentucky are our most valuable varieties.

Mr. Gibbs, of Minnesota—The Wilson is a choice berry if grown alone; it is easily affected by other sorts. It is our best market berry. In sandy soil you can mulch heavily, but in Northern Minnesota the mulch must be light, and the straw should be removed before the crop ripens. Water must be bountifully supplied or the business will beat you. The small grower need not be troubled with insects, as he can let the small chickens run among the vines. The white grub is our worst insect.

Pres Earle—My experience in strawberry growing has been confined to Southern Illinois. The worst insect enemy we have is the crown borer. The root worm is also quite bad, but not so destructive as the crown borer. We were greatly troubled last season by a new insect pest known as the tarnished plant bug. It sucks the juices of the fruit and causes it to become deformed and unsightly. The berries, when damaged by them, are called *buttons*, from their flattened shape. Prof. Forbes, in his paper to be read in your hearing, will tell you something about this new pest. It also attacks the raspberry, but does not damage it so much as it does the strawberry. Some have thought mulching favored the increase of this insect, but I do not think so. The Crescent paid us better last year than any other sort.

Mr. Webb, of Kentucky—I am a small strawberry grower, but try to have large berries. I use bone meal as a fertilizer. The varieties that have done best with me are the Warren, Longfellow,

Cumberland, Triumph, Glendale, Creseent, and Sharpless. The Kentueky has not succeeded well with me, though it does well with others not far from me. The James Vick is very prolific, but the berries are too small.

Mr. Holsinger, of Kansas—The Thwaek raspberry is too poor in quality and the Gregg is but little better. The Hopkins, originating near this city, is one of the best of the black cap class.

Mr. Pierce, of Minnesota—The Gregg and Davidson's Thornless are both poor with us.

Mr. Pearce, of Ohio—I think a variety does best in the vicinity where it originates. This fact will, doubtless, explain the difference of opinions expressed here.

Pres. Earle then read the following letter from Hon. Marshall P. Wilder, President of the American Pomological Society :

LETTER FROM COL. WILDER.

BOSTON, MASS., Dec. 17.—My good friend: I have received the notice of your grand Mississippi Valley Society, and wish I could be with you, but four score and five stares me in the face and warns me to be mindful of my steps. You have ere this received the circular of the American Pomological Society in regard to the nomenclature of fruits. This country is ahead of the old world in pomology, and it is our duty to lead in a true republican manner. Thomas, Downing, Barry, Manning, etc., etc., are wide awake on the subject. The Massachusetts Horticultural Society, Michigan and several other societies have passed votes to adopt the nomenclature of the American Pomological Society. MARSHALL P. WILDER.

The letter was followed by the reading of the extract on nomenclature referred to.

NOMENCLATURE OF FRUITS.

[Extract from President Wilder's Address.]

In former addresses, I have spoken to you of the importance of the establishment of short, plain, and proper rules, to govern the nomenclature and description of our fruits, and of our duty in regard to it; and I desire once more to enforce these opinions on a subject which I deem of imperative importance. Our Society has been foremost in the field of reform in this work, but there is much yet to be done. We should have a system of rules consistent with our science, regulated by common sense, and which shall avoid ostentatious, indecorous, inappropriate, and superfluous names. Such a code your committee have in hand, and I commend its adoption. Let us have no more Generals, Colonels or Captains attached to the names of our fruits; no more Presidents, Governors, or titled dignitaries; no more Monarchs, Kings, or Princes; no more Mammoths, Giants, or Tom Thumbs; no more None-suches, Seek-no-furtherers, Ne Plus Ultras, Hog-pens, Sheep-noses, Big Bobs, Ironclads,

Legal Tenders, Sucker States, or Stump-the-World. Let us have no more long, unpronounceable, irrelevant, high-flown, bombastic names to our fruits, and, if possible, let us dispense with the now confused terms of Belle, Beurre, Calebasse, Doyenne, Pearmain, Pippin, Seedling, Beauty, Favorite, and other like useless and improper titles to our fruits. The cases are very few where a single word will not form a better name for a fruit than two or more. Thus shall we establish a standard worthy of imitation by other nations, and I suggest that we ask the co-operation of all pomological and horticultural societies, in this and foreign countries, in carrying out this important reform.

As the first great national Pomological Society in origin, the representative of the most extensive and promising territory for fruit culture of which we have any knowledge, it became our duty to lead in this good work. Let us continue it, and give to the world a system of nomenclature for our fruits which shall be worthy of the Society and the country—a system pure and plain in its diction, pertinent and proper in its application, and which shall be an example, not only for fruits, but for other products of the earth, and save our Society and the nation from the disgrace of unmeaning, pretentious and nonsensical names, to the most perfect, useful and beautiful productions of the soil the world has ever known.

On motion of Mr. Gibbs, of Minnesota, the President was instructed to tender the congratulations of the Society to President Wilder.

The following paper was then read by its author:

TREES PECULIAR TO TEXAS.

BY T. V. MUNSON, OF TEXAS.

From the want of authentic references and the meager botanical work which has been done in this extensive region, this paper is necessarily very incomplete as to species, and imperfect as to descriptions.

Strictly few, if any, species are entirely within the State, that are here mentioned as "peculiar to Texas." They either extend over one edge or another on to other territory, yet in the main are so much more noticeable here than elsewhere that they can be properly classified as Texas. The region extending from the low forest country of Eastern Texas, beginning on the Navasota river, westward some two hundred or more miles, till we reach the high, dry, sandy staked plains of Tom Green and adjoining counties, is the transitional region from the great cypress, pines, magnolias, oaks, hickories, gums, sycamores, cottonwoods, etc., of the forest region of the South to the arid plateau elevations of the Rocky Mountains of New Mexico and Arizona, and the Cordilleras of Mexico, where the cacti, acacias, mimosa, and numerous other families give nature a thorny and forbidding aspect. Texas, then, comprises within herself a natural division of country, capable of giving a peculiar and characteristic flora. Were it the province of this paper, the peculiarities of the country could be far more distinctly and beau-

tifully set forth in its hundreds of curious flowers, shrubs and grasses, than in only about a score of trees I shall mention. A fuller knowledge of the richness and variety of the forest trees and their locations in the State can be had by referring to a paper in the July number of the *American Forestry Journal* for 1883, entitled, "Forests and Forest Trees of Texas," and of the flora in general of the State, in the August, October, November and December numbers of the *Gardener's Monthly* for 1879 (comment on *Journal*).

Major Emory's *Botany of the United States and Mexican Boundary* presents a fine study of the Western Texas, Rio Grande and New Mexican flora, but this is a rare work and out of print. It will be a boon to Western botanists when Dr. Gray completes his *Flora of the United States*, and all these fragmentary works are framed harmoniously together.

At present there is much inquiry by persons of the North as to the peculiarities of the Lone Star Empire State of the South; so the following list of trees may in part answer the inquiry.

I name in alphabetical order:

Esculus arguta (Buckley), Yellow Buckeye. A peculiar species of the true Prickly Buckeye, small tree with pale yellow flowers; found in a limited region in Cherokee county; has been introduced as an ornamental tree, by Dr. F. L. Yoakum, of Palestine, Texas.

Algarobia glandulosa, Mesquite, or Texas Gum Arabic Tree, occurs in all the prairie country of Central Texas, westward from the Navasota river, and southward from the Trinity, in Northern Texas, to the Table Lands and far across the Rio Grande into Mexico. It is generally a scraggy shrub, but in places grows 25 or 30 feet high, and eight to twenty inches through at collar. Groves, or forests, at a little distance, present the appearance, when out of leaf, of an old peach orchard. Though the top is generally so small, the roots are very bulky, and can be used green in the forge with almost equal effect with charcoal, and, like coal, rapidly destroys a stove or grate in which they are burned. It is the chief fuel in a vast region of the grazing portion of the State. The roots, dug and delivered, usually bring \$6 to \$10 per ton, to be used as fuel. It does not interfere with the pasturage; on the contrary, the pods, with their bean-like seeds, are greedily eaten by stock, which rapidly fatten thereon, when the crop is abundant. The wood above ground, as well as below, is heavy, firm, and admits of a high polish, having a color similar to walnut wood. In its native region, where cultivated lands have been abandoned, the Mesquite springs up and occupies the ground. It makes a very durable fence post, and owing to its generally low branching habit, would, if the limbs were cut at some distance from the body, make a noble grape-trellis. The gum which exudes from wounds on the body is quite equal with commercial Gum Arabic, and is sometimes collected and put on the market.

Arctostaphylos tomentosa, Mountain Mahogany, or Manzanita—with Mexicans meaning Little Apple, is a very ornamental, broad-leaved evergreen, closely allied to the Laurel—*Kalmia*—of the East, but attains fifteen to

thirty feet high. The body at first has a thin, brown papery bark, which breaks and peels off, leaving it and the larger branches very smooth and of a whitish color resembling the Sycamore. The leaves are large and leathery, resembling evergreen Magnolia, with a brownish down beneath. The flowers are conspicuous, and of a lovely rose color. The fruit is berry like and edible. The wood is hard and admits of a high polish. The Manzanita is found on the hills and mountains of Crockett, Tom Green, Presidio and El Paso counties, a territory large as the State of Pennsylvania, thence westward to California.

Carya Buckleyi (Durand), Black Hickory, a larger tree than the Bull Hickory or Mockernut, for which it is often mistaken. Common throughout all the Post Oak region of Texas, but most abundant on rich loamy, sandy land, and always regarded a mark of good fruit soil. Grows fifty to seventy-five feet. It is quite variable and may be identical, specifically, with *C. porcina*, Pig Hickory, which is abundant in Indian Territory and Arkansas, in similar soils to those in Texas. Wood usually knotty and hard to split. Makes a hot fire. Nuts with thin outer hull, but thick inner shell. Kernel very sweet.

Carya oliviformis, Pecan. Though widely scattered through the bottom lands of the Mississippi Valley and Gulf States, yet Texas has a national reputation for her large, rich, thin-shelled Pecans, the finest of which are abundant along the Colorado, Guadalupe, San Antonio and Nueces rivers. The Guadalupe Pecan is most famous, but in obtaining select nuts for planting in nursery to get trees for Pecan orchards, I find the San Antonio Pecans equal to the best Guadalupes. The finest of these nuts, this season retail at from twenty to twenty-five cents per pound from the nut stands of Texas towns. The lowest wholesale rates are thirteen to fifteen cents. Thirty-three pounds of cured nuts make a bushel. An orchard tree of fifteen years should produce from three to five bushels of nuts, making an income per tree of from \$12 to \$20 at wholesale. The price of these fine nuts is not likely to become much less, as the demand grows more rapidly than the supply. A Pecan orchard would last for centuries. The timber is very valuable for wagon and carriage making, and the possessor of a large orchard in bearing would have an investment equal, if not superior to that in Government bonds, and far more suitable as an heirloom to his children.

Cerasus capollin, Texas Wild Cherry, mountains of Western Texas, resembles the Wild Black Cherry, *C. sesotina*, but not so large; twenty to thirty feet.

Diospyros Texana, Texas or Black Persimmon. Found about Austin and southwestwardly into Mexico. Leaves densely tomentous. Fruit being brown or black when ripe, gives the name Black Persimmon. Not equal to the *D. Virginiana*, or common species, in fruit or wood.

Hoopesia arborea (Buckley). Grows on hills near the Gulf, below Corpus Christi, and other localities near the mouth of the Nueces river. Twenty to twenty-five feet, eight to ten inches through collar. Bark of trunk and

branches of a pale green color. Branches spiny, similar to Black Locust. Leaves bi-pinnate one to three paired, and leaflets three to six paired, being a doubly compound leaf, and very pretty. Flowers axillary, solitary, yellow with reddish brown lines near base of petals. Pods three to four inches long, three-fourths to one inch wide by three-fourths inch thick, containing eight to ten locust-like seeds.

Juglans rupstris, Dwarf Walnut. Occasional along streams westward from Austin, on the Solano, Concho, Devil's and Pecos rivers. A large shrub. Fruit small, round, rough, abundant.

Juniperus occidentalis, Mountain or Western Cedar, Oregon Cedar. Though extending over the Rocky Mountain region into Oregon, it forms a striking part among trees in the hills and mountains of western Texas, ten to fifty feet. Wood very firm and durable. This may prove still more valuable in the dry regions of the West than the Red Cedar for forest culture.

Juniperus prichyphlea (Torr.). Thick bark Cedar. Same parts of Texas as Mountain Cedar, but less abundant, and extensive in its range; ten to twenty-five feet, spreading, scraggy, often forked near the ground. Bark thick and checked like that of pine. Fruit large, sweet, edible. Quite an ornamental tree.

Maclura americana, Osage Orange, Bois d'Arc. Naturally confined to central, northern Texas, southeastern Indian Territory and southwestern Arkansas, though it has readily accommodated itself to almost all parts of the United States south of 42°. It reaches its grandest proportions in dry bottoms of Dallas, Hunt, Collin, Grayson and Fannin counties in Texas, where specimens occur three to four feet in diameter and sixty to seventy feet high.

Morus microphylla, Small-leaved Mulberry. On hills, vicinity of Austin and westward; twelve to twenty feet. Fruit black, sour, very rough; leaves small, smooth, mostly entire, cordate; branches smooth.

Melia Azedarach, var. *umbraediformis*, Texas Umbrella Tree. Though this is doubtless an introduced species, the wild or specific form is found of large size in wild forests miles away from habitations, sprung from seeds carried by birds, probably, as robins will eat the berries. The Umbrella form was first brought to notice some forty years ago by J. Burke, Sr., of Houston, Tex., who found a tree on an old place near Buffalo Bayou. Thence it spread, and is a favorite in many parts of the South. Persons from the North are always charmed with its dark, glossy leaves and compact, palm-like head. The tree is brittle and short-lived, and hardy only about midway up in the Indian Territory.

Prunus umbellata, Sproutless Plum. Found throughout the same region with the Bois d'Arc, and extending further South; fifteen to forty feet. Bears abundantly, of a yellowish red, medium sized, firm, astringent fruit, covered thickly with a white bloom. Ripens in August, September, and October. Never sprouts; grows in almost every variety of soil with ease, is a splendid

stock for other Plums, but "jugs" the Peach off when budded, or grafted above ground. It grows finely on Peach.

Quercus Emoryi. A beautiful shrubby evergreen Oak, on the Pecos and Limpio rivers.

Quercus monticola (Mx.). Hills of western Texas. Probably only a dwarfish, high ground variety of the Swamp Chestnut Oak, *Q. prinus*.

Quercus Texana (Buckley). About Austin, on hilly land. Large and valuable; wood close grained.

Quercus virens, Live Oak. Though by no means peculiar to Texas, I mention it on account of there being the finest forests of this species known, on the lower Brazos, Colorado, Guadalupe, San Antonio and Nueces rivers. Ship building will find a rich field here for many years.

Sophora sericea, in low moist places on the Rio Grande.

Sophora speciosa, on Mount Bonnell, near Austin, near Matagorda Bay, among the hills and along the valleys of Western Texas, to the Pecos river, fifteen to thirty feet. A beautiful evergreen. Flowers blue, in pendulous racemes, fragrant, pretty. Has been introduced into cultivation.

Sophora tomentosa, "Beaded Locust." May prove identical with *S. affinis*. Extends from Central Texas northward across Red River through Southeast Indian Territory into Arkansas. Has beaded or necklace-like black pods, which hang on all the year till flowers come the next season. Has much the habit of *S. speciosa*, but not so large, and has deciduous leaves. Bark on small trees and on branches, smooth, of a dark green color. The abundant, pendulous spikes of pink flowers are sweet and pretty. Sometimes called Pink Locust.

Ulmus crassifolia, Cedar-Elm. Texas Elm. Extends from San Antonio in Southern, and Pecos river, Western Texas, northeastwardly across Red River to the Arkansas River and into Southwestern Arkansas. Beginning further to the southwest, it otherwise occupies about the same region with the Osage Orange, and seems to like about the same kinds of soil. I think it will also thrive wherever the Osage will grow. It is remarkably conspicuous in its small, dark green, compact foliage, and in blooming and maturing seed in the fall. The wood is white to heart, and splits almost as freely as Cedar, though the body may be knotty. Wood is a fine fuel, but not durable. Owing to the closeness of growth of head, it would be a fine wind-break, if planted in rows around a place. It is of slower growth than either the American or Slippery Elm.

DISCUSSION ON MR. MUNSON'S PAPER.

President Earle—I wish to call attention to the pecan tree as one of much value in the South. Those who have read the excellent paper of Dr. Mohr's, read before this Society last winter at New Orleans, will remember that he speaks of the culture of this tree in the South as a source of profit. The finer varieties, such as Mr.

Munson describes, certainly would be profitable. I have been told by dealers in New Orleans that they often sell the large, thin-shelled varieties as high as fifty cents per pound.

Mr. Munson—There is a law in our State making it a penalty to cut the trees, but as that is the most speedy way of gathering the nuts, the law is often violated. The finest variety we have is known as the Lady Finger. The nuts of this variety often grow to three inches in length. The pecan transplants with great difficulty. It must be transplanted at one year old.

The paper of Mr. Munson was so well received that a vote of thanks was tendered him by the Society.

A committee of three, consisting of Oliver Gibbs, Jr., of Minnesota, Sylvester Johnson, of Indiana, and George P. Peffer, of Wisconsin, was appointed to examine fruits on exhibition, after which the Society adjourned to meet at 9 A. M. to-morrow.

Second Day—Wednesday.

FORENOON SESSION, January 23.

The Society reassembled at 9 A. M. President Earle in the chair.

D. S. Grimes, of Colorado, was introduced and read his paper, as follows:

HORTICULTURAL RESOURCES OF THE REGIONS OF COLORADO.

BY D. S. GRIMES, OF COLORADO.

The value of the resources of any State or locality will be governed largely by the facilities afforded in reaching a market.

Our soil may be ever so rich, our climate faultless, but, being isolated from market, the horticultural productions of our lands will be almost valueless, on account of their perishable nature, the expense of transportation, and time required to reach that market.

Colorado is a State of vast proportions and possibilities. It is a land of high altitudes and peculiar climatic influences. A country remarkable for its natural scenery, pure atmosphere, and great mineral wealth. Aside from the purchasing power of the State, hoarded away in its mines of fabulous wealth, there is a power in our soil, aided by an intelligent system of irrigation, to produce many of the necessities and luxuries of life.

wonderful to contemplate. But notwithstanding the advantages offered in soil and markets, where the producer and consumer live side by side, protected from successful competition by the great plains on the east and the mountains on the west requiring expensive transportation to reach and compete with us, yet we are sorry to admit, horticultural enterprise, especially the growing of fruits, is sadly neglected. The hundreds of car loads of fruit shipped in, and the large sums of money continually paid to our horticultural brethren, east and west, for these indispensable luxuries, is not true evidence that we can not produce fruit. Up in Colorado we live high and fast. Always in a hurry, our people have not time to wait for trees to grow, or to engage in any enterprise that does not promise large and speedy returns. They stick to the old silver-plated way of raising apples—three pounds for a quarter.

So engrossed are they in mining and mining phrases that when giving prices on fruit they quote, "Strawberries assay fifty cents a quart in silver, with a visible trace of wood." The boys, also, catching the same infatuation, will often take their portable reduction works after night jump somebody's grape or watermelon lead, to test the free milling qualities of the fruit.

Owing to the peculiar topography of the country, of mountain, valley and plain, the season of fruit ripening varies according to elevation, extending the time of a single variety of the strawberry from May to September.

Fruit trees come into bearing fully two years younger than they do East. Our apples and pears do not compare with the same class of fruits grown on lower elevations, but in quality and flavor they are superior, being smooth, heavy, juicy. Grown and ripened in a dry atmosphere, they also are good keepers.

Our country is pre-eminently adapted to small fruit culture. Under our system of irrigation small fruits, especially the strawberry, produce large crops of excellent fruit. Irrigation not only brings the whole crop to full maturity, but it extends the time of ripening all classes of small fruits, almost double.

By a judicious selection of varieties of strawberries, from the earliest to the latest, we can extend the picking season from 40 to 60 days.

While fruiting, we irrigate this crop at least twice each week, soaking the ground thoroughly.

All other varieties of small fruits except the grape require a liberal irrigation during this period.

These crops as grown around Denver yield a gross income from \$100 to \$1,000 per acre, according to soil, age, and manner of cultivation. The prices obtained range from twenty cents to fifty cents per quart. In the mining districts prices run higher.

The shipment of strawberries from Kansas and Missouri affect the prices of the Willson and other early kinds to some extent. These shipments, however, are of short duration, and soon leave the field clear for our later varieties which always bring good prices. The mountain people, on account of

the limited home production, seldom get a taste, except in canned fruits. Of these, large quantities are consumed. Although our mountains, valleys, prairies and parks are well adapted to small fruit culture, having all the elements of soil necessary for successful cultivation, yet but little attention is paid to any crop, except potatoes.

Irrigation being an indispensable factor in the horticultural resources of the county I represent, we can not intelligently give the results of one without describing the other. Not only is irrigation the foundation and salvation of all horticultural industries in Colorado, but you, my brethren of the Mississippi valley, sooner or later, must, for your own protection and success in times of drouth, adopt this system. The most money I ever made in Colorado was when I hired men at \$3 per day to drive away grasshoppers. Likewise, you, when protected by irrigation, will find the years of drouth the most profitable of all in your horticultural history. The money lies more in our ability to surmount difficulties and control emergencies than in the productions of favorable seasons. In the Centennial State we practice at least two distinct modes of irrigation—that of agriculture, referring to field crops, and of horticulture a "row" irrigation where water follows cultivation.

The most favorable conditions for the first, is a level surface and abundant flow of water that will flood the ground rapidly and evenly. In horticulture, where the soil is frequently stirred, the manner of applying is directly reverse to that of field culture. The smallest stream of water is turned into the rows, which are laid off so as to give but little fall, requiring at least twenty-four hours to run 300 feet, which is as long as the rows should be.

As a rule we use entirely too much water. One cubic inch of water is abundantly sufficient for all ordinary purposes in our dry country. It is too often the case that water is applied with but little knowledge of the real wants of trees and plants. There seems to be a kind of denominational character attached to the business which we should correctly understand.

The cherry and grape being the Presbyterians in horticulture, require but little water. Strawberries are the Baptists, and glory in rivers of water and rich food.

Then again we have the Methodist mode of irrigation—enthusiastic amateurs, or tender-feet, in the profession. They select good stock and lots of it; lay off their rows straight down hill; open wide the flood-gates; irrigate with vengeance, washing away both soil and plants, then backslide and try something else.

Water is, however, an essential element in the perfect development of fruit.

It matters not how rich we make the soil, or whether we feed the soil or not, trees and plants must have a certain quantity of water to enable them to develop their growth and mature their fruit.

Our State laws recognize a prior right in appropriating water from the streams. Hence, if at any time the supply runs low, the last canals constructed are the first to suffer from the deficiency. In view of this fact, many of the irrigating canals built lately in the older settled portions of the State,

have constructed lakes and reservoirs to store the surplus flow of water, while the streams are full from the melting snows of the mountains. In this way hundreds of acres were irrigated that would otherwise be without water.

There are four distinct divisions of climate in Colorado. In northern Colorado none but the truly ironclad varieties of fruit trees can stand the extremes of cold that sometimes sweep over that country.

The Arkansas valley not being subject to such extremes of cold as occur north of the divide, is destined to become a favorite fruit growing region from Canon City to the Kansas line.

The valleys of the Uncompagree, Gunnison and lower Grand rivers, on the Western slope of the Rocky Mountains, being influenced by currents of air from the Pacific ocean, are much hotter in summer and milder in winter than any other portion of the State. In the southern part of the State is the San Luis valley, watered by the Rio Grande river and its tributaries. Here we find a large area of fine lands susceptible of profitable cultivation. This valley, together with those of the Animas and Delores, in Southwest Colorado, is greater in altitude than Denver, but more free from the extremes of temperature than any other section of our State.

In wild fruits and flowers found growing in the mountains and canyons, are many varieties, new and worthy of general cultivation. We have several varieties of the red, black and yellow currant, some of them as large as the best cultivated sorts. We have seen the large yellow currant growing on stalks ten feet in height, that were both useful and ornamental, and worthy of a place in any garden.

Raspberries and strawberries are found growing from the foot hills to timber line. Huckleberries and serviceberries are also found in many places.

The *Shepherdii*, with its gray leaves and red fruit are met with in great abundance on the Western and Southern slopes. On the head waters of the Cache-la Poudre river, in Laramie county, and in the North Park, are found a peculiar dwarf cherry, growing on a bush or shrub no larger than a gooseberry bush, but bearing such enormous crops of fruit as to completely prostrate the branches to the ground. The fruit is nearly as large as the May cherry, a little pungent to the taste, but when cooked making excellent sauce or jelly.

The wild plums found growing only on the Eastern and Southern slopes of the Rocky Mountains, are the most valuable and promising of all our native fruits. While many varieties are of but little importance, we often find varieties superior in size and quality to many of the varieties now in cultivation. We have seen red, yellow and spotted plums, with small seed and solid flesh, larger than the Wild Goose and Miner.

The flora of Colorado, like its natural scenery, is rich, varied, and extensive, furnishing the student in botany a field of interesting study.

Mountain ivy, clematis, spiraeas, roses, wigelias, snowberries, columbine lilies, pinks, and scores of others, combine to make beautiful and fragrant the wilds of these grand old mountains.

While traveling over the late Ute Reservation on the Uncompagree and Grand rivers, we saw many varieties of flowering plants and shrubs we had never met before. They were not found in such quantities or varieties along the valleys, but on the high mesas and mountains, even to the very snow line we would pass through acres of wild flowers of the most gorgeous hues.

We can not close our account of the natural horticultural resources of the mountain regions of Colorado, without referring to a few varieties of the Rocky Mountain evergreens. The Spruces, especially, are worthy of consideration. The *Abies Menziesii*, a blue spruce, are admired by all true lovers of beautiful trees.

The *A. Douglasii*, Douglass spruce, has a soft foliage with branches as tough and pliable as the willow, enabling it to resist both wind and snow. They seem well adapted to the plains and prairies of the West. We have transplanted thousands of them from their alpine homes on the mountains to our grounds in Denver, with as little loss as any tree we ever handled. The rules we observe, is in selecting trees from the open grounds—careful digging and handling, then planting as close together in a bed shaded with brush or lath, and giving them plenty of water. The next year they can be transferred to the nursery row, or any where else, with perfect safety.

Referring again, briefly, to the Sheperdi, or Buffalo Berry. We have been experimenting with it as a hedge plant, and find it admirably adapted to that purpose—especially in localities too cold for the Osage. The Honey Locust, White Willow and Osage Orange, belong to the class of trees, while this is a bush easily kept within bounds and does not affect the crops growing near, as is the case of the Willow and Osage Orange. It is easily transplanted, comes early to maturity, and being found growing in a natural state in the Rocky Mountains from New Mexico to British Columbia on the head waters of the Missouri, there can be no question as to its ability to withstand the extremes of both heat and cold. We hope the syndicate of gentlemen forming the Mississippi Valley Horticultural Society, especially those members representing Northern latitudes, will give this hedge plant a trial.

DISCUSSION ON IRRIGATION.

President Earle—The essayist lives in the Rocky Mountain region while most of us live in the more level districts of the Mississippi valley, so the discussion of this paper will be of particular interest to us.

Mr. Pearce, of Ohio—Mr. Grimes said one inch of water was sufficient, but did not tell for how much ground.

Mr. Grimes—I find that very few, not living in Colorado, understand our terms. I should have explained. The water is brought to us in flumes twelve inches wide, and there are gates to regulate

the flow. If I buy twelve inches of water the gate is raised one inch; if I buy twenty-four inches the gate is raised two inches, and so on. One inch of water is generally sufficient for an acre, though some things, especially strawberries, require more. We are adopting a system of sub-irrigation by running tile near the surface. This requires much less water.

G. Y. Johnson, of Kansas—How would one inch correspond to rainfall? We would like to know the relative amounts.

Mr. Grimes—One inch of water is equivalent to about six inches rainfall, but on account of evaporation we, perhaps, require more water than you would. We have been told to ripen up the wood and let the trees go into winter dry, but we find that will not do. We lose fewer trees if, just before freezing, we make the ground wet.

Mr. Johnson—You say during the season. How long do you count for a season?

Mr. Grimes—From April to November. If you irrigate wheat before it is large enough to shade the ground it will not do well. As soon as it is large enough we turn on the water.

Mr. Folek, of Missouri—I once lived in New Mexico. Our system of irrigation was somewhat different. During April, May and June we expected to raise our crops. We used the eight-day system of irrigation, and most of the cereals were irrigated about three times. We let the water run until the ground was soaked several inches deep, then in about eight days we could cultivate it.

The President—Upon this subject we would be glad to hear from *Mr. Hale*, of Connecticut.

Mr. Hale, of Connecticut—My experiences have all been in a small way, but they have convinced me that irrigation is becoming a necessity with us. During a dry season I got a lot of shoe boxes and had my men fill them with water and set them near some strawberry plants. By having some holes bored in the bottom, the water soaked away and watered the plants. In this way we doubled the size of strawberries in twenty-four hours. We are laying plans to irrigate our place. We thought of doing it last spring. If we had, it would have been a blessing to us, for we lost our crop from

drouth. It would have paid in one season for the expense. Strawberries can hardly have too much water.

Prof. T. J. Burrill, of Illinois—Would you apply water to the surface?

Mr. Hale—I would run it between the rows. One of our neighbors used a sprinkler, which spread the water about forty feet. The plan was successful, but he thinks better results can be obtained by running it between the rows.

Mr. Williams, of Kansas—This subject is one of growing interest. We want experience instead of theory. I have had some experience in Texas, and now I am located in Kansas. I am growing that Baptist berry (the strawberry) which must have a great deal of water. I think sub-irrigation will be practical for us. If you pour water on land it will soon soak away, so it is hard to get enough when applied to the surface. Many of us have to rely on wells and windmills. We have not advanced far beyond the Egyptians yet. I hope within a few years we will have a tile which will be within reach of us all.

Mr. Pearce, of Ohio—We have tried irrigation in Northern Ohio. We tried windmills and they were a failure. In parts of Ohio we can obtain water from artesian wells. Mr. Hale comes from a region where many strawberries originate, and they do not grow as large sometimes as they are represented. You want to put shoe boxes around over the ground, as he did, and water them.

Mr. Grimes—Our hills have been considered valueless because irrigation would wash them. I have arranged so I can cultivate the hills. I make a flume from the top of the hill to the bottom. When I come to a row, I bore a hole and fix a button over it, so I can let out much or little water. In this way there is no danger of washing. I can go about my business and let the water run, day and night if necessary. Flumes do not cost much. We have trouble with inexperienced men. One man opened the buttons too wide and made it wash.

G. V. Johnson—I put in some tile for draining. I soon found roodlets had filled the drain so water could not run in it. If you can get the tile so it will stay open, wind mills will do, for it will not take much water.

Mr. Grimes—In connection with the tile I spoke of, there is a hollow plug which runs down into the tile. This lets the water run out on the ground. They plow furrows and run a machine along which makes the tile out of sand and cement. It is forced out a little on the plan of a sausage stuffer.

Prof. T. J. Burrill—I have a single item which may be of benefit to those who want to try irrigating on a small scale. At our university we water flowers a great deal. We put down flower pots and put water in them. In this way the ground does not bake.

Ex-Gov. Furnas, of Nebraska—It has been my good fortune to visit Southern California. The people there have found that only one-tenth as much water was required by sub-irrigation as by applying it to the surface.

Mr. Wellhouse, of Kansas—Is there no trouble from sediment?

Gov. Furnas—I heard of none.

Mr. Barnard, of Nebraska—I spent some time in California. I found that top irrigation was a failure. Where it was used the soil was impoverished and orchards killed. But where sub-irrigation was used, we found good results. Common sewer pipes were used, and the joints were sometimes cemented. On strawberry beds they take up the pipes every two years or so and clean them. I find I have more than doubled my crop by irrigation. I do not get better berries, but they will bring a better price from those who test berries by the eye.

The President—I want to hear from Prof. Cassidy on this subject.

Prof. Cassidy, of Colorado—I am a new comer to Colorado, and have not much to add now. The amount of water required varies according to the soil. A stiff soil requires much more than a sandy one.

Mr. Hale—I would like to ask Mr. Barnard what size tile he would use, and how deep he would put it?

Mr. Barnard—A two inch tile does not fill up like a smaller one, so it is preferable. It should be put in about six inches deep. It is better to take these up to keep from frost.

Mr. Gibbs, of Minnesota—I am reminded afresh of the vast extent of territory represented by this Society and the varied

conditions obtaining in different places. Irrigation by ditches is important in a country where water comes from above, but in many parts the ground which we want to irrigate is above the water supply, so the water must be raised. We have irrigation by wind and by steam power. J. M. Smith, of Green Bay, Wisconsin, is one of the most successful horticulturists and his sons are also very successful. He elevates his water by wind, they by steam power. Their expense is much less than his. They elevate and store the water in great tanks and apply it with hose. Gardeners are coming to the conclusion that this is the best plan. I wish to speak of the Buffalo berry which Mr. Grimes has mentioned. I found it growing along streams in the West, but I also found it growing on bluffs almost independent of water. It will be immensely valuable for a hedge plant, on account of its ability to stand drouth.

Mr. Masters, of Nebraska—While I have had no experience in sub-irrigation, I have been watching the subject with interest. I have visited grounds where it is used. One man tried for two or three years and found on three or four acres his windmill was not sufficient. He put up another larger one and that answered. But he found his soil was being injured. He abandoned the system and used sub-irrigation. He put tile under each row, eight inches deep, and allowed the rows to be a foot and a half in width. In reference to the evergreens of the Rocky Mountains, I think the spruce which Mr. Grimes spoke of will be valuable to us in Nebraska. The Norway does not do well for me. I can get a greater per cent. of the other to grow.

President Earle—Interesting and important as this discussion is, pressure of business demands that we cut it short.

Mr. Hale—One question. Does Mr. J. M. Smith apply the water at night or day?

Answer. At night.

Ex Gov. Furnas, of Nebraska, being called upon for his paper, remarked:

When I was solicited to prepare a paper for this occasion, I only consented on condition that my subject might be 'Forests and Timber Interests of Puget's Sound,' to which I have been giving

some attention. The paper I shall read is a part of the report I have made for the Commissioner of Forestry by whom I was employed to go to Oregon, California, and Washington Territory, in the interest of forestry.

TIMBER INTERESTS OF THE PACIFIC COAST.

BY R. W. FURNAS, OF NEBRASKA.

Urged by the indefatigable President of this Society, to prepare and read a paper at this meeting, I made every possible effort to be excused, pleading, especially, want of time, and consented only on condition that I be permitted to treat on my present favorite theme, "Forestry," to which, for years past, I have given almost exclusive thought and attention. I am announced for "Forests and Timber Interests of Puget's Sound," but have concluded to strike out the words "Puget's Sound," and insert in place thereof, "Pacific Coast," which will be more expressive of what I desire to say.

I had thought, too, that a paper exclusively on the subject of Forestry might, by some, be considered out of place before a Horticultural Society. And yet, I inquire, why should it be? I am further comforted by noting that I am to be in immediate company with such able and profound co-workers, Professors Beal, Lazenby, Robson, Dr. Mohr, Teas and others.

During the summer of 1883, I was commissioned by Dr. Loring, United States Commissioner of Agriculture, to officially investigate and report on the forestry interest of the Pacific Coast. This paper is in part extracts from a report I am making.

VARIETIES OF TIMBER.

The following varieties of timber embrace those of arboreous character, and commercial value and importance, found in California, Oregon and Washington. Most measurements were made in person.

Pines.

Sugar Pine—*Pinus lambertana*.

Common Pine—*Pinus ponderosa*.

Silver Pine—*Pinus monticola*.

Black, or Jack. Pine—*Pinus contorta*.

Also two smaller varieties—*tuberculata* and *albicaulis*.

The Sugar pine grows to a height of two hundred and fifty feet, with a diameter from eight to ten feet. Common pine, one hundred and seventy or eighty feet high, and four to five feet in diameter. Silver pine, one hundred and fifty to sixty feet high, and three to four feet diameter. Black—*albicaulis* and *tuberculata*, from fifty to seventy feet high, and one to three feet in diameter.

Firs.

White Fir—*Abies grandis*.

Noble Fir—*Abies nobilis*.

Lovely Fir—*Abies amabilis*.

Yellow Fir—*Abies (Pseudotsuga) Douglassii*.

The *concolor* is frequently called White Fir.

The *subalpina* is found on the higher elevations, growing to a height of fifty and sixty feet, and one to two feet in diameter.

The White and Yellow firs are the most abundant and of most commercial importance. The Yellow reaches to over three hundred feet in height, and a diameter of twelve feet. White fir to near two hundred feet in height, and five and six feet in diameter. Noble fir about same in dimensions as White. Lovely fir less pretentious, contents itself with a slight advance beyond one hundred feet in height, and two to three feet in diameter.

Tide Water Spruce—Abies (Picea) Sitchensis.

Known also on the coast as *Menziesii*, grows to two hundred feet in height, with a diameter of eight to ten feet.

Hemlock—*Abies (Tsuga), Mertensiana*.

Mountain Hemlock—*Abies (Tsuga), Pattoniana*.

Engelman Spruce—*Abies (Picea), Engelmanni*.

The Mountain Hemlock grows to one hundred feet in height, with a diameter of four to five feet. *Mertensiana* exceeds it in height fifty or more feet, with about the same diameter. *Engelmanni* reaches fifty feet in height, and a diameter of twelve to eighteen inches.

Tamarack—*Larix occidentalis*.

Larch—*Larix Lyallii*.

The Tamarack reaches up from one hundred and fifty to sixty feet, measuring four to five feet in diameter. The Larch is small.

Cedars.

Thin Barked Cedar—*Thuja gigantea*.

Thick Barked Cedar—*Libocedrus decurrens*.

Port Orford Cedar—*Cupressus (chaamecyparis) Lawsoniana*.

The thin barked cedar is the more common and abundant at the mills, and grows to a height of near two hundred feet, with an average diameter of five and six feet. From the ground up, four or five feet, it often shows a stump diameter of twelve and fifteen feet. Thick barked cedar ranges up to one hundred feet in height, and four to five feet in diameter. Port Orford Cedar is very valuable and of limited habitat. Thus far it is only found in Coos county, Oregon, I am informed. The wood is characterized for durability, and also for an exceeding pleasant and perpetual odor, perfect proof against moth and other obnoxious house insects. As such it is used in manufacture of cham-

ber furniture, wardrobes, etc. The wood is of white color. The tree grows to a height of over two hundred feet, with a diameter of six to seven feet. The lumber is worth sixty dollars per thousand at the mills, at Portland, and on Puget's Sound.

Sitka Cedar—*Cupressus (Chamaecyparis) Nutkensis.*

Prof. Collier found in limited growth at the base of Mt. Hood. This too, is rare and valuable. It will be remembered Mr. Seward brought this variety of cedar home with him from Alaska, and had it worked into his library furniture.

Juniper—*Juniperus occidentalis.*

Yew—*Taxus brevifolia.*

Oaks.

Live Oak—*Quercus chrysolepsis.*

White Oak—*Quercus garryana*

Black Oak—*Quercus Kelloggii.*

Chinquapin Oak—*Castanopsis chrysophylla.*

Oaks of the Pacific slope, in value, will not compare favorably with those of other portions of the United States. The wood is brittle, and not so close grain. Trees grow spreading and of comparative low stature, rarely reaching from fifty to seventy feet, and short bodied. Used almost exclusively for fuel.

Alder—Alnus rhombifolia

Is quite abundant, growing from eighty to ninety feet in height, with a diameter of two to three and a half feet. The lumber is soft and light, resembling very much the linden so abundant in many parts of the Eastern and Middle States. It is used extensively in inside work in the manufacture of furniture.

Oregon Ash—Fraxinus Oregona.

This is a strong, valuable variety of timber, found abundant in Oregon and Washington: grows sixty to eighty feet in height, and two to three feet in diameter.

Large Leaved Maple—Acer macrophyllum.

Is found in abundance and used for many purposes. The lumber made from it is valuable. Some extraordinary fine "bird's eye" and "curled," used for veneers. It is used in all the towns and cities for shade and ornamental purposes. The leaf is large, deep green, near a fac simile in appearance and shape of the hard maple, making it highly valuable for latter named use.

Madrona—Arbutus Menziesii.

A beautiful hard wood, taking a fine polish. Grows from fifty to sixty feet in height, and three to four feet in diameter.

Myrtle—Umbellularia (Oreodaphne) Californica.

Lumber used much in cabinet work. Grows to a height of one hundred feet, and a diameter three and four feet.

A variety of cottonwood grows abundant along the banks of the Columbia and Willamette rivers. Botanical name not learned. It grows to good size, is worked up at the mills and considered of value for many uses, notwithstanding so many really more valuable varieties of timber are found in greater abundance.

Several valuable varieties of willows are found in all parts of the territory embraced in this paper; some of sufficient size to be of value.

Also, mountain mahogany, wild cherry, manzinita, chittim wood, choke cherry, quaking ash, dogwood, mountain ash, black haw and serviceberry, were also observed.

Redwoods.

Redwood—Sequoia sempervirens. While peculiar to the Pacific Slope, in fact almost exclusively so to California, its characteristics are too well known to call for any extended notice.

Redwood is the prevailing timber of commerce of California and South-western Oregon, and is of great value. The important consideration is its present supply, rate of consumption, and probabilities of reproduction. It has existed in the mountain valleys and canyons of the coast and Sierra Madre ranges, in immense quantities. There is yet a large supply, but being rapidly consumed, and with little regard for economy or saving, where obtained and cut.

Its value as a lumber for working is scarcely to be excelled. Its first and most remarkable quality is due to its astonishing straight grain. Its fibers seem to run parallel with each other. Boards can be rived, or split, almost as evenly as sawed—scarce need planing. "Shakes," as they are called, are gotten in this shape, twenty feet long, an inch thick, and twelve inches wide, as regular, almost, as boards. The wood is soft and easily worked. It is a beautiful, rich, dark red, and when well finished and varnished, makes an elegant appearance.

There can be had no exact data as to acres of timber of any kind or varieties used. The trade is conducted under the general term "Lumber," with but little if any further distinction. After personal visits to lumber yards and conference with dealers, it is safe to record a very large preponderance of Redwood lumber made and used in California. In round numbers, including lumber, railroad ties, posts, shingles, lath and shakes, it is estimated there was consumed and handled in San Francisco, during the year 1882, 2,500,000,000 feet. This supply was not all obtained in California; portions came from Oregon and Washington. At Los Angeles there had been shipped to that point from January, 1883, to June of the same year, 85,000,000 feet. Source from which obtained, about the proportions as at San Francisco.

Parties who prepared and reported, for California, statistics for the census

office in 1880, estimated the Redwood standing in forest then at 25,825,000,000 feet, board measure, and the cut of the same year at 186,635,000. The same parties, and experts, having knowledge of conditions, estimate the standing supply of 1880 reduced by the cuts of 1881-2 to about 20,000,000,000 in round numbers. Some new discoveries of supplies have been made. Supposed to equal the cuts of 1881-2.

Redwood timber yield per acre is so much larger than that of any other variety, or any portion of country, as to seem to one, not having "seen with his own eyes," fabulous—Munchausen like. In the Russian river red wood groves (Hulburt Canyon), I measured numbers of trees. One girthed sixty feet, five feet above ground. One felled tree measured three hundred and sixty-seven feet from ground to topmost extremity. Others standing, were estimated by loggers to be over four hundred feet high. In many portions of this forest the interior was so dense that trees could not be felled to the ground, or in fact any important movement from their natural growing perpendicular. Cutting and felling is done from the outer borders of groves. A reliable gentleman, mill man, at Guerneysville, informed me that one of these large Redwood trees had been worked up to a maximum of two hundred and forty thousand feet of lumber, including all purposes for which its various parts could be used. Bayard Taylor, it will be remembered, reported one of the "big trees" as yielding two hundred and fifty thousand feet of lumber.

While as yet but little attention is given reproduction of this valuable timber, it is believed by those who have given the subject thought, it can be done as readily as with other varieties. Passing through portions of forests from which all the original growth had been cut, all visible indications were favorable. Where undisturbed, and fire kept out, young growth was abundant and of rapid development. Some experiments, on small scale, have been made, growing seedlings in nurseries. But, as a rule, the same old condition of affairs seems to prevail where this timber grows naturally and abundant, as in other timbered regions. The value is not appreciated and realized until nature's supply is entirely exhausted.

Eucalyptus.

The introduction of Australian gum trees—*Eucalypti*—into California and other portions of the United States, where climate permits, has given such satisfaction, and has been fraught with such beneficial results, that prominence is here given, indulging and expressing the belief that the future will more than fulfill the most sanguine expectations, or predictions. Its introduction is of comparative modern date. The more seen and known of it, the more it grows in popular esteem. When in Southern California two years before, I was interested in observations then made, and during my last visit investigated with renewed interest.

It was originally introduced for both sanitary and ornamental uses, and later for fuel. It is called sometimes the "Fever Tree," because possessed

of properties preventing malarial fevers. Also has "disinfectant virtues, and is antiseptic for wounds—its essential oil being a stimulant, and the tannin in the leaves, acting as a tonic astringent applied exteriorly, hastens healing of wounds." Chemists enumerate its uses as "an infusion, decoction, powder, distilled water, tincture, extract and essence." It is of as rapid growth as the Cottonwoods of the Missouri valley, and yet of hardwood. The wood combines density of texture with rapidity of growth. A singular characteristic is, that growing isolated, it reaches upward astonishingly, does not branch out laterally, as do near all other varieties under similar circumstances. It is equally durable for underground uses, and railroad ties, as oak. The wood is compact and tenacious, and owing to the presence of resinous matter, possesses unusual incorruptibility, which allows it to remain in contact with salt water to advantage. Keels of the best South American whale ships are made from the variety *Eucalyptus globulus*. The English navy value it for solidity, tenacity and durability. In its native habitat it grows to enormous size, excelled only by California big trees—*Sequoia gigantea*. Baron Ferd. von Mueller reports "a plank on exhibition at the London Exposition, in 1862, ten feet in width and seventy-five feet in length. Australia desired to send a plank 175 feet long, but no ship could be found to transport it."

Ellwood Cooper, Santa Barbara, California, has given much attention to the cultivation of these trees. He reports thirty-one varieties introduced, and has a plantation of over fifty thousand trees growing in forest form. His experience shows "a growth in three years, from a seedling transplanted, of nine and one-half inches in diameter, and forty-two and one-half feet high. At this rate sixty years would give a tree sixteen feet in diameter."

It grows without irrigation, on the highest, driest, arid soils of Southern California. Particularly from Los Angeles to San Diego, and intermediate sections, much attention is given its cultivation. It has been introduced with success in Algeria. M. Trottier, a colonist and planter there, estimates the "profits of one thousand trees at five years old at \$240, and at twenty-five years at over \$10,000. By actual measurement the annual growth was found to be four and one-half inches in circumference. The growth in height, an average of nineteen inches per month. A yearling seedling planted out in May measured nineteen feet high the following December. At the age of fifteen years the tree measured over seventy feet in height."

It is excellent for fuel, but must be cut, split, and worked up while green. When dry and well seasoned it is said to "split cross-wise about as well as length-wise with the grain."

The editor of *Rural California*, Geo. Rice, Esq., Los Angeles, who is doing much to encourage the cultivation of Eucalyptus, gives strong facts and reasons when he says: "These fuel forests are the very best and most certain investments that capital can be put into in this section."

A blue gum plantation, on properly selected soil, will take care of itself, and in eight or ten years bring to its owner a certain result, in the way of income, yearly. From that time into the indefinite future the tree repro-

duces itself from the stump and the root that produced a tree a foot in diameter in ten years, will produce two of equal size in the next ten years. The second crop will thus be double in value to the first, and as the root lives, there seems to be no limit to the life and continued reproduction.

When the trees have grown to be large enough to be cut for fuel, the owner will commence by cutting off one-eighth or tenth of his grove, and on each succeeding year the same quantity, until he has gone entirely over the ground, when the part where he first commenced will be ready for him to commence again, and so on indefinitely at an increasing ratio; the larger and stronger the roots become, the more timber they will produce, and all the care and attention that the forest will require will be to confine the number of sprouts on the stumps of the previous year's clearing to two, the expense of which will be small. M. Nadeau is now cutting his five year old blue gums, which yield twenty-five cords of good hard wood per acre, worth \$10 per cord on the ground, or \$250 per acre. This is \$50 per year for the land. In the next five years the stumps from these trees will produce trees that will yield at least fifty per cent. more wood, or thirty-seven and one-half cords, worth \$375 per acre; or if permitted to grow for ten years, \$750, and no care or expense to the owner, except thinning out the suckers the year after cutting. The total cost of the land, planting and cultivating need not be over \$100 per acre, and after the trees are large enough to cut, the harvest is annual and the income perpetual.

FORESTS AND LUMBER OF WASHINGTON TERRITORY.

The most important portion of territory I visited was that of Washington, contained in the area north of the Columbia river and bounded on the east by the Cascade range of mountains, on the north by British Columbia and the Straits of Fuca, and on the west by the Pacific ocean, containing in round numbers about 30,000 square miles. The principal portion of this region is covered with a dense growth of timber trees, of which the most abundant and most important being used almost exclusively in the manufacture of lumber, are:

The firs (*Abies Douglasisi* and *Abies grandis*). The other kinds of coniferae found at the mills are the cedar (*Thuja gigantea*), the spruce (*Abies menziesii*), and hemlock (*Abies mertenciana*). A species of white pine (*Pinus alba*) is occasionally found. The pine (*Pinus ponderosa*), which grows to majestic proportions in Eastern Washington, is not found on Puget's Sound. The other cone-bearing trees are the arbor vite (*Thuja plicata*), which grows along the borders of the Straits of Fuca. Full 90 per cent. of all the lumber, timber and spars produced on Puget's Sound is fir, and is so known and classed by all lumber dealers and mill men.

Of the deciduous trees, the most common is the white maple (*Acer alba*), a beautiful wood, capable of a high polish; the alder (*Alnus Oregona*), the wood being white and soft, is good for carving and for furniture and the bark furnishes a red dye, used by the Indians for coloring. The white ash (*Fraxinus*

Oregonia) is larger than the ash of the Atlantic States, and is light and elastic. The laurel (*Arbutus menziesii*) extends from California to Van Couver's Island, and is common on the immediate shores of Puget's Sound, Fuca Straits and the west coast. Three species of poplar are found, the most abundant is the aspen (*Populus tremulus*). Several varieties of the willow grow along the river banks; only two (*Salix speciosa* and *Salix scoulerana*) attain the size of trees.

The first shipment of sawed lumber from Puget's Sound was in the fall of 1851. The first steam saw mill was put up at Seattle, 1853. At present the following mills are operating on the Sound, with a per diem capacity as indicated:

Mill.	Feet.
Port Gamble	150,000
Port Ludlow	150,000
Utsalady	75,000
Port Madison.....	92,000
Port Blakely.....	150,000
Tacoma (old).....	150,000
Seabeck.....	65,000
Milton ..	30,000
Port Discovery	60,000
New Tacoma	15,000
Stetson and Post at Seattle.....	20,000
Coleman's at Seattle	30,000
Whatcom.....	15,000

The demand for lumber is such that these mills are run at their full capacity.

The primitive method of logging, handling and sawing timber into various merchantable products, have all been superseded by most modern improvements.

The finest timber region of Washington may, with propriety, be termed as yet unexplored in reality, which is that west of the Willamette meridian, commencing at a point opposite Portland, Oregon, and running due north to Port Townsend. Between this meridian and the Pacific ocean is an area composed of the Olympic range, as large as all the New England States, densely covered with the most magnificent growth of firs that can be found on the American continent.

This vast timber tract is distinct from the forests on the eastern side of Puget's Sound, where many million feet of timber are annually taken from the dense growth of gigantic firs which line the banks of the Samish, Skagit, Snohomish, Snoqualmie, Dawanish, White, Nesqually and Pinyallup rivers, and extend eastward to the snow line of the Cascade mountains. All the rivers named are capable of floating millions of logs to the waters of Puget's Sound. The product is towed in booms of logs by tug boats to the various mills.

As the value of the logs is constantly increasing, and the demand for lumber also on the increase and will continue, when railroads to the interior will add new markets to the great foreign demand of the present, the question naturally arises, how long will it be, with this great and increasing demand upon the timber resources of Puget's Sound, before the stock of marketable timber will be exhausted? The vast pine forests of Maine have been shorn of their strength, and whole districts of the finest pine lands of Michigan and other Western States have been entirely cleared of their timber; and, in almost every instance where the pine has been cut, the succeeding growth is of deciduous trees. In fact the great lumber men of the States east of the Rocky mountains already have turned their attention to the forests of Western Washington, and pronounce them to be the source from whence in the near future the world must derive its supply of fir timber, as well as other coniferous woods. This question has already attracted the attention of careful observers, and it has been computed that perhaps a hundred years will elapse before the present growth shall have been cleared off by the woodman's ax, even allowing the new growth to occur.

Bold writers assert a belief that the supply of fir in Washington Territory can never be exhausted. All past history proves to the contrary. Personal observation warrants the assertion that destruction of timber by fire has never been greater anywhere than in Washington, especially along the sound. It is simply fearful—criminal! It is admitted that with the natural peculiar reproductive characteristics of the fir region of this country, if forest fires can be guarded against successfully, generations to come will not live to see the supply exhausted. The new growth springing up spontaneously, where denuded by fire or ax, is wonderful, thicker, seemingly, than the original. But it must be remembered that from half to a whole century is required for this class of timber to reach size, and perhaps as many more years to ripen fit for use. Replanting or reproducing timber is estimated to be in proportion of one-thirty-fifth that of destruction. This may be considered applicable elsewhere.

The general government has done, and is doing all possible in way of enactments and special agents to protect in various ways the vast timber domain of the North Pacific slope.

Mere statutory provisions, either national or local, enacted to protect timber domain or encourage timber growing in naturally treeless or denuded regions, while good as far as they go, and regarded as moves in the right direction, are next to infinitesimal in themselves. Public opinion and interest must be awakened and educated up to a sustaining and enforcing point. This is the important desideratum. How, and in what manner this can be most speedily and successfully accomplished, is yet an open question.

To the observing student, facts have long since been made manifest, that the increased demand for and rapid consumption of the timber of the country, together with the wanton waste and useless destruction of it, is rushing us to the vortex of a timber famine. While most writers, even from a non-

producing standpoint, bring the famine date nearer to hand than facts warrant, it is sufficiently near to alarm most careful and reliable calculators.

The following leading factors in the timber trade of that portion of the Pacific slope were obtained from parties and sources considered reliable. Railroad ties, telegraph poles, fuel and other items for which timber is used, are not included.

CALIFORNIA.

Number feet sawed—

Lumber proper.....	629,435,000
Shingles.....	363,139,000
Shakes or staves ..	4,135,000
Laths.....	4,631,000

OREGON.

Number feet sawed—

Lumber proper.....	245,202,000
Shingles.....	10,520,000
Lath.....	25,371,000
Staves.....	2,125,000

WASHINGTON TERRITORY.

Number feet sawed—

Lumber proper.....	602,624,000
Shingles.....	20,830,000
Staves.....	45,434,000
Lath.....	55,326,000

Nine-tenths of the above, it may be safely said, is from what is familiarly known as the Puget's Sound district.

Comparatively little of this product at present finds its way to Eastern States. The Northern Pacific Railway, now completed, and others reaching to various points on the Pacific slope, afford a medium of exchange, and enables these great timber supplies to be more largely distributed than heretofore.

Extensive shipments of timber and lumber are made by sea to foreign countries. The largest sized vessels entering through the Strait Juan de Fuca can traverse all the Sound waters, at all stages, to within a few miles of Olympia, the southernmost point, and to her docks at high tide.

The President—The discussion of this paper, I think, had better be deferred until a report of a committee on this subject is made.

Mr. N. Ohmer, of Ohio, was then introduced and read his paper on raspberries.

RASPBERRY CULTURE.

BY N. OLMER, OF OHIO

GENTLEMEN OF THE CONVENTION: Having been solicited by the Secretary of this Association to read a paper before you on the Cultivation and Marketing of Raspberries, I, out of respect for the gentleman, and the desire to add my mite to make this meeting one of practical value, consented to do so, and now rise, not to tell you where the first raspberries came from, by what name they were called, nor what were their quality and commercial value, but propose to go directly into the merits of the case by giving you in a brief form

WHAT I KNOW ABOUT RASPBERRY GROWING.

Raspberries are attracting more attention at this particular time than ever before. Raspberries have always been appreciated more or less on account of filling in the place nicely between strawberries and blackberries. It is a fruit much admired by many, though never so popular as the strawberry. Up to within a few years there were but few varieties. The Red Antwerp, American, or common Black Cap, and Brinkles Orange, were popular as far back as I can recollect. As much improvement has been made in late years in the raspberry as in any other fruit, we are now not confined to three or four varieties, but varieties of distinguished merit can be counted by the dozens. I have grown the raspberry for market now twenty-six years, but never to the same extent as at present. I now plant largely of them because I find their culture profitable. Any of you can do as well if you have suitable soil, varieties, and understand the proper mode of culture.

THE CONDITION OF SUCCESS.

To grow raspberries successfully you must select good soil, well under-drained; let it be clay loam or sandy soil, but prefer upland clay loam. I have known them to do admirably in almost any soil, provided it is rich and not wet. Plow as you would for any other crop, the deeper the better if your soil admits of it. Harrow well; plow out furrows six or seven feet apart and plant in said rows three feet apart—a partial shade I find to advantage. My patches that do best are in an old orchard.

BLACK RASPBERRIES

Are usually planted shallow, an inch or two deep. If it is your intention to tie up your canes, that is deep enough, but if you wish them self-supporting you must plant them so that by after culture they will be at least three to four inches deep, otherwise they will not be self-supporting. By so planting and pinching back, as hereafter described, I never have trouble about my canes blowing or falling down by the weight of fruit.

The first year's growth I pinch back when eight to ten inches long. The second year, and every year thereafter, I pinch back the tips of the growing

shoots when from twenty inches to two feet high. They then cease to grow in height, but throw out laterals in all directions, balancing and supporting the main stem effectually. The following spring, early in the season, I cut back all laterals with hand-pruning shears, leaving them from one foot to two feet long, according to the number and strength of canes in the hill. This operation is quickly done and inexpensive. After pruning, I gather and carry out and burn all the debris between the rows. I then cultivate, first with a double shovel or bar-shear plow, then in time with a cultivator, as often as it is necessary to keep them clean, free from grass and weeds, up to August, after which I let them rest. It is not a good plan to cultivate too late in the season: you thereby cause them to grow too late to mature the wood sufficiently to withstand the cold of winter. I plow and cultivate them three to four inches deep. You need have no fear of injuring the roots by so cultivating.

RED RASPBERRIES.

I plant the same distance as black, three by six feet. This takes 2420 plants to the acre. I do not cut back the canes of red varieties (as I do the black) until the following spring, except strong growing varieties like the Turner, Conover, Colossal and others of like character. These I cut back during the season of growth, when about three feet high, otherwise they may grow to seven or eight feet, as I have seen them grow, necessitating the cutting away of too much wood in the spring. Treat suckers between the rows as you would weeds, unless you want plants: cut them out when young and tender. Sprouts, or suckers, are a great annoyance in growing red raspberries. If taken in time they need scarce any care. Red raspberries, to do their best, must be kept in hills, same as black. This can be done by cutting away with a sharp hoe all sprouts, when young, between the hills in the rows, allowing from four to eight canes to the hill. Many growers allow them to grow all along the rows, though not too thick.

OLD CANES.

There is a difference of opinion among raspberry growers as to the best time to cut away the old or bearing canes. I have tried both methods, namely, leaving the old canes remain all winter and cutting them in spring, or cutting them as soon as I can find time after fruiting, carrying out and burning them. I am satisfied, by adopting the latter method, I destroy many noxious insects, worms in various stages of life that would live over winter, were I to practice the other system. It is argued that the leaf of the old cane has much to do in the growth of the canes that are to bear fruit the following season. I take no stock in that opinion. If your plants are in good condition there will be leaf enough on the young canes to mature them without the assistance of the leaf of the old canes that have already performed their functions by maturing the crop of berries just gathered. Then, again, the old canes are certainly not ornamental. Having an eye for the beautiful as

well as the useful, I get rid of them as soon as I can after the fruit has been gathered.

TYING UP CANES.

For a long time I advocated and practiced the tying up of canes, first to stakes, then to an iron wire stretched along the rows fastened to posts every twenty-five to thirty feet. Either of the systems I found expensive and slow work. It did well enough when I had but an acre or two, and did not know any better. But when I had many acres I found it was not the thing to do, especially so when I learned that stakes and wire were of no use, I might say entirely unnecessary. I can not help but sympathize with those who are so far behind the times as to follow that system now. By adopting the pinching back process, at the proper time, I save the expense of stakes, or posts and wire, and the time necessary to tie the canes to them, and raise as many bushels of as nice berries per acre as I did when I followed the old system.

GATHERING BERRIES.

I have often been asked how I manage the many hands necessary to pick my berries to have the job well done, and to have them continue to the end. First, I live near a large city, Dayton, Ohio, (too near to save a large part of my apples and pears) and can get all the pickers I need, and my system is as follows: I use a stand with handle holding four quart baskets to pick into. Each picker is given a stand and a basket holder, which holds one quart basket. This holder is tied around the waist, enabling the women, girls and boys to use both hands in picking. Thus equipped, they are put two to a row, one on each side. I have a trusty man to be with them continually, his business is, first to see that they pick none but ripe fruit; second, that they pick all that are ripe; third, that they do not damage the berries nor canes; fourth, that they do not skip rows or parts of rows; fifth, that there is no wrestling in the patch. When the stand has four full quarts, they are brought out to where the packing is done, in the shade of one or more trees. Then give them a check for the full stand, and an empty stand filled with baskets to fill again, and so on till the day is over. I have large printed checks good for ten, twenty and thirty checks, which I give in exchange for smaller checks when desired. I pay no one money on account, or in full, until the last picking is over, except in case of sickness or other good cause. By adopting this method my hands continue their work until the last picking is over. When pay day comes all are made aware of it, all come, and when we are through with the last picking, all hands collect in the shade and are paid off in full, after which I give them a treat of cider, lemonade and cakes; all have a good time and go away more happy than many worth their millions.

PACKING AND MARKETING.

There is a very strong disposition about Cincinnati, and where I live, to stick to the old half bushel drawer (four drawers to the stand), for such ber-

ries as will stand shipping well: of course I comply with the wishes of those who buy my berries, *whilst I may not agree with them.* I therefore empty the berries from the quart baskets into which they were picked into the drawers, sixteen quarts to the drawer, put the drawers up in stands, and deliver them at the business places of the parties who buy the crop. Red raspberries are put up in pint baskets, and so shipped. Such varieties as Thwack, Brandywine and Cuthberts can be put in quart baskets, and will so carry to market in good condition. It has been my good luck since I am in the business to sell all my berries to responsible shippers at home—Dayton. They do the shipping, run all risks, furnish the stands, and charge me ten per cent. on sales. I do not retail, get satisfactory prices, and run no risks. One or two parties usually handle all my berries.

VARIETIES TO PLANT.

Of varieties I will say but little, except to advise those who desire to go into the business to make money to confine themselves to but few varieties; two or three each of black and red, early and late, are all that are necessary.

DISCUSSION ON RASPBERRIES.

President Earle—We have a very short time for the discussion of this subject. We must adjourn in time to attend to some important business.

Mr. Williams, of Kansas—I dissent from the paper in one particular—that in regard to cutting away old canes in the fall. I think some of us will learn better when we find they have held the snow during the cold weather and protected the new canes. Then we do not know in the fall how much wood to cut away. We can't tell the condition of the canes till spring. We may cut out too much or not enough. I am friendly to some of our noxious weeds for the protection they give.

Mr. Ohmer, of Ohio—I think the gentleman did not understand me. I am speaking of Dayton, not where you have snow three or four feet high. Then we leave canes according to their strength, etc. I have tried both systems.

Mr. Hopkins, of Missouri—The gentleman's plan of paying pickers at the end of the season, will not work here. They want their money. I pay every day. As berries get scarce I raise the wages.

Col. N. J. Colman, of Missouri—What do you mean by pinching in?

Mr. Ohmer—Cut the canes while young and tender with the fingers, by pinching, or with a sharp knife.

Col. Colman—Why could you not use a corn knife?

Mr. Ohmer—It will not do, you can not get at them so well. It will not hurt your back to pinch them off. With my plan you can pinch almost as fast as you can walk. The canes are not all ready to be cut off at the same time.

Mr. Pierce, of Minnesota—My plan is to go along with a pruning knife. In a few days I go over them again and so on for some time.

Mr. Hale, of Connecticut—By pinching we can use both hands and get along twice as fast. I want to endorse all of Mr. Ohmer's paper except about cutting out old canes in the fall. We consider them of great advantage. Two years ago we had quite a good crop by the snow being held in by old canes.

Mr. Ohmer—I never was troubled by canes breaking down, but I think there is more wind in Connecticut. [Laughter].

Mr. Pierce, of Minnesota—I do not cut out old canes in the fall. I have had some trouble with the red raspberry. I do not cut them back at all. I did cut them back, but found that the fruit set below the new growth and smothered out. I have doubled the crop in quality and quantity by not trimming.

Mr. Hopkins—We think black raspberries are injured more by the hot sun than by the winters.

Mr. Holsinger, of Kansas—Why do you take canes out at all? Last year I did not remove any. Our crop was as good as usual.

Mr. Patterson, of Missouri—I am glad to have my slovenly way indorsed. I have never removed old canes and I have had good results. Another point as to how deep we should plant. If I hill up apple trees when I lay them by the latter part of July, I find roots will be thrown out above the former level of the ground. They make roots where they want them and I can't force them to do otherwise.

Mr. Cadwallader, of Kansas—I should be sorry for friends to go home thinking that we have two or three feet of snow. But I rose

to say that I think raspberries are hurt more by the hot sun. They need shade.

Col. N. J. Colman—I expected to have heard something in reference to raspberry blight. A few years ago we had hundreds of acres which were abandoned on account of blight. I hoped we would hear more from practical growers on this subject. It may be that other places have not suffered so much as where they plant so largely.

Prof. Burrill, of Illinois—We have had abundance of blight, but not so much for the last year or so. I think the real agent at work, where it is thought that the hot sun does it, is a kind of fungus. The only hope for it that I can see is to protect the canes from dew and rain, as the fungus will not spread if the canes are kept dry. All that is to be done to see how the fungus will spread is to take from a white spot on a cane, a little of the material and put it on a healthy place. If plants are in a row, pretty thick, and are pinched back, this will be prevented to some extent.

Oliver Gibbs, Jr., of Minnesota—In inoculating, do you make an incision?

Prof. Burrill—No, sir.

Mr. Pierce—Why does it affect certain plants?

Prof. Burrill—Some plants are more susceptible to certain diseases than others, just as in the case of different individuals. I have heard it said that a dog will bite some people and not others.

Mr. Peffer, of Wisconsin—I found blight on raspberries to be caused by a sort of fungus. It appeared first on Davidson's Thornless, next on Doolittle, and last on Mammoth Cluster. I have not seen it on the Gregg. I have seen it on blackberries. I do not know why there is this difference unless some bark is heavier than others.

The President—Is there a remedy?

Prof. Burrill—None that I know of.

President Earle—I think, after making some announcements, it will be best to adjourn to attend to some other business, and it will give the people a chance to become members of the Society. Any one becoming a member for the present year is offered the last year's proceedings for one dollar additional.

Oliver Gibbs, Jr., Secretary of the Minnesota Society, made the following offer: He said that to any old member renewing and to all new members paying the additional dollar for the last year's proceedings, he would give a copy of the Minnesota Society's proceedings.

On motion the Society adjourned to meet at two P. M.

Second Day—Wednesday.

AFTERNOON SESSION.

The Society reconvened at 2 o'clock P. M., President Earle in the chair.

S. Johnson, of Indiana, moved that a committee on nominations, consisting of one from each State represented, be appointed to report a list of officers for the ensuing year. Col. N. J. Colman, of Missouri, moved to amend the motion that each State's delegates select a committeeman, which motion, as amended was adopted.

The President—Ladies and gentlemen, we are here in this great city the invited guests of the generous horticulturists of this section. They have already welcomed us heartily, but they will now do so formally through Col. Twitchell.

ADDRESS OF WELCOME BY COL. D. S. TWITCHELL, OF KANSAS CITY.

Mr. President, Ladies and Gentlemen: The event which has called together this body of ladies and gentlemen, representing horticulture and cognate interests, from sixteen states constitutes an event of no ordinary interest. I feel, in common with every citizen here, peculiarly honored. Of the many associations which have met in this city, I remember none which can have a better influence than this. In this particular locality and climate, where everything grows with wonderful facility, there can be no one but will rejoice in the proceedings of such a meeting. Then, to you, delegates and members from the people of this city and surrounding country. I give a hearty welcome. No one can tell the extent of the work mapped out before you. Not a single thought will be represented nor a paper read but will be eagerly digested. I know you all feel that we do not come here merely in a formal way, but if the people of the city knew you personally, they would do all in their power to make you enjoy yourselves. It would be out of my place, not

representing nor being acquainted with horticulture to any great extent, to attempt to speak at length on this subject.

When I read the account of your proceedings yesterday, I noticed a letter stating that the writer could only be prevented from being present by his four-score and five years. I was deeply impressed by the reading of that touching letter. What may we not expect will be the influence on the youth? Horticulture not only affects the homes of the living, but it has its touching influences in the homes of the dead. Mr. President, and gentlemen delegates, bear in mind, I speak this welcome in behalf of Kansas City and the State Society.

To which President Earle responded briefly as follows: "I will only say that this entire society receives the welcome in the same spirit in which it is extended. I will not say more, as I will now read my address, which will take your attention for some time. It was deferred yesterday because so many were still on the road."

ANNUAL ADDRESS.

Ladies and Gentlemen—Members of the Mississippi Valley Horticultural Society:

I am most happy to greet you at this fifth meeting of our Society. Four times before this have we convened in the four greatest cities of this great valley—in St. Louis, in Cincinnati, in Chicago, and in New Orleans. And now we salute each other on the banks of the noble Missouri; where but a generation since was the border-land of civilization; where now stands this most wonderful young city of the world.

Last winter we were received with enthusiastic hospitality on the borders of the gulf of Mexico in the commercial metropolis of the South, and held a memorable meeting in that quaint and beautiful city. To-day, we assemble a thousand miles distant from that city of orange orchards and winter gardens, and yet a thousand miles this side the limits of our Society's territory, to meet this heartiest of welcomes from the citizens and horticulturists of the robust and energetic metropolis of the plains.

These simple facts will suggest to you, my friends, something of the grandeur of the field which our organization has for its labors, and within which we hope to contribute something toward making the world more beautiful, and for the elevation of mankind. And throughout all this imperial territory, which stretches from the Rockies to the Alleghanies, from the frozen zone to the tropical gulf, men are working as men never have worked before during all the ages of human history, to change the face of nature; to develop the wonderful resources of soil and mine, and to upbuild the great structures of a restless and an ambitious civilization. They are destroying the forests and planting the plains, and in a thousand ways are revolutionizing the conditions and the problems of human society.

THE RANGE OF SUBJECTS

Which properly come before a horticultural society is a very wide one. Everything which relates to the garden, the orchard, and the forest comes within our view. All of the arts of embellishment which apply to the home, the park, or the roadside should get encouragement from us. All private lawns, all public grounds, all school-house yards, all cottage windows, should be the more beautiful for the existence of horticultural societies in a country. Horticulturists have given no more important service to society than in what they have done to beautify the homes, and thus to sweeten the lives of the people. Regarding the usefulness of this work, there is no controversy or lack of belief. But there is no branch of horticulture, the principles, the laws, the difficulties, and the possibilities of which are so well settled. There is little room left for discussion; there is plenty for exhortation. But the daily life, and practice, and teaching of every horticulturist is a perpetual exhortation to his neighbors. It is fortunate that the arts of rural beauty win their own way easily with people in both town and country. These sweet influences of trees, and grass, and flowers make their own appeal to almost every nature. This is shown in the surprising expansion of the business of our florists in all communities where life is settled into quiet channels.

But, when we come to consider those branches of our subject in which most of us who establish and maintain horticultural societies, are immediately interested in a business way—the propagation of trees and plants, practical fruit growing, with its questions of handling and marketing, and the planting and maintenance of forests, we enter a field full of diverse opinions, full of unanswered questions, of disputed theories, of unsettled methods. It is to bring harmony, so far as may be, out of this chaos of conflicting views, and to shed as much light as we can borrow from scientific research upon the darkness and ignorance which invest so many of these things, that the main labor of horticultural societies must tend. A few suggestions of a practical nature relating to this subject will fulfill for me the duty of this hour.

THE BUSINESS OF HORTICULTURE,

Aside from the refining, educational influences of it, produces annual value, within the Mississippi Valley, amounting to, perhaps, \$100,000,000. The commercial importance of fruit-growing and gardening and the other horticultural industries, has generally been much under estimated. In a certain county of Illinois the wheat crop, which was the important staple, failed the past season. To help meet expenses, the farmer gave especial attention to drying their surplus fruit. The result was, as shown from the books of the merchants and bankers of the county, that the total income from dried apples was greater than the ordinary proceeds of the wheat crop. The statement was received with astonishment, for this is not a country where orcharding had received much attention; but the fact is an interesting illustration of

the wealth of our horticultural resources, which are often very poorly utilized. There are many districts where the money received from the orchards and gardens exceeds the profits from all other branches of agriculture.

The business aspects of horticulture are worthy of very serious attention, and the societies and the newspapers, which work to promote these really immense and rapidly expanding interests, should receive all necessary recognition and support. It is a leading purpose of this Society to introduce better methods in this business in various directions. We want better management in field and orchard; better and more certain crops; better facilities for transportation; wider markets. And we want to promote a greater sympathy and spirit of co-operation between all the various sections competing in these enterprises, and between the different agencies necessary to make this business a commercial and financial success. We, who grow fruit, should cheerfully recognize the fact that there are other men who are as essential factors to the successful issue of our business as the producers themselves. Can the grower of peaches or strawberries in Mississippi or Michigan, in California or Delaware, make it a profitable enterprise without the facilities furnished by railroad companies, and without the indispensable agency of the fruit merchant or commission dealer? You will all agree with me that without these three factors of production, transportation, and sale, there could be no such thing as commercial fruit growing, as we understand it.

A topic quite worthy of our thought is that of our relations to that factor in this business enterprise, the agency of

THE COMMISSION MERCHANT.

There has been some wild and foolish talk in certain rural circles about that "superfluous being" in this world, "the middle man." I think that this talk has never done any good. I am sure it has done much harm. Now it is simply absurd to suppose that great crops of any kind, horticultural or cereal, can be marketed, as great crops must be, hundreds and thousands of miles away from the place of their production, without the help of the middle man. Strike down the agency of the commission merchant, and we should have no grand system of commercial fruit growing. Looking at this question as I do in this light, I have sought to bring these two classes in this one interest together in this Society, that a better acquaintance, a clearer understanding, a stronger sympathy, and a fuller confidence might be engendered between us. It has been common to hear, in certain fruit growing circles, serious charges made against the faithfulness and the honesty of commission men as a class. I think this is very impolitic and very unjust. There doubtless are rascals in this trade, as in all others, but this should not lead us to reflect unfairly upon a very large, useful and honest class of merchants. You will excuse my saying that I have had something to do with commission fruit merchants for nearly a quarter of a century, having done business with over one hundred and fifty of them in some eighty cities of twenty states and provinces, without ever having consciously been cheated out of a dollar

in all that acquaintance; and I cheerfully express my belief that there is not a more faithful, energetic and honorable guild of business men in this country. I am glad to welcome so many of these essential friends of the fruit grower in our meeting to-day. They are as much interested as we are in all that pertains to this gigantic business which we are all engaged in building up. I desire that they shall feel fully identified with the interests of this society, as with all schemes which tends to the healthful development of so grand an institution as American horticulture.

THE IMPORTANT QUESTIONS OF FRUIT PACKAGES AND PACKING AND OF THE
BEST METHODS OF TRANSPORTATION

Will be brought up before us by able papers to be presented, but I will suggest a preliminary thought. It is my belief that fully half the market value of our products is determined by the treatment they receive after they leave the tree or vine. Indeed, I have sometimes known good packing alone to double the market price of consignments. In regard to packages I desire to urge the importance of our securing uniformity in the size and in style or proportion of our packages. The terms "a quart of strawberries," a "basket of peaches," or a "barrel of apples," should convey to the mind of the purchaser a definite idea of a certain precise measure of these commodities. And in berry packages especially there would be an advantage in having the boxes from the different manufacturers all made with the same proportions. The Michigan quart box, for instance, is much deeper than the box used in the Southwest, and with a less surface area holds no more, does not look as large, does not show the fruit as well, and does not carry it as well. But with oblong quarts, square quarts, octagon quarts, deep quarts and shallow quarts, saying nothing about the numerous styles of baskets in use in some sections, the minds of purchasers are in some confusion as to which of all these boxes holds the "honest quart" which their hearts yearn for. The common conclusion is that the various styles are so many attempts to get boxes that will hold a less amount of berries than they pay for. There is no advantage in all this. There is a best style of box—one having the proper proportion between length, breadth and depth to carry the berries best and show them best, and this style should be adopted by us all, and, I think, this Society should record its opinion on this subject and use all of its influence for uniformity. That marketing system under which the packages are returned to the grower should continue to receive the condemnation of this Society. There is nothing but evil results and poor economy attending this system. When I say that the same fruit will bring enough, more in most or all markets, in new clean packages to pay for the packages, I need not add other arguments, and yet many other reasons might be given against the return system. The system grew up in pioneer times, when the materials for fruit packages were more costly and difficult to secure in large quantity than they now are. There is no longer any good excuse for its continuance.

As most of our fruits now go to market in railway cars, it becomes a matter of great consequence

WHAT KIND OF CARS WE HAVE TO USE.

The amount of horticultural freight has now become so large that railway companies should be induced to build cars specially adapted to carry this valuable produce in the best manner. I know that certain companies have shown a willingness to do this. But the question of what constitutes a good, or the best fruit car, has never been settled. If we could do something as a Society to determine this question it would be a help to growers in making their claims upon railroad companies for better cars. Fruits of a delicate and perishable character are shipped yearly in great quantity and with entire success from California across the continent. It will be well for us to inquire into the precise means which have made this possible. The tides of our fruit commerce in this valley flow northward and southward rather than along lines of latitude; and our markets should in many cases, and for large quantities, be found a thousand miles or more away from the place of production. As this transportation along north and south lines involves rapid changes of climate, it becomes of the utmost importance that appliances for this traffic should be of the best possible character. That rapid transit should be afforded by the important through lines, and that beyond and outside of the facilities offered on passenger trains, would seem essential to the profitable expansion of this business to meet the growing demands of our markets.

But when we have arranged all these matters of markets and packages, of handling and transportation in a satisfactory way according to the best business principles, shall we not soon find ourselves lacking in the

QUALITY OF THE PRODUCTS WE HAVE TO OFFER TO THE CONSUMERS?

I fear that our most serious difficulty as fruit growers will be found right here. We have, perhaps, plenty of varieties, and those that are good enough for our markets, when we can get them; but the difficulty of securing good and regular crops becomes more and more apparent as time goes on. In the process of horticultural development, our accomplishments in the production of the utmost variety of fruits, with size and form and color and flavor to please every eye and every taste at all seasons, has far outstripped our ability to protect them from the vicissitudes of extreme climates, and from the insects and diseases which attack them in all climates. We enter here a domain of too much ignorance.

SCIENTIFIC AID SOLICITED.

The peach grower of Michigan knows varieties as delicious and tempting as the apples in the garden of Eden, and he knows how to grow them and market them, and to make great profit thereby; but he finds himself defeated by the rapid spread of an obscure disease that has attacked his costly and valuable property. He can not, with his present knowledge, combat

the dreaded "yellows," except by the destruction of the property itself. The man has no choice but surrender. For this serious trouble we must wait for scientific research to give us a remedy. The strawberry grower of Southern Illinois, having overcome all the common enemies to his crop, and carried it forward to within a week or two of profitable harvest, suddenly finds his promising acres in complete possession of myriads of a destructive little insect too insignificant to have attracted his attention. The strawberry grower is powerless before these trifling bugs: his crop is taken and he has plenty of time to consider how little he is master of his own field. The pear grower in any and all of these states knows varieties for all tastes and seasons, and as fascinating as the cheek of beauty; and golden profits beckon him to plant and prune and cultivate and wait, until within the very portals of success, he sees that mysterious and irresistible pestilence we call "blight" sweeping like a demon of destroying vengeance through the beautiful orchard, and the pear grower is as powerless as the other unfortunates when he meets his enemy.

But the world is hungry for peaches, and for strawberries, and for pears, and we must grow them and we shall grow them to meet this want. These difficulties must be surmounted or avoided.

The great fruit crop of this country and of the world is the apple. It can be grown almost everywhere. It is the fruit of the palace and of the cottage. Everybody wants apples. A general destruction of apples would be a world's misfortune. And yet a single enemy destroys annually three-fourths or more of the apples produced. These millions of bushels of blessed God given apples, which should make millions of children happy and healthy; which should load every table on the continent with beautiful, fragrant food; this fruit of Paradise; this fruit of all civilized peoples, is given over to the riot and destruction of loathsome worms! But here is an evil that we understand. Here is an enemy whose ways are known. We know how to destroy the apple moth; but most of us neglect to do it. Here is occasion for the most zealous missionary work of horticultural societies. We have first to convert our own members, and then to save the rest of the apple growers. With the means for the almost total extirpation of this evil within reach of every orchardist, I do hope that the wasteful and sinful neglect which has characterized our apple management will not long continue.

I alluded to that disease of peach trees which battles the peach grower wherever it prevails. Luckily it does not afflict all sections of our country; and there are large districts of peach growing territory where nothing hinders the growing of good peach crops except that

SUPREME LAZINESS OF MEN,

Which permits the almost universal destruction of these crops by that omnipresent foe, the alert and versatile curculio. There is a district in this valley as large as the German empire, where the climate and the soil are congenial to peach trees, where no "yellows" ever invade, where crops could be had

half of the years, where these crops would bring greater profits than any other line of horticultural production, and yet the peach orchards of this region are declining in amount year by year, for the simple and only reason that their owners don't like to catch "bugs." Peaches are worth \$4 or \$5 a bushel in the market, and careful accounts of the labor of thorough curculio protection show that it costs but about seven cents a bushel for the crop saved and marketed; and yet the majority of our peach orchard owners fold their arms in dignity and say that if they "can't grow peaches without killing bugs they won't have peaches"—and they don't. True, they send to market some small per cent. of a crop of half ripened, gummy, wormy, rotting peaches, and receive back more curses than dollars therefor. But such a thing as a full sized crop of sound, red faced, melting, delicious, wealth-bringing, beautiful peaches, these men have never beheld; and they will not, until somebody can persuade them of a fair margin of profit in the transaction of bug killing on the basis of the figures I have given. It is a painful fact that peach growing throughout most of this favored region is but a sad mockery of a noble and lucrative avocation.

The apple moth and the curculio are the two most destructive enemies that infest the orchard. They are found everywhere in this valley where fruit trees are grown. They seem to have been sent us from Providence to test the worthiness of men to have fruit. They are both perfectly, or sufficiently, under the control of good orchard management; and yet they are allowed to lay waste the rich inheritance around us, and to threaten the extinction of the most beautiful products of the land. Nothing will arouse the majority of our orchardists from their slothful attitude to these evils but the brilliant and profitable success of the few among them who can see this question in its proper light, and who have the energy to combat these difficulties single handed and alone.

There are no more destructive agencies in the orchard than the two insects I have alluded to; but there are other hindrances to success far more difficult to deal with. The many forms of parasitic fungi which attack our trees, vines, plants and fruits, are the most serious of these. When we enter the wide realm of the blights, the rusts, the mildews and the rots, we are in a strange and obscure world whose laws and causes and effects few of us well understand, but whose varied power over our property we are made painfully aware of. That stealthy fungus described by Prof. Burrill, in our last volume, under the title of

"AN ORCHARD SCOURGE,"

is quietly establishing itself in the orchards over great areas of country. And, wherever it gains a foothold, it seems, like original sin, to have "come to stay." I can not but believe that the researches of our scientific investigators will open to us some deliverance from this vegetable pestilence. If not, the outlook for apple and pear growing is gloomy enough for many sections. Certain it is, that with grape rots and mildews so infesting the vineyards of

the best adapted grape lands of this country, that sound grapes are an exotic luxury upon most tables; with the numberless fungi and corrupting forces which are continually attacking the plants and the crops which we grow, there is need of a great awakening among us of a spirit of investigation, and the energetic use of remedies, until we find out how to make and take the necessary measures to make our fruits in reality what they purport to be, something delicious to the eye and delightful to the mouth, instead of repulsive travesties, worm eaten, scabbed and deformed.

But whatever success may attend our efforts to conquer the insects and the parasitic diseases which are overwhelming us, there is one great unchangeable law governing vegetable growth, the law which sets

CLIMATIC LIMITS TO ALL GROWING THINGS.

The earlier experiments in Western horticulture seems to have been made in serene forgetfulness of this primary principle. It has taken some costly experience to convince us that the Baldwin is not a good winter apple in the latitude of 37, or that the Rhode Island Greening is not quite reliable as a market fruit in Iowa and Minnesota. The sharp discipline of many hard winters has taught our orchardists to search for varieties which can bear the severest climates. It is, in fact, not reasonable to suppose that a class of fruits which flourish in the moist and moderate climate of the seaboard States should succeed in the interior of the continent, where all climatic conditions are different and more trying. To the few men who have been working for years to produce and to introduce new kinds with a special adaptation to these extreme conditions, the deepest gratitude of the public is certainly due. I look with the greatest satisfaction and anticipation upon the labors of Prof. Budd, of Iowa, in this most important field. I have no doubt of the correctness of his belief that we must have for this great interior plain of the continent entirely different races of fruits from those succeeding nearer the sea.

THAT MOST INTERESTING POMOLOGICAL JOURNEY

Of Prof. Budd and Mr. Charles Gibb, of Quebec, through the northeastern portions of Europe, and their researches among the orchards of that ancient and remarkable fruit growing region, seem to throw a new light upon this important problem. I fear that most of us were so ignorant as not to know that one of the most remarkable "fruit belts" on the face of the globe lies between the parallels of 50 and 56 in Eastern Russia; and that large and reliable crops of apples, pears, cherries and other fruits are annually harvested where the mercury occasionally goes down to 50° or 55° below zero. And that their varieties are so far from degenerating in that region that the same kinds are known to have been in cultivation in the same neighborhoods for several hundred years. If this can be done in a latitude and with a climate corresponding to that about the shores of Hudson's Bay: if scores and hundreds of large orchards give annual crops surpassing our best orchard yields

in quantity, and with table qualities and beauty of appearance of the highest character on the cold and dry plains of frigid Russia, then who shall place a limit upon the pomological harvests to be gathered throughout our vast northwestern domain when once it has been planted with the proper races of fruits? I certainly feel that to the men whose genius shall make successful orcharding possible over these immense plains, will belong not only generous earthly rewards, but the nobler harvests of imperishable honors.

At our last meeting I called your attention to the subject of the

TARIFF ON FOREIGN FRUITS.

A movement for the abolition of which was inaugurated by this Society at its Chicago meeting. I am glad to be able to report to you that Congress at its last session, among its other revenue changes, adopted the policy suggested by our Society, and abolished the duty on all fruits except those of a semi-tropical character. I think we may congratulate ourselves and the fruit commerce of the country upon this easy deliverance from a burdensome and useless tax. We have relieved the fruit importing trade with the British provinces of a harrassing and costly burden. Very few changes in the national laws affecting a large interest have been effected by so small an expenditure of effort.

You are aware that this Society was organized at St. Louis, in September, 1880, in connection with and upon the occasion of holding a great and useful exhibition of fruits. There was many among us who felt then, and feel now, that properly classified fruit exhibitions are not only extremely valuable to the pomologist, but an important educator of the public taste. It was the purpose of this Society then to continue to hold such exhibitions as suitable opportunities should occur; but for one reason and another a proper occasion has never, until now, been found. The holding of such exhibitions as this Society should make, if it undertakes the matter at all, necessarily costs several thousand dollars. We had no money as a Society to risk in such a venture, and we have not been able to believe that such a show made independently of other attractions would pay its cost. We have had negotiations with several fair associations and expositions, but have not found among them a sufficient appreciation of the value of such an exhibition as we felt able to make. But during the past autumn application was made to me by the board of managers of the

WORLD'S INDUSTRIAL EXPOSITION,

To be held in New Orleans next winter, to arrange on the part of this Society for the holding of a winter horticultural exhibition on a large scale. I corresponded with members of our executive committee, and received their authority to make definite arrangements with the exposition management. It being inexpedient to postpone the making of plans until after the holding of this meeting, I have closed a definite negotiation with those gentlemen for the holding of a fruit exhibition under their auspices, but under our

management, which will, if properly supported by the horticulturists of this country, far surpass all previous shows of the kind.

We aim at nothing less than a complete exposition of the pomological resources of the world. We wish to place side by side for comparison the same varieties of apples, of pears, of grapes, and of oranges, grown in the old countries and in the new: and to bring together from all the nations, that marvelous range of classes and species and kinds of fruit which have survived the trial of ages, and which feed and gladden the different peoples of the globe. This is an ambitious scheme, truly, but the means have been placed at our command to accomplish it in a good measure, if the fruit growers of this and other countries will give us their support. I think the simple statement I make is a sufficient appeal to all of our members to give us help in every possible way. If we succeed in this grand enterprise, we shall not only bring a great honor to our noble Society, but do an important work for the pomology of this country and the world.

Most pomologists have long appreciated the extreme ill taste and absurdity of so many of our fruit names. So far as it is practicable without creating confusion,

OUR NOMENCLATURE SHOULD BE SIMPLIFIED.

Many of the established names can be reduced without any loss of significance: others can not. But in all future naming we should rigidly discountenance complex, meaningless, or vulgar designations. Another careless feature in nomenclature will be fully illustrated by my calling your attention to two of our most promising new strawberries. The *Mrs. Garfield* is a staminate plant, while the *Daniel Boone* is a pistillate plant. What a happy improvement it would be if the names of these and all other varieties which bear the names of persons should correctly suggest the sex of the variety. I commend to your attention the propositions for reform in this matter which were so ably presented by President Wilder in his late address to the American Pomological Society, a copy of which is herewith submitted.

There is one other branch of horticulture which is fully recognized as within the scope of our work, and which no horticultural body should ever pass by without thoughtful consideration. I refer to the

GREAT AND PRESSING QUESTION OF FORESTRY.

There is no subject which ever comes before us of so great importance as this. There is no question of an economic character which ever comes up in State legislatures or in the national congress which equals this in its bearings upon the future comfort and wealth of this nation. The deforestation of our woodland States has gone forward, and still goes on with alarming haste and recklessness. Not faster could men work destruction to our glorious forests if God's command had been to lay bare the earth for its punishment. The majestic pine forests, which nature has been centuries in growing, perish in a year before the remorseless lumberman, who skims the cream

of the timber, and leaves the young growth to be consumed by the fires which his refuse makes possible and resistless. A generation since who could have predicted the present scarcity of white pine in some of the best timber districts? The white pine belt of this country is already nearly exhausted; and, vast as are the forests of yellow pine in the South, another score of years of such destruction as we have witnessed will see little left of all this seemingly boundless wealth of timber. You know what changes of climate this entails. You know that it brings long periods of drought following devastating floods. The numberless mill streams—sources of mechanical power and a diversified industry in all the older States; and the thousands of babbling brooks which ran all summer in woodland and pasture in the days of our boyhood, are now as dry and lonely in the midsummer season as the parched canyons of desolate Arabia. We are but repeating the history of other lands. There are whole provinces and kingdoms in the Eastern world which God made fertile, and which man has made a desert by doing just the things which the American people are doing to-day.

The past year has given, both in our country and in Europe, the most forcible illustrations of the results of too great a destruction of forests. The unprecedented floods which have poured down our valleys, interrupting the commerce and threatening the existence of many cities and towns, tells the story of how little protection we have left us in these natural conservators of the rain—the beautiful forest garments of the hills. In Northern Italy, where the southern slopes of the Alps have been stripped of their protecting forests, the plains are yearly devastated by the floods. Every mountain brook is alternately a dry channel and a torrent. The hill sides are gullied and ruined for culture. The waste of the hills fills up the beds of the rivers, and a deposit of stones and mud and gravel is made over miles of gardens and farms. Every succeeding freshet washes the soil of the hills thinner, and relegates a certain portion to permanent sterility; as no agriculture can re-establish itself upon the naked rocks. How long this process of degradation will go on, or whether it is now beyond the possibility of arrest by human energy and skill, I can not say. But it will take generations of effort to reclothe the Alps with such protection as the primeval woods gave them, and which on all mountain sides should be permanently maintained.

With this impressive lesson of a wasting country in Italy before us, with the knowledge of the impoverishment of many other portions of Europe; with “the white bones of the hills of Palestine now glittering in the hot sun where the slopes were once clothed with olive groves and vineyards,” it would seem that we might take measures in time to save the Adirondacks, the Alleghanies, the Rocky mountains and our numberless and nameless mountains and hills from that certain and destructive waste which will follow the general removal of their forests. There is no question that all of the public domain now covered with trees should be maintained in permanent forest. Congress should take immediate measures to this end, and the protection laws be rigidly enforced. And much as may be done and can be

done by private parties in planting new forests, there is grave reason to doubt whether anything short of government forest planting will ever secure a sufficient area of sylvan growth to insure a proper supply of timber for our future needs, and for the preservation of that fertility of the land without which no great civilization can be permanent.

We may wisely go to Russia and other nations of Europe

TO TAKE LESSONS IN FORESTRY.

When we learn that Russia has nearly 800 forestry stations, as Prof. Budd has told us, each of these stations being under the management of an educated forester; that the 12,000 and over of separate artificial forests under their control embrace large areas, some of them reaching 20,000 acres each; that the government is constantly planting new forests, and that, too, in regions where they have but six inches of annual rainfall, we may well admire the wisdom of this grand national economy, this magnificent, forecasting practical statesmanship. May we hope that we may, before it is too late, inaugurate some similar system for our own country? The inventions of the time may enable us to dispense with the use of timber for fences, for railway sleepers, for house building, and for many mechanical purposes for which it is now deemed essential; but no invention of man will ever provide a substitute for God's own garniture of the mountains and the hills with its great conservative power over the climates of the world and the destiny of mankind.

And now, in closing, it becomes my painful duty to remind you that since our last meeting we, as a society, and the whole horticultural world, have met with

AN IRREPARABLE LOSS.

The greatest name has been stricken from the roll of our living members. Dr. John A. Warder, of Ohio, has been called from his noble labors on earth to the higher ministries of the immortal life. No man could have been taken from us whose presence would have been so much missed in so many horticultural bodies in this country. He was one of the founders of our Society, and was always a member and an officer. One of the last communications he ever made to the public was his letter to our New Orleans meeting, written from his beautiful home on the bluffs of the Ohio, where he was beleaguered by the great inundation.

Dr. Warder was one of the noblest and kindest of men. Every person who ever knew him was his friend. He was forever doing some thoughtful, helpful act. I can but allude to the many sided usefulness of his life. He was interested in every work for human good. He was, perhaps, the most useful man connected with American horticulture. There was no department of it in which he did not have great learning and in which he was not a teacher. We shall all miss that genial face, that hearty greeting, that kindly voice, with its perpetual suggestions of wisdom. His loss to us can not be made good. We can only say to this noble, great hearted, wise friend who

has passed onward to those immortal uplands whose orchards fail not in flower or fruit, and whose forests wear eternal verdure—farewell and farewell!

At the close of the reading, the President very gracefully acknowledged the presence on his table of three very handsome baskets of flowers, presented by Mr. and Mrs. Basley, of Kansas City.

Ex-Gov. Furnas, of Nebraska—Mr. President, that many things in your address may be brought before us in a proper manner, I move that six different committees of five each be appointed; that is, on (1), Fruit Packages, (2), Transportation; (3), Nomenclature; (4), Forestry; (5), Exhibition at New Orleans; (6), Dr. Warder.

This was amended so that the Committee on Dr. Warder should include one from each State represented. The following were appointed on said committee :

Committee on Memorial.—Ex-Governor Morton, of Nebraska; Sylvester Johnson, of Indiana; N. Ohmer, of Ohio; J. H. Hale, of Connecticut; Oliver Gibbs, of Minnesota; Prof. Burrill, of Illinois; George Y. Johnson, of Kansas; A. D. Webb, of Kentucky; Governor Colman, of Missouri; George P. Peffer, of Wisconsin; George H. Wright, of Iowa; S. H. Nowlin, of Arkansas; T. V. Munson, of Texas; D. S. Grimes, of Colorado; E. Ashley Smith, of New York; Giles C. Burnham of Michigan.

Mr. Ohmer, of Ohio—You who knew Dr. Warder, must have known he was a gentleman of extreme modesty. I have tried to get pictures of the prominent horticulturists. I never succeeded in getting his till I got a wood cut since his death. I have several printed from it, which I will hand around to those who desire them.

The Secretary—The eagerness with which this audience has accepted the kind offer of Mr. Ohmer suggests what I want to say. That is in regard to securing a likeness of Dr. Warder for our report. I have about succeeded in doing this. This will add greatly to the value of our Transactions, especially to those of us who knew and esteemed the original, and what horticulturist is there that did not?

Ex-Gov. N. J. Colman, of Missouri—Fearing that the kind, generous act of Mr. Ohmer may be forgotten in the resolutions, I move a vote of thanks to him.

Prof. Burrill, of Illinois—It seems to me the President's Address has been too comprehensive to pass without some more mention. I will not take anything from the Committee on Resolutions, but I move a hearty vote of thanks for this Address.

Which was unanimously adopted.

Mr. Wright, of Iowa—For the committee on the Reports of the Secretary and Treasurer, made the following report :

The undersigned, Committee on Ways and Means, to whom was referred the reports of the Secretary and Treasurer, beg to say that we have carefully examined said reports and the vouchers attached, and find them correct, and move their adoption by the Society.

GEO. H. WRIGHT.
JOHN BUCK.
T. V. MUNSON.

Which report was adopted.

REPORT OF COMMITTEE OF WAYS AND MEANS.

The Committee of Ways and Means made the following additional report, which, after the discussion following, was adopted, and the necessary funds provided by voluntary contributions.

Your committee, to whom was referred the question of ways and means, is of opinion that, under existing circumstances, the only feasible mode of providing compensation justly due the Secretary of this Association for his valuable services, is by voluntary contributions on the part of members, friends, and State organizations existing within its jurisdiction :

Therefore, we recommend for adoption such plan.

GEO. H. WRIGHT,
Chairman Committee.

DISCUSSION ON THE REPORT.

The President—Our Secretary has rendered us faithful service. We must not ask a man who can ill afford it to do such work for nothing. The proposition is that we go down into our pockets and pay him.

Mr. Wright—I learn that the Secretary, in addition to his labors, has paid out several dollars for the Society. I speak of it because he is too modest. This manifests his interest in the work.

Ex-Governor Furnas, of Nebraska, called on Mr. Barnard to speak for their State Society.

Mr. Barnard, of Nebraska—This is my first meeting with this Society. In behalf of the Nebraska Society I will give \$25.

The Missouri Society also gave \$25.

Col. N. J. Colman, of Missouri—There are many horticulturists who have many friends. Could they not take some of these reports and dispose of them and thus raise money?

The Secretary—Governor Colman has said the right thing. I do not want any one to make a contribution for my benefit. If we will all do as he suggests, the Secretary will be provided for. I want it to come from this source. I need a salary, but I want no one to go into his pockets and pay me. This Society is on foot now, and I think my salary will be provided for.

The President—We owe a debt, and it will go to protest if we pass it by now.

Mr. Williams, of Indiana—It happened to be my pleasure to be on the committee at New Orleans to devise ways and means to pay the Secretary. I think Mr. Colman has said the right thing about it. We should circulate our reports.

Mr. Wright—I think our debt is past due and we must get rid of it. I move the adoption of the report.

Mr. Johnson, of Kansas—I move that this committee take contributions for this purpose, whether by sale of books or otherwise, and extinguish this debt.

Maj. J. C. Evans, of Missouri—I think we should pay this debt now.

Mr. Johnson, of Indiana—Mr. President, you announced that this was a debt. Indiana wants to pay her debts. You may put Indiana Society down for \$25.

President Earle—I will take twenty-five copies of the report at \$2 each.

Treasurer Evans—Our President can beat me raising strawberries, but I will take as many books as he will. You may put me down for twenty-five copies.

AN ELOQUENT TRIBUTE

TO DR. J. A. WARDER.

Ex-Gov. J. Sterling Morton, of Nebraska, from the Committee on Memorial to Dr. J. A. Warder, presented the following :

As guests register their names at a hotel, depart, and are forgotten, so humanity, stopping for a short time on the earth, makes its auto-graph upon the age and sets out upon its returnless journey to that realm whence come neither tidings nor greetings.

Each individual of the race leaves some trace of his existence on the generation in which he lives, and considerable numbers transmit their names to posterity italicised in good deeds or embalmed in noble and elevating thought.

The desire to be remembered and esteemed by those who come after us seems to be, with the better and more exalted minds, a greater inspiration to high intellectual effort than the mere plaudits of cotemporaries. As on the stage, those actors who play best their parts are recalled and applauded after the curtain has fallen, so those in the brief drama of life who have best performed their duties are, after their mortal costumes have been forever laid away in restful graves, again called out by their admiring cotemporaries, and thus their intellectual and moral personalities reappear before the lights, amidst tumultuous and emulative applause.

It is the duty and pleasure of your committee, gentlemen of the Mississippi Valley Horticultural Society, in harmony with this line of reflection, to bring before you the character and services of the recently deceased Dr. John A. Warder, of Ohio. His naturally strong mental faculties were led out and trained, in school and college, to a full and vigorous stature. His chosen profession of medicine, in the earlier years of his manhood, occupied his entire thought and stimulated him to untiring labor of mind and body, and, at the same time, gave him also that culture of the heart which, through his refined, emotional nature, was ever incarnating itself in delicate acts of kindness and generosity toward those who needed sympathy or friends.

But he turned at last from his professional studies—from the books in his library—to those broader investigations of the mysteries of life and growth of flowers, fruits and forests, to which the fields, orchards and wild woods of Ohio ever allured him. His childhood and youth

had passed amidst the rustic scenes of a home in the country, on a farm; and as the seashell, though ever so long and far away from its home in the surf, will, when placed to the ear always moan of its ocean home, so his great and tender soul ever yearned for a life among the flora and sylvia of youth. His brave and benignant spirit explored all avenues of knowledge which led into flowering fields and orchards. To his eye every blossom was a poem; to his quick perception every tree a book full of useful and agreeable teachings. And to the study of these volumes—these continued annuals—fresh in new binding, embellishment, and gilding every summer and autumn, Dr. Warder devoted the choicest years of his mature manhood.

It is the enthusiast of a cause who gives vitality and propulsive power. Dr. Warder was an enthusiast in horticulture and in forestry. To advance the race in those two vocations no labor was too great for him to undertake, no sacrifice too severe for him joyfully to make. At his own expense he went into fresh territories and States, preaching, as a missionary of a new gospel, the importance and necessity of orcharding and tree planting. His thoughts were strewn, like precious seeds, among the dwellers on the prairies of Nebraska, Dakota, Wyoming, Minnesota, and the Northwest. And they took root, so that the concepts of thousands of groves and orchards, which now stand as living monuments to his useful life, came from his own philanthropic brain. In his mind miniature forests grew on every prairie, and golden fruit flashed in the autumn sunlight of every hillside. He knew no limit to his love of horticulture and arboriculture. He was earnest, he was active, sincere, and his vitagraph is written wherever flowers bloom, fruits ripen and forests wave all over the country he loved so well and served so modestly, efficiently and faithfully.

His example is worthy of the emulation of our sons and of their sons. And standing at his grave it is meet and proper for this Society to recall his noble services to its cause, to wish that, with each recurring year his memory may, like the flowers and foliage he studied so well, be clothed in new verdure and its fragrance perpetuated as a grateful perfume.

Resolved, That the Mississippi Valley Horticultural Society deplores the death of its friend and active member, Dr. John A. Warder, of Ohio; that our sincere condolence is extended to his family, and that we recommend to kindred societies throughout the Northwest the planting of memorial trees and groves to commemorate his labors, his achievements, and his philanthropy as a skilled orchardist and forester.

Mr. Scofield, of Kansas—As a life-long friend of Dr. Warder, I want to indorse the memorial.

Secretary Ragan—It was my pleasure, at sixteen, to meet Dr.

Warder. The kind attention and encouragement then shown me has exerted an influence upon my life work.

Z. S. Ragan, of Missouri—I have known Dr. Warder for forty years. At our meeting in Cincinnati, he could not do enough for us. He did not go to his home during the meeting, but devoted his whole time to the Society.

Gov. Colman, of Missouri—I do not think anything could be added to the beautiful memorial we have heard. Dr. Warder was of a very affectionate disposition. A young Mr. Beeler, of Indianapolis, one of the most promising young men I ever knew, was very much attached to him. Dr. Warder shed tears at his grave—such was his interest in the young. When attending a meeting, we once occupied the same room. He was to give an address, and I was astonished how he wrote it there on the spur of the moment, and it was so beautiful. When he was studying forestry in Missouri—with his usual diligence—he told me that the people did not appreciate the subject then, but they would at some future time. When he went to Montreal to attend the American Forestry Congress, his whole soul was in the work. I hoped and almost prayed that his life might long be spared, for I knew of no one else who could have done so much in that direction. Dr. Warder was one of the most careful and cautious of men. He was also most unselfish. If there ever was a philanthropist in the widest sense of the term, he was one.

T. V. Munson, of Texas—Though I only knew him a short time, I want to express my appreciation of him. I first saw him at the meeting of this Society in St. Louis. He came to me for a word in a resolution. Since that time we have had considerable pleasant intercourse.

Gov. Furnas, of Nebraska—When the United States was divided into four districts for the investigation of forestry interests, one division was assigned to him and one to myself; but illness soon compelled him to resign. A few weeks later his body was carried by his four sons and quietly laid to rest in Spring Grove Cemetery. He was a Friend; and in his death, as in his life, all needless display was avoided.

The President—My friends, I feel that this is a sacred hour. I feel as though we stood by the bier of an honored friend. I can not say more.

On motion of Major Nowlin, of Arkansas, the Secretary was directed to have the pages of our Transactions relating to these memorial exercises draped in mourning.

After which, the memorial was adopted by a rising vote.

On motion of Gov. Furnas, the Society adjourned as a mark of respect.

Second Day—Wednesday.

EVENING SESSION.

The Society was called to order by President Earle at 7:25 P. M. He suggested that it was a good time for the delegates from the different States to select the Committee on Nominations, which was provided for this afternoon. The following were appointed said committee:

F. Wellhouse, of Kansas; G. P. Peffer, of Wisconsin; G. H. Masters, of Nebraska; D. S. Grimes, of Colorado; A. D. Webb, of Kentucky; E. Ashley Smith, of New York; G. C. Burnham, of Michigan; W. B. Clark, of Arkansas; J. H. Hale, of Connecticut; J. Williams, of Texas, N. Ohmer, of Ohio; Z. S. Ragan, of Missouri; E. Y. Teas, of Indiana; L. A. Williams, of Iowa.

REPORT OF COMMITTEE ON CONSTITUTION.

The Secretary, as chairman of the Committee on Constitutional Amendments, submitted the following report, which was adopted, and the constitution so amended:

Mr. President: Your committee respectfully recommend that the constitution be so amended as to provide for the election of vice presidents by this Society. Also, that the term of office of President, Vice President, Secretary, and Treasurer shall begin on the first of July succeeding their election.

Mr. Gibbs, of Minnesota, being called upon for his paper, said: Sir John Falstaff, in one of Shakespeare's plays, when asked what he would do with certain ragamuffin soldiers, is represented as saying that he would use them for filling up. So I will give my paper for filling up. My paper was prepared without expecting to read it here, but as I am here I will read.

CONDITIONS OF PROFITABLE FRUIT CULTURE IN MINNESOTA.

BY OLIVER GIBBS, JR., OF MINNESOTA.

APPLES.

The first condition is that the grower possesses a courage that does not quail upon the brink of any earthly woe.

The second is that he loves his trees.

The third, that he study his subject thoroughly to learn all the known laws of adaptation.

The fourth, that he select for his main planting only the few hardiest; and

The fifth that he keep out a liberal line of experiments, according to his means, and be ready to branch out in good time.

In regard to the first condition—no other State has been such a slaughter-ground of apple trees as Minnesota. Nearly every farm that was opened from 1850 to 1860, when all the southern and central sections were settled up, has had a succession of orchard funerals. First eastern and southern trees, next western trees, then Canada trees, then home-grown seedlings, and lastly the crabs. All are gone of these old plantings but the Duchess of Oldenburg in general, and in particular, here and there a survivor from some other sort that is unable to give any account of itself. Many of these lost trees lived to bear fruit, and give promise of long life and profit. One farmer in my neighborhood, from a small orchard of two or three hundred trees, had five hundred bushels of choice apples, and was peddling them around town from his wagon like potatoes. The winter of 1872-3 froze up dry. In the spring his Plum's Ciders, his Fameuse, his Saxtons, his Jonathans, his Golden Russets, his Talman's Sweets, and all that ilk, had not a live root remaining, although potatoes left undug in the fall on ground adjoining lay through under the deep snow-drifts, and came out perfect in the spring. One may think he knows the reason of all these failures, and how to avoid them in the future, but let him be ever so well posted, when he comes to open his purse for a new purchase, and contemplates the labor, the use of his ground, and the possible chances of another failure—here is where he needs the courage—a courage like that of Peter M. Gideon, the originator of the Wealthy apple, who for twenty years went ragged in the battle for apples, but said all the while, "I will grow apples or leave the State, and I won't leave the State!"

Love for trees is, perhaps, more necessary for success in severe climates than it is in mild ones. Nothing so well keeps up an interest and a watchful care. Trees need more care in Minnesota than in Missouri, though they get none too much of it anywhere. It must be a love akin to that of parents for children, of a lover for his mistress, a husband for his wife, of friend for friend; a love for their society, for their beauty, their protection from all danger, their help in time of trouble; an enjoyment of their budding and blossoming time, their growth, their fruitage, until and through the autumn, when they hang out their crimson, russet, and golden banners, vying with all the lovely colors of the wooded hills, and onward with the same care to shield them from harm during the white-robed period of their winter rest. A man who will bark a tree in cultivating, if he can avoid it, or who, having done it, will not hasten to bind up the wound as he would upon the limb or body of a friend, is not fit to grow apples in Minnesota. If he loves not his trees, he is liable to put it off—"time is too valuable; something else will pay better." Pay! a man must feel that nothing else pays so well as to keep himself and his associates out of trouble; and he must have that feeling for his

trees. He must feel hurt when they suffer, and guilty when he neglects them. Nothing but love for his trees will give him this feeling.

"I would like to look through your orchard," I said to a German farmer several years ago, as I was driving by his house. I had just passed by his orchard, and noted the clean ground, the smooth, healthy look of the trees, their orderly and well-kept expression. "Come in, I will show you." "How nicely your orchard looks," I said, as he was pointing out the different sorts and telling me their names, "Oh, yes," he replied, "*I love my trees!*" The words were few, but such as they were—with the man's own expression of countenance—and another glance of mine up and down the rows of his pets, they gave me a good, long lesson that will never be forgotten.

Adaptation: This is too great a question to discuss in this paper. There is, first and foremost, climatic adaptation: and this is something that seems to require centuries for its growth. That we must look beyond our own country for present success in selections of races adapted here is evident, from the fact that nowhere else in America where apples have been grown is there any such climate in reference to summer and winter temperature, dryness of air and the peculiarities of rainfall, all taken together. That we can find this adaptation in some of the older countries abroad and transplant it here, is indicated by the further fact that all of the sorts now growing and showing adaptation to Minnesota climate are traceable to an origin in those countries abroad where there are similar climatic conditions. We have the history of the Duchess of Oldenburg. This variety was obtained by Thomas Andrew Knight, President of the London Horticultural Society, towards the close of the last century, with forty other sorts sent him by the British engineers, who were employed by the Russian government in the improvement of navigation on the Volga river. It afterwards went to France. There they dropped its Russian name of Borovinka and called it by its present name, and from thence it came to Canada and thence down the Atlantic coast and across the river St. Lawrence and everywhere over North America. It never attracted pre-eminent attention over many other sorts until it came into those parts where its Russian adaptation to extreme cold, extreme heat and extreme aridity of air and dry soil singled it out as the one only reliable variety. Knight made many crosses with his Russian apple trees. They, too, have gone over the Western world. When we see a negro, we know he is from Africa, wherever he was *born*, as we call one of the later processes in individual life; when we see a mulatto we recognize his African blood, and so it is with Russian trees. The expert student sees their blood in form of tree and branches, in buds, in flowers, in leaves and fruit, and their crosses can never be hidden till they fade down by division and by prepotency of other sorts beyond the reach of the senses to distinguish them. In fact, we have found out almost enough already to declare whenever we hear of a previously unknown sort having done well through a period of seven or eight years, without seeing it, "it is a Russian." Our Minnesota Wealthy, now celebrated as a profitable apple for the North, passes, by the tests of botanical science,

into the Russian category, and acknowledges them its adaptation. - Second. There is adaptation to high lands and adaptation to low lands, to sandy soils and to clay soils. There are trees that have a general adaptation and others with special adaptation—while the Duchess is general and the Wealthy nearly as much so. If a farmer has a valley location, sandy, or where the water comes near the surface, let him plant the Wolf River, a variety whose parent tree, now thirty-two years old, in Waupaca county, Wisconsin, stands where its roots touch the waters of the river, whence it takes its name, and whose progeny, scattered well throughout the West, show, as I am informed by J. C. Plumb, of Milton, the same adaptation to low, sandy and wet soils. A large State like Minnesota has variable climates and soils. There are adaptations for all that must be studied. Russia, as said by Prof. Budd, is a great country. It has its counterparts probably for all the climates of our American apple belt. It is not enough to say Russian. The Northwest has lost thirteen years by not knowing this. We must know from what part of Russia. It is not enough to say Minnesota. We must know what part of Minnesota. Is it where the dry, cold arctic winds sweep up the valley of the Red River of the North? Is it where the moist winds of the Gulf of Mexico or the St. Lawrence and the great lakes, the hot air of the southwestern plains, or the mild breezes from the Pacific, fugitives from the Chinook, squeezed of their vapors in passing over the steppes or the forests of the Rocky mountains, mostly or in part prevail? Is it on the wide prairie sweeps, the bluff lands with their air drainage above as well as below ground, the timber and prairie openings, or the dense forests of the big woods? All these are questions which must be studied in order to make fruit raising profitable in Minnesota.

A man must not begrudge a dollar a year for his State Horticultural Society, or two or three for the Mississippi Valley Society, to secure him the reports to read on all the vital points in the business, and pay twenty dollars for a worthless bill of trees that the books would have warned him of.

Selection of a few only of the hardiest for general orcharding is important for many reasons, but these reasons are so open and palpable that it seems almost a waste of time to mention them. A man must go for sure things to some or the main extent in order to keep his courage up. Everlasting failure or liability to it will beat the toughest orchard crank in time, as it does the Keeley motor or the inventor of perpetual motion. The man in Wisconsin who said several years ago before the Wealthy was found out, that if he was going to set out another orchard of one hundred trees, he would plant ninety-nine Duchess and one Duchess of Oldenburg, was not far from right. That would be sure to be profitable. The only orchardists in Minnesota today who are making any money in apples are the ones who did about the same thing, or who divided their plantings between the Duchess and the Wealthy. There are many other sorts coming favorably into notice—seedlings and imported trees—that promise to show equal, in some respects superior merit. It even looks as though we are on the eve of a sudden exten-

sion of our list into a large variety of apples, and that we shall soon add to the acknowledged beauty and quality of the apples we have, the merit of long keeping in these new sorts, and be able to dispute the markets of the world as to winter apples with New England, New York, Michigan and Missouri; but on the experimental list let these new candidates stand, with reasonable hospitality, for further acquaintance, before putting them into orchards on a large scale by men of moderate means and without expert knowledge in making selections.

I need not say much of other fruits under this caption.

PEARS.

The pear, for our adoption, we have yet to find. Our hope is now in Charles Gibb and Prof. Budd.

THE CHERRY.

The cherry went out of general view when the winter of 1872-3 killed our Early Richmonds. The Germans of Carver county, latitude about 45°, have had the Ostheim for over twenty years, unknown to the Minnesota Horticultural Society till now. They say it is hardy enough there and is adapted to the climate; that it blossoms late in the spring, bears heavy in favorable seasons, and is a large, good, dark colored cherry. They propagate it only by root sprouts. Mr. Charles Ludluff, a farmer of Carver, who obtained the first trees from Germany, says that if grafted it must *not* be on sour cherry stocks. Whether it will be hardy west of the big woods or in the northern part of the State, we do not know. We want to try for the severest tests, the Russian Vladimers, and shall do it as soon as we can get them, by importation, or from that "nest of spicery," the Iowa Agricultural College farm at Ames.

THE PLUM.

Plum culture we know nothing of in Minnesota, except as to the Iowa, Illinois and Wisconsin natives, like the Forest Garden, the Weaver and De Soto, and many nice wild sorts selected from our native Minnesota groves. But the growing of these sorts is successful and profitable. They are of fair quality for eating out of hand, and good for cooking. They are large, handsome and sell well in market. The Forest Garden is earliest, but will not bear much handling or transportation unless with extreme care, it is so tender in skin and pulp. The Weaver and De Soto are firm. These two resist the Little Turk, and for some reason he does not seem to get hold of the Forest Garden where I have seen it grown. Perhaps he may under other conditions. These varieties are all perfectly hardy. Opinions differ, but I consider the De Soto most reliable for a crop and most profitable. There are others known by name and highly recommended but I am not acquainted with them.

SMALL FRUITS.

As to small fruits, little need be said. From the currant to the grape, they are nearly all at home in Minnesota; only that some of them entail more

labor on the grower in their needs for winter protection. Aside from this, the manual of small fruit culture is the same for Minnesota as elsewhere in the north. We think our climate—or our climate and soil together—produces a better out-door market grape than can be grown east or further down the Mississippi Valley. We see no others growing as handsome Concord or as good Delawares. The river bluff region at and below St. Paul, and the lands around Lake Minnetonka at present produce the finest. Whether our success in grapes is due to our quick soil, our dry air, our short hot summers, or all combined, I can not say. Our growers have lost but one crop of grapes by frost in twenty years.

AWARDS TO MINNESOTA IN 1883.

On the 13th of September last, at Philadelphia, the American Pomological Society awarded to Minnesota the Wilder silver medal on its collection of apples and grapes, there being but four medals awarded on the entire exhibition of fruits. On the same day, the Pennsylvania Horticultural Society, having all the exhibits of both societies before them, awarded our State the second premium on the best twenty varieties of grapes in cut bunches.

THE AMERICAN POMOLOGICAL SOCIETY IN 1885.

Members of the Mississippi Valley Horticultural Society from other States: We hope to meet you in Michigan in 1885. We acknowledge your supremacy in oranges, peaches, pears, and plums—in some States in the extension of the number of varieties of apples, in others in the production of winter apples; but when this venerable umpire and patron comes to consider the greatest beauty and quality combined of which the apple is capable, and the character of our out-door grapes, we may claim the medal again. But the rivalry shall be generous, as it is in all strictly horticultural exhibitions, and whoever wins, the defeated party will lead the other out for the applause at the footlights before the curtain, and help bestow the wreath of bays.

The President—We have another excellent paper, whose author, Prof. J. L. Budd, of Iowa, is, unfortunately, not with us, but which I suggest we have read before discussing the topics introduced by Mr. Gibbs. I know you would all like to hear this paper, and with your consent (which was cordially granted) we will have the Secretary read:

THE FUTURE OF ORCHARDING IN THE PRAIRIE STATES.

BY PROF. J. L. BUDD, OF IOWA.

Mr. President and Fellow Members:

The apple, pear, cherry, and most of our plums, are not native to our continent, and their introduction into the States west of the great American

lakes has not been guided by the scientific skill in selection which characterizes such work in the colonies of all the civilized governments of Europe.

Without exception, the scientific observers connected with the early surveys of the illimitable prairies of the West, interpreted the absence of the Conifers, the Rhododendrons, the Mosses and all the characteristic trees and plants of the more equable regions nearer the coast and lakes, to mean an inter-continental climate of extreme changes in temperature and humidity.

In these early days of prairie settlement, such men as Judge Knapp, Dr. John A. Kennicott, Robert Russell and J. G. Cooper, unitedly expressed the opinion that the world had no counterpart of our plains in soil and climate except the great plain which covers, like a blanket, fully three-fourths of Europe on the northeast.

These men, in connection with Arthur Bryant, Hon. G. P. Marsh, and many others also predicted, in those early days, that unless systematic timber planting was commenced and carried forward to offset the destruction of the dense growth of prairie grass, and the effects of opening the clogged drainage centers of the primitive prairies, consequent upon occupation and cultivation, the already fickle and extreme climate would change for the worse as the years went on.

With such clearly expressed views as to the real nature of our climate, it would seem passing strange to the people of Europe, so long accustomed to well-equipped and endowed experimental stations, that we have never attempted to row our own horticultural boat, but have permitted the nurseries of the Eastern States to do our importing of trees and shrubs from the mildest portions of Southern Europe, mainly, indeed, from the nurseries of Thomas Rivers, in England, and Andre Leroy, in Southern France. Our plan really has been to try everything which our eastern friends had to offer, and hold fast to that which was good. Unfortunately for our interests, Southern Europe has very few varieties of the fruits which will long survive in our climate, and the very few we have received are really strays from the east plain of Europe, or seedlings grown on our own soil. As instances of real iron-clads over broad expanses of our prairies, all will think of the Duchess, Gros Pomier, Fameuse, Drap d'Or, and Wealthy—all but one strays from the east plain, and that one, beyond doubt, a seedling of Duchess or Tetofsky.

Of pears, we have not one true iron-clad, and the nearest we have—the *Besi de la Motte* and *Flemish Beauty*—are from Poland, on the borders of the east plain, but modified by the breath of the gulf stream.

With cherries we are quite as unfortunate. The Dukes and Bigarreans of the East utterly fail with us, and the early and late Kentish and English Morello, in addition to short life of tree and irregularity of bearing, are far lower in quality than any one of the Griottes grown by the train loads on the plains north of the Carpathians. As to plums—without thanks to our Eastern friends or to South Europe, we have been more fortunate, as nature has provided us with better native varieties than I know to exist elsewhere.

Beyond doubt we have lost millions of dollars and an untold amount of time and faith, in unsystematic trial of fruits adapted to more equable climates. Surely the time has come when we should unitedly give trial to fruits of like climates, so far as they are commercially obtainable. Perhaps ultimately our favorite fruits will be seedlings of those we first introduce, but the only safe line of experimentation is based on the assumption that the future favorites of our orchards of the apple, pear and cherry, will come from climates fully as severe as ours, or will be the seedlings of such varieties grown on our own soil.

With the hope of aiding in this systematic experimental work so much needed, I will offer a few suggestions based on a careful study of the climate, soil and fruits of intercontinental Europe in the summer of 1882. These hints are formulated on the well-known fact that every part of the Mississippi basin is subject to extreme summer and winter variations of temperature and humidity of air, consequent upon the varying winds, and that mere ability to endure a very low temperature is the only requisite needed at the north which in the south part of the basin may be dispensed with.

Southern Illinois, Missouri and Kansas may safely experiment with the apples, pears, cherries, plums, apricots, nuts, ornamental trees, and shrubs of the plains of northeastern Austria for the western portion, and of Transylvania for the eastern portion. Here are found late keeping varieties of the apple, comparing favorably in size, beauty and quality with the best we know, growing on trees with foliage as perfectly adapted to a varying air as our Duchess. Here also are found many varieties of the pear with the perfect foliage of the Chinese Sand Pear, yet producing fruit nearly equal to the best sorts of France and Belgium. We have less reason to believe they will be subject to blight to a serious extent, as for ages they have been subject to intercontinental extremes like those of our valley.

In this region will, in like manner, be found the coming cherries for the dry belt where the extreme winter temperature does not reach lower than from fifteen to twenty degrees below zero.

The plains of Galicia are checkered with lines of cherry trees along the sides of all highways, and marking the division lines of estates, to an extent not found in many parts of Europe. The varieties, too, are all new to an American. A careful study of their leaf structure, fruit, habits of growth, etc., will convince the most skeptical that we have gone sadly astray in selecting fruits for an interior prairie climate. The Griottes, with small pendulous branches, and fruit with colored juice, are generally used for roadside planting, as the trees do little shading on account of their small size, and the fruit can be used for dessert, culinary purposes, and for the favorite drink of high and low known as "Kirschwasser." In every respect the fruit is far superior to our Kentish cherry, or any one of the Morello type we know. In the fruit orchards, and on the grounds of land proprietors, we find many varieties of a race of sweet cherries not known to us. With the round spreading top of the Morellos they have the excellent fruit of the tall growing

Heart varieties, and a leaf that can defy our summer changes. Some of the Amarels of this region seem a cross of this sweet cherry with the form of Morello, of which our Leib is a type.

The apricots of Galicia and Transylvania, and their form of English walnut (*Juglans regia*), are equally worthy of trial in the Missouri belt, together with their filbert, currants, gooseberries, and even grapes. Though we have failed with the French grapes, the northeastern varieties are well worthy of trial, as their foliage will stand our air quite as well as our native *V. Labrusca*. We saw on the Volga many tons of dried grapes from Northern Persia and Bokhara, which were infinitely superior to our home sorts. Where they will endure the winters they are eminently worthy of trial.

In this region no hardier peach is found than those we have. The coming peach for the Missouri belt is from Northwestern China. While equal in fruit to our best sorts, it is able to endure greater extremes of temperature.

The belt across the Mississippi Valley corresponding to Southern Iowa may experiment with the same races of fruits, and from a portion of the same great plain, *but farther to the east*.

The provinces of South Russia, east of Poland to Kiev, are well supplied with choice fruits, and the soil and climate are as nearly identical with ours as they well could be. Many varieties of the Galicia belt will not be found, but their places are taken by others but slightly, if at all, lower in the scale of value. The most positive change is with the pear. Many of the best dessert varieties here become tender, unproductive and short-lived, and their places are taken by slightly coarser varieties of the Bergamot and Gueha type. The best of the Griotte cherries are still found, and many varieties of the Glaskirke, and a form of the Geans much like our Dukes, but with different leaf and a lower spreading top. The *Juglans regia* is still productive, but is sometimes injured by the test winters.

For the belt across the valley corresponding to Central and Northern Iowa, the fruits of the black soil prairies of the great provinces of Orel, Koursk, Varonesh and Saratov in Central Russia, will best meet the requirements of soil and climate. Apples, pears, cherries and plums are yet found of such size, appearance and quality as would surprise any member of this organization suddenly set down in the midst of one of their great commercial orchards. The visitor will rarely find a variety of any of these fruits which he found six hundred miles eastward. The very few exceptions, such as Autonovka and Longfield apples, and Bessemianka and Red Bergamot pears, we are told at once are strays from Central Russia, thriving equally well in a less extreme climate, as does our Duchess apple. Excellent forms of the Griotte cherries are still found, and many varieties of the low-growing sweet cherries and amarels are grown with greater or less satisfaction, depending upon soils and mode of growing. The apricot and mulberry are yet grown in considerable quantity, but the varieties are lower in quality for dessert use than farther west. The belt corresponding with

MINNESOTA UP TO THE FORTY-FIFTH PARALLEL.

including *Southern Dakota* and *Northern Wisconsin*, will reach the highest attainable success with the fruits of Simbrisk, Penza, Riazan and Tula, on the north line of the black soil section of Central Russia. The visitors to these little known provinces, reaching up to the 55th parallel of north latitude, will be surprised to find so many varieties of excellent apples for all seasons, and so many variations of the indigenous Bergamot and Gucha pear, most of which are excellent for culinary use, and a few are from fair to good for eating.

The only forms of the cherry grown in quantity are of the Griotte race, and the trees are grown in commercial orchards, in *bush form*, with several stems, and pruned on the renewal system of taking out the old wood. In size, flavor, and amount of grape sugar, they far excel any one of the Kentish type found in South Europe.

To those who may conclude that the apples of this high latitude in Europe will materially change their season of maturity when grown in the Minnesota belt ten degrees farther south, it will be well to suggest that the prevailing summer winds of this part of Russia are from the southeast, coming up from Persia, Arabia and the heated steppes of Southeastern Russia. Hence the average summer temperature is really higher than that of the Minnesota belt across our valley, while the winters are much colder and with less average snowfall.

In the extreme upper portion of our valley, in

NORTHERN DAKOTA AND MINNESOTA.

even in the great valley with a northern trend at Lake Winnepeg, the possibility of successfully growing the apple, pear and cherry exists. The ancient provinces of Kazan, Nishni-Novgorod and Vladimir—even north and far to the east of Moscow, on the 57th parallel of north latitude—grow apples for all seasons, of excellent quality in a commercial way. In this coldest orchard region of the world the little trees seem as hardy as the Siberian crabs, yet the fruit sells well in Moscow in competition with that from the south.

The far northern pears of this section are quite as hardy in tree, but the fruit is too low in quality for consumption in the large cities. Yet it is grown in great quantity for culinary use among the peasants and for exporting to Perm, on the northeast verge of the plain. As an ornamental tree this far northern form of the Bergamot has much merit, and it gives us a hint of possibilities in the way of originating, by crossing pears of excellent quality for the extreme northwest.

The cherries of this region have had a historic record for centuries. In Vladimir, one hundred and fifty miles east and north of Moscow, they are grown in quantity too surprising for popular belief in our valley. Though somewhat smaller than the best Griottes of the south parts of the plain, some of the Vladimir varieties are nearly sweet and of decidedly good quality for

any use. That they can be grown as far north as Lake Winnipeg, in Manitoba, we do not for a moment doubt.

Plums, approaching our Damson in quality, and much resembling it in size, form and color, are grown in quantity in this far northern section of the steppes. That they will prove an acquisition in the extreme northwest is beyond doubt, if the curculio will respect them to the extent of giving us an occasional crop.

THESE HASTY SUGGESTIONS

as to the adaptation of the fruits of special portions of the greatest steppe section of the world to special belts across the prairie States of the West, must of course be of a general character. In practice they would be modified by the varying soil and climate of the east and west portions of each belt, and the belts would overlap with special changes of soil, elevation, exposure, etc.

The only purpose is to outline some profitable lines of work for the

EXPERIMENTAL STATIONS,

now in process of organization and development in all the States of the valley. We have learned that the process of acclimation is a tediously slow one with our trees, and I believe our people are about ready to encourage the policy universally accepted by the European governments in the management of their colonies, viz: The introduction of cereals, grasses, fruits, shrubs, etc., from like climates and soils, if they can be found on the earth's surface.

With the limited pecuniary means at command, we are doing what we can in the line indicated on the grounds of the

IOWA AGRICULTURAL COLLEGE AT AMES.

We have now growing specimen plants of the apple, pear, cherry, plum, apricot, peach, juneberry, walnut, ornamental trees, shrubs, etc., from every part of the great east plain of Europe I have named. Their summer and winter behavior for the past two years in our climate has been exactly in accordance with what we might expect from their relative position in their natal home. To briefly illustrate: The leaf of the Richmond cherry has been defective with us for two years, and last winter the trees were killed to the snow-line. On the other hand the Griottes and the Russian Glaskirke varieties have maintained perfect foliage and have been unharmed by the test winter. In like manner the Flemish Beauty pear has not had, during the past two summers, a single leaf free from brown fungus on the under surface, and last winter the trees were either wholly killed or so lowered in vitality as to be really worthless. The Besi de la Motte, from the edge of the great Eastern Steppe, has maintained healthy foliage, but its wood was slightly colored by the test winter, yet it has made rapid and healthy growth the past summer.

The Bessemianka, Tonkavetka and other pears from central Russia have maintained perfect foliage, except slight injury by the pear leaf mite, and the terminal points of the shoots were as clear and bright last spring as the wood of the Russian poplars.

Our apples of the grade of hardiness of Ben Davis, Jonathan and Dominic were defective in leaf the past two years, and last winter were irreparably ruined. On the other hand, our old varieties from the east plain, or their descendants and over two hundred varieties recently imported, started from the terminal points where grown upon rich garden soil.

Yet our collection *is too varied for any one experimental station of the West*, as it embraces varieties which will do best in the Missouri belt, and varieties which should do best in the belt of North Dakota and Minnesota. If the experimental work could be distributed and each of the belts across the valley I have tried to indicate could experiment with the products of its corresponding section of the east plain, the work could not fail to result in advancing our horticultural interests. So far, in talking of

RUSSIAN FRUITS

We have not taken into account the enormous extent of the empire. We do not want the fruits of St. Petersburg or of any part of the coast section within three hundred miles of the Baltic. That we do want the fruits of the provinces named in this connection I am equally certain, if properly distributed over our great valley. We must never forget that we must have in our valley, from the Missouri belt northward, varieties of all the fruits that will maintain perfect health of foliage, or we can not expect paying crops of perfect fruit. A tree may endure our winters passably well, yet on account of leaf trouble during our dry, hot summers, it fails to develop the cell structure of the wood in the perfect way needed for holding and perfecting the fruit crop. With the advent of varieties as perfect in leaf as the Duchess apple, the Bessemianka pear, and the Vladimir cherry, we may expect a show of blossoms, to be followed by perfect fruit.

The crying want of the Mississippi valley is *well endowed experiment stations*. With their aid we may be able to walk without the leading strings, which so far in our history have been furnished us by the nurserymen of the eastern States.

DISCUSSION ON THE PAPERS.

The President—These papers are both good, and you have them before you for discussion.

Mr. Gibbs, of Minnesota—Mr. President, I am convinced that the great study in pomology for the West and Northwest lies in the direction indicated by this paper of Prof. Budd's. For the purpose of aiding the members of this Society, I will put on record a few facts as to what has already been done in regard to it.

In the first place, as we have to wrestle with these names, I would suggest that Mr. Ragan get a catalogue of the varieties brought from Russia, and when he gets so he can pronounce them trippingly, Prof. Budd will have another lot.

So far as our literature records it, the attention of American pomologists was first called to this subject by Col. D. A. Robertson, of St. Paul, in a series of essays, published in the Minnesota papers from 1860 to 1873, on the subject of climatology in its relations to fruit growing. These essays were finally embodied in one paper, and published in the *St. Paul Pioneer* in 1866, and in 1873, when the first report of the Minnesota Horticultural Society was published, it was given a record there. In this paper the orchards and fruits of the interior steppe region of Russia were mentioned and described from facts obtained by Col. Robertson in the old French libraries at Paris.

A. G. Tuttle, of Baraboo, Wisconsin, appears to have been the first to adopt the suggestions of Col. Robertson and obtain Russian apples for trial. He sent over in 1866, and secured some sixty sorts, through Hon. Cassius M. Clay, then United States Minister at St. Petersburg. In 1866 William Saunders, of the Agricultural Department at Washington, commenced sending American trees, plants and seeds to Dr. Riegel, Director of the Botanical Gardens at St. Petersburg, as a basis for an application for an importation of Russian apples to America, and in 1870 he received, under names and numbers, about four hundred varieties. These were grafted and planted in the Department grounds at Washington, in 1875 and 1876. When the trees were large enough to cut, the scions were distributed to all parts of the United States and Canada for trial. It does not appear that they attracted much attention, except in the northern portions of our American fruit belt, and here they were largely top-worked upon the Siberian crabs, and for want of congeniality of race they mostly proved failures. Here and there a farmer or nurseryman, better educated in pomology, worked them upon *Pyrus Malus* stocks, and to this we owe the fact that some of the varieties have been preserved for fruitage and examination. It appears, from what we know, that most of those four hundred varieties were from the coast region, but a few were from the interior of Russia. We have in this list a few sorts that are

winter, hardy in tree, blight-proof in summer, productive, and the fruit large, handsome and fairly good, and in season ranging from summer to fall and late winter.

The next step was the visit of Prof. Budd, of Iowa, and Charles Gibb, of Quebec, to Russia, in 1882. They used the essay of Col. Robertson in the Minnesota report of 1873 as their guide book in searching out the orchards of the Volga and the cherry districts of Vladimir. An account of their researches can be read at length in the Iowa and Minnesota reports and the Montreal Horticultural report of 1883. As a help to this study, I would recommend that the Washington catalogue of 1870 be printed in our next report, to be followed in time by the lists of Prof. Budd and Charles Gibb. The labor of these men in bringing those varieties was a good work, but it was only a beginning. I think there ought to be another commission sent to bring more. When we find varieties in corresponding climate there, they will suit us here. I think the attention of the government ought be brought to this. I know of no other society that could move the government as well as this.

Prof. Robson, of Kansas—There are only three ways of producing varieties of fruit to suit different regions; first, by acclimatizing of trees brought from other places; second, by producing varieties from the primitive form; third, by hybridization. I do not want us to get excited. There are many here old enough to remember the Morns Multicaulus excitement, the Larch excitement and the Willow excitement. I would recommend that the youngest men of this Society be selected to make experiments by the second plan, that is, producing varieties from the primitive form. Andrew Knight, of England, produced more varieties of pears than any one else by crossing, and he was very successful. There has been too much effort made to get large, fine looking fruit regardless of quality. We have deteriorated by working for large fruits. That is the way we have got strawberries with imperfect flowers. If I was young again I would commence cross-fertilization. I know an orchard in which, for twenty-two years, I never saw a blighted pear shoot, and they bore most every year. Select those which have good qualities and join them by crossing, and you will have good varieties. You can get varieties to suit any place. I hold that the locality where a variety is originated will suit that variety better than

any other. This is the general complaint among strawberry growers. Mr. Hale, of Connecticut, has, no doubt, represented strawberries which, in other places, have not come up to the representation. With regard to American trees, I must say I never saw better. I never saw such oaks, such tulip trees, etc. It was through Bartram that these varieties were taken from America to Europe. They were most successfully acclimatized. I would not throw cold water upon acclimatizing Russian varieties, but I wish we would rise up and say we will produce good varieties.

Gov. Colman, of Missouri—I think this thing of making new varieties is all right, but I want to second what Mr. Gibbs has said. I have, for the past four years, had the pleasure of attending the meetings of their Society, and when I saw assembled as large a meeting as this, or larger, in their State, I was impressed with the interest manifested. While we and you in Illinois have twenty, thirty or forty, go up there where they can't raise near all the fruits we have, and there are three or four hundred in their meetings. I say, in my humble judgment, a variety of apples which will flourish in Russia away from the coast will succeed in the same climate here. If there is no other one to make a motion that another commission be sent to Russia, I say I am ready to do it. It is well enough to make experiments, as has been suggested, but if we go there and bring scions we can have them bearing in two or three years. We can graft them on bearing trees. We do not want to wait so many years. There are places in China which I think ought to be visited.

Mr. Gibbs—We are carrying forward our experiments in the direction indicated, but there is nothing to show that we can very soon find what we want. Andrew Knight never got an apple which did well in Minnesota but the Duchess, and he imported that from the interior of Russia. The hardiest seedling we have of the Duchess is the Pewaukee, originated by Mr. Peffer. The evidences are we would have to wait for centuries to obtain what we want by crossing. We have trees in Minnesota obtained from Russia which care no more about winter than the oaks in the woods. They came in the collection of four hundred brought by Mr. Saunders.

Mr. Wright, of Iowa—The question that rises is, where must we

import from? It depends upon where you want to take the tree. If I want to take them to the northwest I would go away from the coast to the interior of Russia, where the gulf stream does not affect them. We look upon this work which Prof. Budd, of our State Agricultural College, is doing as a good work. (Mr. Gibbs remarked that Mr. Wright is the President of the board of that institution.) I think the larch was not a failure, and there is no tree that has given more satisfaction than the white willow. It will not do in certain localities; but we must discriminate. Jesse Full, of Illinois, who has studied the willow more than any other person, perhaps, said in a letter that he had a section of a fence rail before him which he put in a fence thirty years ago and it shows no signs of decay. I speak of growing it as a forest tree, not as a hedge. In regard to another importation which Prof. Budd has made, there are forest trees adapted to this country which we get from Europe. The silver-leaf poplar will not sucker in groves, only around the edges. It is as valuable as the black walnut in quality. I say in discussing these varieties we must take in consideration the country we take them to. When we go to Volga we find a high and dry place. They have from six to ten inches rainfall, and they raise trees successfully. In Dakota it was said we could not raise trees because it was too dry. I went there and I said trees could be grown where cereals grow, and I see no reason to change my opinion. They are growing the cottonwood. It will do on some soils where it is low and wet. The box elder will grow better in dry places, also the ash. I have met a great many persons who say that box elder is not worth growing, but if grown systematically it will do well. They want to be planted close together and be trimmed up. It is one of the best trees also, for street planting.

Question—Are there not two kinds?

Mr. Wright—I never have noticed any particular difference. I have noticed a difference in the ash. If we go at tree planting systematically we will succeed.

Mr. Pierce, of Minnesota—Mr. Gibbs is right in recommending few varieties for Minnesota. If I did not believe we could raise apples easier than potatoes, I would not go back home. While you freeze to death here at zero, we are comfortable at forty degrees

below zero. It is the same way with fruits. My first planting was put out in 1856. They grew and looked nicely. They looked well for three winters. On the second day of June they were all killed. They were killed other places too. Two years after peddlers came in from Ohio, New York, etc. They sold many trees. Every one thought he could grow any variety. In the summer and fall of 1872 it was excessively dry. I examined the trees. They were dead, ninety-nine out of a hundred. Everybody said it was the winter, but it was the dry weather. I went to work again on scientific principles. I kept the ground mulched, and so damp and cool. In the fall the wood was well ripened. I have never lost a tree by cold since. The reputation of our country is generally bad for fruit; but when I consider the price of our fruit, there is no business at which a man can make more money with better satisfaction.

Gov. Colman—I have been interested in these remarks. I have wondered why apples could not be grown in Minnesota when they can in New York, where the mercury falls to forty or more degrees below zero. If it is the dry weather that kills them, I hope it will be published, so the people will know it.

Mr. Peffer, of Wisconsin—Drouth has had much to do with our failures—more than cold. The season of 1855 and 1856 was very dry. It froze up dry. All kinds of trees came out dead in the spring. In 1871 and 1872 it was the same way. Evergreens were killed. We thought it was the winter, but it was the drouth.

Mr. Gibbs—On the Volga, in Russia, are the largest orchards on the globe. They do not suffer their trees to go into winter dry.

Mr. Day, of Nebraska—I have been raising trees for fifteen years. I have not lost from cold, but from drouth.

COMMITTEES APPOINTED.

At the conclusion of the discussion of this paper, the President, in accordance with a resolution adopted during the afternoon, named the following committees:

On Fruit Packages—E. T. Hollister, of Missouri; N. Ohmer, of Ohio; M. Pierce, of Minnesota; E. H. Williams, of Indiana; and C. C. Wright, of Illinois.

On Forestry and Pomology—J. Sterling Morton and R. W. Furnas, of Nebraska; G. H. Wright, of Iowa; S. H. Nowlin, of Arkansas; N. J. Colman, of Missouri; E. Y. Teas, of Indiana; J. B. Schlichter, of Kansas; S. M. Tracy, of Missouri; and T. V. Munson, of Texas.

On Transportation—F. A. Thomas and John Buck, of Illinois; F. Wellhouse, of Kansas; L. A. Goodman, of Missouri; and E. Y. Teas, of Indiana.

On Nomenclature of Fruits—S. Johnson, of Indiana; T. J. Burrill, of Illinois; J. H. Hale, of Connecticut; J. H. Masters, of Nebraska; and L. B. Pearce, of Ohio.

On New Orleans Exhibition—R. W. Furnas, of Nebraska; Oliver Gibbs, jr., of Minnesota; J. C. Evans, of Missouri; S. H. Nowlin, of Arkansas; D. S. Grimes, of Colorado; George Y. Johnson, of Kansas; P. J. Berekmans, of Georgia; L. A. Williams, of Iowa; N. Olmer, of Ohio; C. W. Garfield, of Michigan; S. Johnson, of Indiana; A. D. Webb, of Kentucky; D. W. Beadle, of Ontario; J. M. Smith, of Wisconsin; T. V. Munson, of Texas; W. C. Barry, of New York; A. C. Hammond, of Illinois; J. E. Porter, of Tennessee; S. M. Wiggins, of Louisiana; J. J. Colmant, of Mississippi; Major Gaines, of Alabama; and E. H. Hart, of Florida.

Mr. Gibbs moved that the Committee on Forestry be made to include pomology, and that that part of the President's address relating to Russian fruits be referred to this committee. Adopted.

Mr. Masters, of Nebraska—It has been a practice of some societies to extend an honorary membership to the ladies who attend the meetings as horticulturists. I move that we do the same. Which was adopted.

After which the Society adjourned.

Third Day—Thursday.

MORNING SESSION, January 24.

The Society was called to order by President Earle at 9:45 A. M.

The President—Ladies and gentlemen, that greatest of American horticulturists, Hon. Marshall P. Wilder, has remembered us again. I will read a letter from him:

LETTER FROM HON. MARSHALL P. WILDER.

To Parker Earle, Esq., President of the Mississippi Valley Horticultural Society:

MY DEAR SIR—I take a deep interest in everything which has for its objects the promotion of fruit culture in our own and other lands. I therefore commend most

heartily the International Exposition in New Orleans, thus bringing together the fruits not only of our own but other nations, and what is better still, the cultivators who produce them. Especially would I welcome the pomologists of foreign nations that we may compare fruits and the results of experience, and concert measures for further improvement of them. This meeting will afford opportunities for the interchange of experience not often offered to the pomologist, and will give another illustration of the power of association, that great agent which propels the engine of modern improvement, and to which we are mainly indebted for the wonderful progress of fruit culture on this continent. Under this influence the American Pomological Society, with the co-operation of kindred societies, has spread its organization from the Atlantic to the Pacific shores, and now furnishes columns in its catalogue of fruits adapted to more than fifty States, territories and districts of our immense domain. To all this the Mississippi Valley Horticultural Society has contributed largely. God bless her. MARSHALL P. WILDER.

I will now read you another communication from a gentleman whom many of you know well, and who stands very high in horticulture, especially in forestry. I allude to Robert Douglas, of Illinois :

WAUKEGAN, ILL., January 1, 1884.

Parker Earle, Esq., President Mississippi Valley Horticultural Society :

MR DEAR SIR—On my return home for the winter, I find your very kind letter of two months ago, cordially inviting me to meet with you at Kansas City, and in the event of my not being able to attend, that I would send a paper on the subject of forestry. I very much regret that I can not make it convenient to meet with you, and have no doubt that ere this time you have selected some one much more competent to write a paper that will interest the whole membership of your association (which extends from the home of the glorious magnolia and live oak to the habitat of the hardy box elder and cottonwood), so that, fortunately for you in this case, "my loss will be your gain."

There is one subject, however, in connection with forestry in which every member of your Society is deeply interested. Even the planting of forest trees is a secondary matter, just at this time, in comparison with the subject to which I am about to refer, and it is of more importance to the Mississippi valley than to any other part of the country.

It is well known by the members of the Mississippi Valley Horticultural Society, that if the Missouri river had come directly east from the Rocky Mountains in the same manner as the Platte river, much of the land in your valley would be submerged annually, and the terrible freshets that occur once in several years would then be of yearly occurrence; but owing to the peculiar formation of the country, the Missouri river trends northwardly to the border of the British Possessions, and with the assistance of its tributaries, collecting the melting snows from the cañons of the mountains and carrying them around by this long, circuitous route, gives the lower Mississippi time to carry off the spring rains and melted snows from its lower tributaries before it comes down from the north to form the June rise.

The sources of the streams in the Rocky Mountains in Northern Montana have

been more thoroughly explored the past season than ever before, and it has been found that large growths of forest trees flank these streams and the sides of the Rocky Mountains, which divide here into three and sometimes four main ridges, and it is believed by these explorers that if this timber shall be cut away it would be a serious damage to the lower country, as the forests now hold the snows, to be melted gradually, which would, in case of their destruction, be melted rapidly and earlier in the season and cause a freshet, which would carry the waters much faster, and there would be great danger of the "June rise" in the lower Missouri and Mississippi rivers and causing immense damage.

As this region of country has never been surveyed and has no inhabitants, and as the President of the United States has recommended in his message that it be set apart for a forest preserve, your Society might, if thought best, memorialize Congress on the subject.

Yours, truly,

ROBERT DOUGLAS.

President Earle—This paper should receive some action from this Society.

Mr. Johnson, of Kansas, submitted the following circular of the Kansas State Horticultural Society, protesting against the repeal of the Timber Culture Act, which was referred, together with the letter of Mr. Douglas, to the Committee on Forestry :

SECRETARY'S OFFICE, KANSAS STATE HORTICULTURAL SOCIETY,)
LAWRENCE, KANSAS, January 4, 1884.)

MY DEAR SIR—Permit me to most respectfully invite your earnest consideration of the following copy of resolutions, passed by a unanimous vote at the seventeenth annual meeting of the State Horticultural Society, held in Ottawa, December 5 to 7, 1883:

Resolved, That we, members of the Kansas State Horticultural Society, in annual meeting assembled, viewing with feelings of deep concern and alarm the present efforts of members of our National Congress to secure a repeal of the "Timber Culture Act," do hereby express our most earnest protest to a repeal of said act, and do most earnestly and respectfully request the Senators and Representatives in Congress from Kansas to use their utmost endeavors to defeat any and all such measures; and, furthermore, to direct their influence to secure a rigid enforcement of the provisions of said act, and the penalties therein fixed for the offenses of fraudulent entries and false holdings of the public domain; and, if necessary to put a stop to the abuses of said act, to secure further legislation, providing severer penalties and making it the special duty of some officer or officers to detect and vigorously prosecute all violations of the provisions of the act, to a conviction of the offender. Furthermore, we do most earnestly ask that said act be so amended that land once claimed under its provisions shall be forever withdrawn from public disposition, under the provisions of the Homestead, Pre-emption, or any other act, but shall be rigidly held for the encouragement and promotion of the forestry interests of these United States. And further be it

Resolved, That the Secretary of this Society be instructed to furnish each of the Kansas Senators and Representatives an authenticated copy of these resolutions at an early day.

For the purpose of testing the sense of the people on this question, a circular was sent from the office of the Secretary of this Society to the representative men of the following counties, to which the following response was received :

OPPOSED TO THE REPEAL OF THE ACT.—Allen, Atehison, Barton, Bourbon, Butler, Cherokee, Crawford, Cloud, Coffey, Crowley, Davis, Dickinson, Douglas, Edwards, Elk, Ellis, Ellsworth, Graham, Gove, Harvey, Jackson, Jewell, Johnson, Labette, Lincoln, Linn, Lyon, Marshall, McPherson, Montgomery, Morris, Nemaha, Osage, Pawnee, Reno, Republic, Rice, Riley, Rooks, Rush, Saline, Sedgwick, Stafford, St. John, Sumner, Trego, Wabaunsee, Washington, Wilson, Woodson and Wyandotte.

The Ness county reporter took a decided stand in favor of a repeal; Ottawa county reporter favored a modification; and nearly every reporter recommended a rigid enforcement of the provisions of the act.

Such other counties as are not given in this summary are those supplied with native forests, coal and easy railroad facilities for shipping in lumber, etc., from timber regions, and by them the question of timber culture has not been considered.

By reference to the list of counties above given, it will be seen that nearly every organized county located in the section of our State commonly called the "plains" or "treeless prairies," and where exist the greatest obstacles to a successful forest-tree culture, and where its necessity is the most fully realized, is decidedly opposed to a repeal.

These reports were made by men representing the element of actual settlers and home-seekers, and who are in no way connected with or interested in land speculations, and whose faith, practical work, and extended observations have convinced them of the ultimate success of forest-tree culture in their respective counties.

Very truly,

G. C. BRACKETT, *Secretary.*

Gov. Furnas, of Nebraska—I move that the Committee on Forestry be made to consist of nine members, and that it, with three others, that is, on fruit packages, transportation, and nomenclature, be made standing committees. (See list of committees in yesterday's proceedings.)

ELECTION OF OFFICERS.

Mr. Wellhouse, of Kansas, from the Committee on Nominations, presented the following report :

Your Committee on Nominations beg leave to report that we have had the subject under consideration and would recommend the following names for officers of this association :

For President—Parker Earle, of Illinois.

Vice President—E. M. Hudson, of Louisiana.

Secretary—W. H. Ragan, of Indiana.

Treasurer—J. C. Evans, of Missouri.

State Vice Presidents—N. Ohmer, Ohio; T. T. Lyon, Michigan; E. Y. Teas, Indiana; Prof. Burrill, Illinois; G. P. Peffer, Wisconsin; M. Pierce, Minnesota; R. W. Furnas, Nebraska; Prof. E. A. Popeno, Kansas; D. S. Grimes, Colorado; Prof. J. L. Budd, Iowa; Z. S. Ragan, Missouri; S. H. Nowlin, Arkansas; T. V. Munson, Texas; R. S. Willet, Dakota; John T. Hardie, Louisiana; Prof. J. J. Colmant, Mississippi; Dr. Charles Mohr, Alabama; J. E. Porter, Tennessee; A. D. Webb, Kentucky; A. W. Campbell, West Virginia; Dr. Samuel Hape, Georgia; Thomas

Mehan, Pennsylvania; E. H. Hart, Florida; E. Moody, New York.

Resolved, That the President and Secretary of this Society make nominations properly tributary to the Mississippi valley for States not named.

All of which is respectfully submitted.

F. WELLHOUSE, *Chairman*.

Which, on motion, was adopted, and the gentlemen named duly elected to the several offices of the Society.

President Earle—I now have the pleasure of introducing to you Prof. S. A. Forbes, State Entomologist of Illinois, who will entertain us with a supplement to that interesting paper given us one year ago at New Orleans.

Prof. S. A. Forbes—I wish to say that the papers I prepare are not suitable for public reading, so I omit part, only giving what is suitable to give here.

[NOTE.—Owing to circumstances unavoidable, Prof. Forbes is unable to finish his paper in time for publication here. It, therefore, will be found in the appendix to this volume.—*Secretary*.]

Secretary Ragan—I do not wish to discuss the merits of this paper, I am not competent to do this. But I do wish to refer to the renewed obligation we, as a society, are placed under to Prof. Forbes. Our chief paper last year was from his able pen. It was illustrated without cost to us by the Professor. That paper added not a little to the value of our book. For these distinguished services I move a vote of thanks to the Professor.

Mr. Wright, of Iowa—I second the motion, and in doing so I wish to congratulate the Society in having such papers. The Professor not only treats of enemies, but how to get rid of them. I think our college professors are at fault in not getting out into the field as he does.

The President—I think we not only here, but fruit growers all over the United States owe the Professor a debt of gratitude. There is certainly no one in our country standing higher in his work. Motion adopted. We will now hear a paper from Mr. Hale, of Connecticut.

J. H. Hale, of Connecticut—I think I owe this Society an apology, for on your programme you say there will be a lecture by J. H. Hale on Strawberry Culture. I have hardly touched upon it. I have just prepared a few thoughts on my way here on the train, as I had not time before.

STRAWBERRY CULTURE.

BY J. H. HALE, OF CONNECTICUT.

The subject is a broad one, and has been so often and ably discussed at horticultural meetings and in the agricultural press, that I do not propose at this time to enter into a general discussion in regard to the best methods of culture, but rather spend a very few moments and just touch upon two or three points that to me seem vital to success in the culture of this, the most important of all the small fruits.

I am not here to teach you anything new, but merely to tell you some few of the little things that have come to my notice as a cultivator of strawberries for the past twenty years, and trust that we shall all learn more from the discussions that follow than you would if I spent more time in simply giving you the results of my experiences, all of which you must know have been at the East, where our operations are so limited that it would be almost impossible for an "Earl" to become "King" so far as the acreage under cultivation was concerned, although he might attain the still higher position of an American citizen: that by the use of right methods of culture, could cause one acre of land to yield 400 to 500 bushels of strawberries in a single season, not an impossibility by any means; for what has been done so many times on a small scale, can be done again on a larger one, if only the same methods are followed; and while there is a vast difference between the East and the West in many things, I doubt not that the same general rules that apply there in regard to successful berry culture, will hold true here to such an extent that it will be safe to follow them, at least until you prove their unsoundness. When quite a small boy, I heard a successful farmer, in reply to the query of how many acres of corn he had grown the past season, and what it cost per acre, say, "I never grow my corn by the acre, I grow it by the bushel." And although he is dead, his teaching still lives, as shown by 117 bushels of shelled corn to the acre not far from there a few years since; and it should be the aim of every one that wishes to be successful in strawberry culture, to produce the greatest possible number of quarts from the smallest possible area. Fifteen hundred to two thousand bushels produced from ten acres, will cost less and sell for more money, than the same amount from twenty-five to thirty acres, which is not far from the average yield under ordinary methods (or no methods) of cultivation.

A *thorough* preparation of the soil to start with, should be carefully attended to if we expect to make a success of cultivating the strawberry. Land well drained, either naturally or artificially, deep plowing, followed by a subsoil plow and then made perfectly mellow before setting the plants, will, to a certain extent, insure us against the effects of drought, as well as too much water in a wet season. Next, a liberal manuring of some sort we *must* have at the East: in fact, it is the all important question with us, and if I mistake not, the time has now come when you of the West, if you must not have it to

get good crops, can at least increase them more than enough to pay for the intelligent use of manures of some sort to a far greater extent than at present. And while some of you may think it a waste of time to talk on *this* subject, there may be some that can gain a few crumbs of comfort from the experiences of a poor Yankee whose very bread and butter has depended on a careful study of the manure question. At a recent meeting, while discussing this same subject, I said :

“ Well rotted stable manure is usually at hand on most farms, and if applied liberally will give good returns, but from a somewhat careful study of the manure question in the cultivation of large fields of strawberries for market, I think a better crop of fruit can usually be had from the use of commercial manures, having less nitrogen, and the fruit be of better texture and flavor than when stable manure is used or nitrogenous commercial fertilizers. I may not be able to explain it to the satisfaction of the scientific gentlemen here present, but the strawberry is a gross feeder, and whenever well rotted manures or fertilizers containing a large amount of readily available plant food of a nitrogenous character, such as blood and bone, Peruvian guano, or fish scrap are used, it will take them up greedily, and a very rank foliage growth is the result the first year and the plant seems to make its plans for an enormous crop the next season. But somehow it never quite keeps its promises, making a much greater show of foliage than of fruit, and what fruit there is is watery and insipid in flavor and lacking in firmness.

“ On the other hand, I have found a manure of raw ground bone and wood ashes, or muriate of potash, to encourage a much less rapid plant-growth early the first season, but that it is steady and even the whole season through, and by fall we have a fine stand of well developed but not rank foliage plants that will always, at fruiting season the next year, give a heavy crop of firmer, brighter colored and better flavored berries than can be grown on the same soil by the aid of manures containing a large percentage of nitrogen. Whatever manure is used it should be applied broadcast after plowing, and thoroughly harrowed in.”

Now, understand, these experiments were made and results obtained on poor, worn-out New England soil, some of it so reduced in fertility that in a favorable season less than five bushels of rye was the most that could be obtained per acre, and it would not be reasonable to expect that the same manure would produce the like results, or at least to such an extent, here at the West on your soils that are not as deficient in plant food. Yet I believe it will pay any of you that are cultivating the strawberry for profit to experiment and find out, if possible, what special fertilizers, if any, will improve the fruit in any way so as to increase your profits.

Potash, in its various forms, I have tested on light sand, on loamy soil, on heavy clay and on muck bottom lands, and in every case found it has greatly improved the *flavor* of the strawberry, its effects, however, being more marked on some varieties than on others. It also has a marked effect on the color of the fruit, giving it a much richer, darker color; and while the time of appli-

cation seems to make little difference with the flavor, it does with the color, the most marked change being noticed where it has been applied early in the spring previous to fruiting.

But enough of the fertilizer question. We have much to learn yet in this as well as in other points of successful berry culture. Yet even now we can, to a certain extent, manufacture (if I may be allowed to use the term) just such fruit as we may want by supplying the proper raw materials in the form of plant food in the right proportions and by cross fertilization when in bloom, for not only are the pistillate varieties greatly affected by the perfect flowering ones that supply the pollen, but even the perfect flowering varieties themselves are more or less affected by other perfect flowering ones if planted with or near them. Thus, Wilson and Sharpless grown together the past season gave larger, more irregular and better flavored Wilsons than when grown alone, while the Sharpless were darker in color, firmer and more acid than when alone; and from my present light on the subject, if I were growing the Wilson strawberry for profit, every third row would be planted with Sharpless, or some other perfect flowering large berry, to increase its size, while to improve its flavor I would use President Wilder, Downing, or other fine flavored varieties. However, this change in the perfect flowering varieties is not as noticeable or important as in the pistillates, and I only call attention to it to provoke discussion.

Many of the pistillate varieties, being the most productive of any we have, are being extensively planted for market, hence it is of great importance for us to know just how to treat them to obtain the best results.

Some years ago, when I first mentioned it before the New Jersey State Horticultural Society, only one man, Mr. Jesse B. Rogers, was willing to bear me witness that there was any noticeable difference where various perfect flowering varieties were used to supply the pollen to the pistillate flowers. Since then many experiments have been made, and it is now an undisputed fact that the size, form, color, flavor and texture of the pistillate strawberry depends to a considerable extent upon what variety is used to fertilize its blossoms.

Plant Wilson with Crescent and you get bright colored, good formed Crescents that are moderately firm but very acid, while Downing with Crescent will cause the fruit to be lighter in color, quite soft, and of moderately good flavor; with Sharpless the Crescent increases in size as well as in the number of irregular formed berries. Take the Manchester, one of the most regular and perfect in form, fertilized by Wilson, Mt. Vernon or Cumberland, and every berry will be as perfect in form as though run in a mould, while fertilized by Sharpless or President Lincoln, many of them will be irregular and imperfect. Manchester with Pioneer was very light in color, while with Black Defiance the difference was so marked that it was hard to believe it was the same berry. Manchester with Wilson was a very acid berry, while with Miner's Prolific and Charles Downing it was of fine flavor. I might give

other facts, but perhaps these are enough. They have at least convinced me that if I have a good pistillate strawberry lacking only in firmness, this can be improved to a great extent by planting it with Wilson or other perfect flowing sorts that are firm. Increase the size by planting with larger varieties, and so on through the whole list. *Color, flavor and form*, all can be more or less changed by the aid of the right perfect flowering varieties.

DISCUSSION ON STRAWBERRY CULTURE.

Prof. Burrill, of Illinois—I can not help but express my gratification at having this subject of cross fertilization so ably presented. For my part I hope we can have all the facts Mr. Hale can give us for publication. The thing we are after is not the seeds but the pulp. We are not so sure that the seeds will partake of the character of both berries. I should not be surprised if we should learn to grow strawberries without fertilizing and without seeds. The process has been brought about in the banana. You do not find seeds there. There are the rudiments and that is all. What has been done with it may be possible with the strawberry. A yellow Bellflower tree was neighbor to a Russet, and it gave some Russet appearance to the fruit of the Bellflower. If cross fertilization affects all the strawberry, I do not know but it will affect the whole apple.

Mr. Pearce, of Ohio—In my father's orchard two varieties, the Russet and Belmont, mixed so they were sometimes scarcely distinguishable. It set me to thinking. I have noticed the same thing in the strawberry. I have been laughed at, but I believe in this.

Mr. Smith, of New York—One thought occurs to me with regard to the success of the grower of the strawberry. My experience has been that success has depended upon the keeping off of the runners. On my way to Philadelphia last fall I stopped with a friend. He said his berries netted forty-five cents a quart because he had gotten up a reputation for growing such berries. He said it was due to keeping off the runners. One point was suggested to me in the effect of fertilization on the seeds of the plant. One gentleman speaks of the crossing of the two varieties of apples. I can go a step farther. Fruits of different species, such as the pear and butternut, became so hybridized we could scarcely tell the difference. [Laughter.] I do not speak without knowing. Here is a pear taken from

one of those trees, and here is one sawed in two, and you see the butternut inside. [Great laughter.] This is no Yankee trick.

The President—I suppose this is from Connecticut.

Mr. Pierce, of Minnesota—Some years ago I went to a very successful strawberry grower in this State. He always beat me. I told him I was going away and would not be in opposition to him and I wanted to know how he grew his fruit. He said it was by planting varieties together which were adapted to each other. I went to Minnesota with his suggestion. I planted a row of one variety and then of another adapted to it, and so on. When the season of ripening came they were the finest berries I ever raised.

Prof. Burrill—This is a subject upon which crude observation and experiments may be made, and it will be hard to sift out what is valuable. Some people are a good deal better to make such observation than others. It is so easy to infer a cause which is not a cause. If we were to plant one long line of strawberries in a field with first one fertilizer and then another, we might reach conclusions which would not be correct. There are so many things to take into consideration. I need not name a number of delusions which might come up.

Mr. Munson, of Texas—Going in a different direction with a different fruit, and one in which we would not expect to see the effect of this cross fertilization, I have experimented with grape seeds. My theory is that natural fertilization is better than by hand. My method is to plant vines side by side that I wish to hybridize. I think I can tell those berries having hybrid seeds in them. Particularly was this the case with the Triumph and Herbemont. One remarkable thing I have noticed is the effect on the new hybrid plant. The Herbemont at first is slow in growth, but the hybrids from it were vigorous growers. This growth shows that they are hybrids. I have noticed the same facts in corn. Take a variety which you know has no striped grains and put it by one which has and they will cross. I think we have sufficient evidence already to say that the fruit and plant are influenced by this process.

Mr. Ohmer, of Ohio—This is a new idea with many of us, and as I am connected with the Board having control of our Experiment

Station in Ohio, I am going to introduce this subject and report to our next meeting. I think others should do the same.

Mr. Hale, of Connecticut—Most of the experiments we have made have been in places half a mile apart, not in a long row.

Mr. Peffer, of Wisconsin—If we do anything in this way we must do it thoroughly. We must do it right or we can not depend upon it. The only way to do it successfully is to have each experiment separate. You must remove the stamens from a flower if necessary to keep it from fertilizing itself.

Mr. Webb, of Kentucky—I came 700 miles to attend this meeting and I am probably on the way to find out a fact which will more than pay my expenses. I had a row about 300 feet long with two varieties in it. Next to it I had a row of Crescent. I had fruited it before but the berries were not large. I did not know why they were not large till now. They were darker in color, too. I am going to experiment in this direction.

Mr. Wellhouse, of Kansas—It is a question with me whether all these results are from cross fertilization. Is it not from the influence of tree upon tree? My attention was called to this by noticing in two rows of apple trees, where one variety was influenced by one kind in one place, and another in another, and there was a difference in them. I am satisfied it is not all from fertilization, but from the influence of trees upon each other.

Mr. Masters, of Nebraska—I have investigated this subject somewhat. I commenced investigating with the strawberry. I grew Crescent by Sharpless and thought perhaps I did not have the right berry for the Crescent. I suppose it was cross fertilization that deceived me. There is another thing I have observed. Where I have set apple trees separate from other varieties the fruit was different from those set by other varieties.

REPORT OF THE COMMITTEE ON NOMENCLATURE.

Mr. Johnson, of Indiana, made the following report for the Committee on Nomenclature:

Your Committee on Nomenclature beg leave to report that we indorse the recommendations made by Hon. Marshall P. Wilder, President of the American Pomological Society, as well as those of our President Earle, looking to a simplification

and uniformity of the names of the fruits of America, and recommend the following rules, to-wit:

1. Every fruit should have one, and but one, authorized name.
2. If tenable, this name should be the earliest one published, as hereinafter provided.
3. Each name should consist of one word, and for all new American fruits such words should be readily pronounceable in the English language.
4. No name should be considered authorized until published in some reputable and generally accessible horticultural periodical, accompanied with a clear and full description of the fruit. Such published name and description shall be sent to the Secretary of the American Pomological Society and to the Secretary of the Mississippi Valley Horticultural Society.
5. In case of doubt as to tenability, priority or authority of publication, or appropriateness as a good English word, special action by the above named societies, or by a State horticultural society, should be considered valid and final.
6. No variety of fruit shall be named by a society which is not esteemed practically valuable and worthy of cultivation.

This report to be considered as a recommendation to the American Pomological Society.

DISCUSSION ON THE REPORT.

The Secretary—I am very much pleased with this report in every particular, but it does not go quite far enough. What are we to do with these terrible Russian names? Can we not have them Americanized in some way so that we can pronounce them? Can our committee give us any relief?

Mr. Williams, of Indiana—I think none are more desirous of simplifying the names of our fruits than commission men. Fruits go a good deal according to their name. Everybody knows what a Bartlett is. Commission men are often perplexed by people who want certain kinds of fruit and can't give the name. The idea of bringing such names to this country is preposterous.

Mr. Peffer, of Wisconsin—I think the last speaker is correct. I visited Prof. Budd. I found a great many Swedish, Russian and Norwegian names which he could not pronounce. I think the suggestion a good one.

Mr. Gibbs, of Minnesota—I am not quite clear whether this is intended to be a recommendation to the American Pomological Society or whether it is for this meeting to name varieties. We are members of the Pomological Society, and it would create confusion for us to name them here. This report authorizes persons to name varieties.

The Secretary—Every parent has a right to name his child; this is simply a recommendation that the name be published.

Mr. Goodman, of Missouri—Several apples have been originated here and we have claimed the right to name them and then send the name to the Pomological Society. I think the work of this committee, to a great extent, should be to simplify the names we already have.

Mr. Ohmer, of Ohio—If we have to wait for the Pomological Society to name varieties, it meeting only once in two years, we would have to wait too long.

Mr. Masters, of Nebraska—The Pomological Society recognizes a person's right to name.

Mr. Wellhouse, of Kansas—I think Mr. Goodman hit the right point. We not only want to recommend as to new varieties, but we want to change old names also.

Mr. Pearce, of Ohio—May I read section four of the report? I think it is not understood. [He reads it.] This gives no authority but gives notice of names given.

Prof. Burrill, of Illinois—Section five does not prohibit a person naming, but the Society may change it if it is best.

The President—I think it is the purpose of Mr. Wilder and others to simplify old names as they can without too much confusion. This is done somewhat already. The Beurre de'Anjou is called Anjou, as it should be. This is like the spelling reform, it must be done cautiously.

Prof. Popenoe, of Kansas—It seems to me the names revised should be local.

Mr. Munson, of Texas—We should have a standard of authority, as we have a standard dictionary.

Mr. Pierce, of Minnesota—We must go slowly, or we will get into confusion. So many apples are easily confused by the names.

On motion the report was adopted, after which the Society adjourned.

Third Day—Thursday.

AFTERNOON SESSION.

The Society was called to order at 2:30, by President Earle.

The President—Ladies and gentlemen: The first paper we shall hear this afternoon will lead our thoughts along one of the finer lines of horticulture. We can not spend all our time, however practical we are, and we are most practical, in talking about packages we use, the fruit we put in them, or the means of transportation. There are influences of a higher nature. I have great satisfaction in presenting to you Mrs. G. A. Tryon, of Galesburg, Illinois, who will read to you a paper on the educational power of horticulture.

EDUCATIONAL INFLUENCE OF HORTICULTURE.

BY MRS. G. A. TRYON, OF ILLINOIS.

Horticulture stands preeminent among the great industries of the world as an educator of the people. Her instructions faithfully carried out will be crowned with success.

Our first horticulturists were not a success. They were placed in a "garden of delights," just fresh from the Maker's hand. They were to dress it, keep it beautiful, and thus earn an honest living. They were not to idly eat of the luscious fruit, and feast the eye on the surpassing loveliness around them. They were to study God's perfect plan and work up to his standard. They were to improve their hearts and minds by cultivating an intimate acquaintance with these beautiful creations which formed the connecting link between themselves and their Mother Earth.

These living, moving, growing things, in their infinite variety, were, in their turn, to be their companions, their silent teachers, their educators. They beheld around them beauty without vanity, strength without roughness, homage without pride.

Lessons of industry, endurance, modesty, constancy, faithfulness, reverence, adoration—in short everything that goes to make up a perfectly rounded character, found its counterpart in nature, and taught the beautiful lessons of life. A young couple never had a better start in life, or a better opportunity to make something of themselves. But vigilance was the price of success then, as now. And just as everything was at a high tide of prosperity precious time was spent in gossiping with an unprincipled neighbor. Morals were corrupted, business neglected, weeds, thorns and thistles grew apace. Shame and disgrace and a forfeiture of their once beautiful home followed in quick succession. But happily for us, they retained in their hearts a

peculiar reverence and an undying love for trees, shrubs and flowers, and some practical knowledge of horticulture. And whenever this passion is allowed to take possession of one, the earnest, though perhaps unconscious endeavor is, to reproduce the lost Eden, the garden of delight. And with this effort comes the silent, yet potent influence of all nature's instructors, leading the heart of man back to its pristine purity.

Hence it follows that in all climes and among all nations, the refinement, morality and happiness of a people may be measured by the plants they cultivate, and the variety and perfection of their garden vegetables.

On the other hand, the *natural* developements in the vegetable kingdom largely determine the tastes and character of a people. In the extreme North where vegetation is scanty and color somber, and the Ice King holds undisputed sway, the inhabitants are content with their snowy huts, pot of blubber, and costume wrested from the back of bear and seal.

As latitude diminishes and the Ice King's power is partially broken, and vegetation takes on a greater variety of form and color, man is correspondingly stimulated to activity. He begins to rise above the mere necessities of life and we catch the first glimpses of culture. As we pass through successive degrees of latitude a gradual change in the habits, tastes and aspirations of the people keep pace with nature's floral developments until the point is reached where the four seasons follow each other in distinct succession. The earth is stimulated to greater activity. Field, forest, mountain and plain become richly decorated with an abundant variety of grass, shrubs and trees, suggesting to the mind of man important enterprises. The felling of trees and converting them into lumber is an immense business. Out of this grows ship building, which has reached magnificent proportions; and house architecture, which has attained various degrees of perfection, from the cabins of the backwoodsman to palatial residences and century building cathedrals. In this region, where sunshine and storm, heat and cold are about equally balanced, and often contend for the mastery, vegetation is vigorous and persistent, and we find a people noted for energy, push, vim, who set in motion machinery, found colleges, build railroads, annihilate time and space by telegraph and telephone. But husbandry is the underlying principle, the foundation out of which and on which all these enterprises grow.

As we come into the sunny South, this most royal clime, where vegetation simply revels in its own luxuriant perfection; where nature gives with a lavish hand even the delicacies of life for the simple asking, we find a people proverbial for tender and warm affections, unbounded hospitality and keenly sensitive to beauty, loveliness and grace. It is here the fine arts reach their highest perfection. The old masters of painting, sculpture and music largely drew their inspiration from their natural surroundings. And then there *seems* to be more time in this clime, and no necessity for push and a rush. A higher degree of perfection is easily reached in nature, and in the arts and sciences we note a corresponding superexcellence with apparently less exertion.

Had Columbus landed on the rugged and forbidding coast of Labrador, where all is bleak and sterile, and where the few stunted spruce, birches and aspens struggle for life amid the thickly strewn bowlders, his enterprise and discovery might have shared the fate of other navigators. But instead, he landed on a fertile island, brilliant with foliage and flowers, sparkling with springs and streams, abounding in fruits and valuable woods. The heart of Columbus and his mutinous crew were at once cheered, softened, expanded, inspired; their trials and hardships were forgotten, and with courageous hope they builded better than they knew.

The horticulturist, to be successful, must study and imitate nature. A farmer, whether north or south, who devotes his time and labor to the raising of some one thing, as corn or wheat, cotton or tobacco, as a rule, is not as intelligent, public-spirited, refined, or social as the small farmer who combines horticulture with agriculture.

The large farming, which is obtaining in the Western States, is not calculated to educate the people up to a *high* standard of civilization. These vast factories of nature's products contain no element of the real home. The only cementing element is money, and when that is attained disintegration is sure to follow. "Every one for self" is the universal motto. The most money for the least labor on the one side, and the most labor for the least money on the other. The affections are not softened, but the reverse. Intellectual superiority consists in being sharp in a bargain. Public improvement for the general good is not thought of; morals and religion are considered unnecessary; the Sabbath is hailed, not as a day of rest, to be kept holy, but as a convenient time to ride about the country, or to post books.

And this result is almost universal. England at one time was on the verge of moral bankruptcy. One of her divines traced the evil to the solitary pursuit of large farmers. The rich grew richer, and the poor poorer, until the antagonism between the two classes was fearful to contemplate. Theft, murder and arson were rampant throughout the land. And as one aptly puts it, "The poor, who have always been fed by the plow, now have nothing to do, but go from door to door and ask alms for God's sake. And, some because they will not beg, do steal, and then they be hanged, and the realm doth decay." Act after act was passed to check this state of things, with only partial success. England has been hampered more or less to the present time. And now Mr. Gladstone, with his characteristic good sense, proposes small farming as a remedy for the present ills of England. In short, he advises them to turn horticulturists. Like Euripides of ancient Greece, he believes it is the intelligent, refined homes of the horticulturists that save the nation.

A gentleman, expensively educated in Europe, took his fortune in his hand, crossed the ocean, and settled on a Brazillian coffee plantation. Closing his eyes and heart to the beauties of nature and her ample resources, he soon became entirely absorbed in his solitary pursuit. His coffee plants, which were subjected to endless experiments simply for his own profit, his

laborers, which to him were a part of his machinery, and his accumulating fortune claimed his entire attention, and prevented him from taking any interest in the world, its doings, or necessities. Being intelligent, and naturally progressive, his new ideas, expensive machinery, and wonderful achievements were the astonishment not delight of his neighbors. For as he grew rich, they grew poor. He literally absorbed everything around him. The neglected grounds, and smileless faces of his poorer neighbors told too truly the secret of his success.

Neither the farm nor the plantation nor the ranch should be a place of drudgery and unthinking, monotonous toil. Work, hard work, there must be. But this is incident to any undertaking, moral, mental or physical. But labor, to be improving, as well as remunerative, must not only be connected with thought, study and research, but with recreative diversity. Every farm, large or small, should combine the delicate, attractive duties of horticulture, which can hardly be separated from floriculture, with the sterner duties of agriculture. The former is to the latter what light is to the landscape, the sparkling stone to the golden crown, the finished capital to the fluted column, the brilliant rainbow to the darkening cloud; a final touch, giving a charm of grace to the plain necessities of life. Here woman finds ample scope for the free exercise of her taste and skill. Our Brazillian friend was a bachelor. But had there been deft fingers to encircle his ample porch with carefully trained vines; had his lawn been dotted here and there with beautiful plants and brilliant flowers, creating a delicious commingling of love and admiration; had vases of fragrant bloom been placed with careful negligence about the house, to attract his attention and arrest his sordid thoughts, think you he could have worshiped gold for its own sake with the same devotion, and remained as indifferent to the interests of those about him? Never!

As a recreation, horticulture can be engaged in by old and young, rich and poor, learned and unlearned, alike, producing pleasure without alloy, and unrivaled sweets without treachery. O, the blessed influence of nature's growth! Silent, constant, progressive. Nature creates no antagonisms, no resentment. Rivalry, envy, strife, jealousy, find no food for growth here. And unlike most other pursuits, every effort brings its own reward, from the cultivation of a single plant, shrub or tree, to the magnificent extent and proportion of a Shaw's Botanical Garden. With loving care, such as a child may give, a plant will develop the same beauty of flower, the same perfection of fruit, and teach the same lessons by the cottage of the poor as by the palace of the millionaire. In this God is verily no respecter of persons.

The weary mother turns from her perplexing household cares to her plants, the offspring of her forethought and skill, and finds in the care of them a solace and a comfort, and restful inspiration not connected with any other duty. With every draught of water, every pruning process, some new development, some unexpected beauty is presented, to charm dull care away, to lighten the burden of life, and inspire the heart with hope and courage.

Education of any sort, based on philanthropic and Christian principles, elevates. Horticulture, whether engaged in as a business or recreation, carries with it its own great moral and scientific lessons, lessons which never have to be learned anew under a more competent successor. And yet variety, not monotony, is the rule. Day follows night with mathematical precision, and yet no two days are alike. The seasons succeed each other in regular order throughout the centuries, and yet how definitely the seasons stand out in the memory, distinguished for heat or cold, rain or sunshine, or the perfect combination of these elements. Nature never travels in a rut; yet seed time and harvest are as sure as the sun itself, and seed put into the ground will produce its own again. But it is in the power of man to increase the yield, improve the kind, and even to produce new varieties. The results of horticulture stand next to creation itself. There seems absolutely no limit to improvements or new achievements.

College education to be of avail on the farm must be underlaid and overlaid and inwrought with good, practical common sense. One may be able to elucidate the most obscure passages of the grand old Greek and Roman writers, he may be able to walk boldly side by side with the ablest mathematicians and astronomers, yea, he may understand all mystery and all knowledge, and yet not be able to intelligently direct the cultivation of a hill of potatoes. Such common, matter of fact, every day things have had no claim upon his lofty intellect. It may be said this is an extreme case; happy for our country that it is so.

And yet these cases are not so very rare. Doubtless every one present has in mind one or more who would answer to this description. Impractical lawyers, doctors, ministers; impractical merchants, mechanics and teachers. We often hear it said of these men, they are well educated, why so little success in life? Because they are more familiar with printers' ink than with nature. Books, musty and modern, have been their companions. "Sermons in stones and books in running brooks" have never caught their attention. But let one of this class take hold of horticulture if we want to see the absurdity of a theoretical versus a practical education.

There comes to mind a gentleman bearing the highest collegiate honors. This was followed by comprehensive preparation for the ministry. But his lofty mind soared so far above the masses with whom he had to do, that short pastorals were inevitable. At length he thought to turn his attention to fancy farming, in which (*he had read*) was bound up the fortune which would maintain his rapidly increasing and expensive family. He took no hints from nature. Soil, surface, surroundings were of no consideration. He studied catalogues. Everything was to be Utopian. The landscape gardener was called in. Lawn and garden were laid out in the most astonishing patterns. Imported seeds and bulbs only met his approval. Rare exotics and the choicest plants and vegetables of his own country only were fit to adorn his grounds and tickle his palate. Fast horses, fancy stock, gay plumaged fowls took their place as superadded ornaments. He read about getting

ahead of nature in the use of cold frames and hot bed. He decided to astonish his rural neighbors by untimely lettuce and radishes. All this was well enough, but neither farm nor garden can be wound up and set going like an eight-day clock. One of the most practical lessons in husbandry is uniform diligence. While he and his family were riding through the country in their luxurious carriage, things did not take care of themselves. He set in motion a great variety of operations, but they lacked a balance indeed. With all his boasted knowledge of astronomy, meteorology and kindred subjects, he failed to note the proper time for transplanting, cultivating and harvesting. A very genius in mathematics, he failed to keep the balance between expense and income, debt and credit, interest and discount. These problems he did not solve. The result, not the one aimed at, but bankruptcy, was soon reached. Instead of a blessing he became a laughing stock in the community. Like our first parents, he educated the people negatively.

Let us take another picture, just as true to facts as the above. An educated merchant, wishing freedom from indoor toil and constant contact with the varying phases of human nature, bought a farm, the cultivated portion of which was a tangled mass of brush, weeds, half used straw-stacks, decaying rails, unkempt orchard, and an accumulation of rubbish generally. Having been from boyhood a close observer of nature, he saw at a glance that she had been lavish in her expenditures and adornments, which the slovenly farmer had not been able to obliterate. First began the work of renovation. Father, mother, son and daughter, down to the little four year old, lent a helping hand. A beautiful shade tree took the place of the rickety chicken coop, not ten feet from the house. A rose bush superseded the ash barrel. All the appliances for soap making were removed to a more quiet corner. The bonfire made up of front yard adornments was magnificent, and the children wished there was more. The pigs and chickens soon came to understand that their proper place was about the barnyard. The bare ground was soon covered with a carpet of green. The soil of the garden, field, knoll and ravine were carefully examined to know what vegetable, grain or tree best adapted to certain localities. Succession of garden and field crops were systematically arranged, to make the most of a season and keep the soil in best condition. The family did not leave behind them the polish and culture of refined society, but this was all so thoroughly enveloped by a social, neighborly interest that the hearts of their rural friends were won. They began to enjoy the new state of things, and soon found that nothing, in the way of cultivation or expense, had been undertaken but what they themselves could do. Little by little the surrounding farms began to take on a more cheerful aspect. Weeds no longer had things all their own way. Neighborhood quarrels about line fences and unruly cattle settled themselves and were forgotten. Order and thrift took the place of carelessness and negligence.

Even the district school was startled into new life by the introduction of new faces and new voices. The hum-drum routine of school life, without progress and without interest, began to be oppressive to the children. The

new comer complimentarily suggested that they had the material for the best school in the county, why not have the best teacher. One was procured and retained. The prophetic suggestion was fulfilled. In two years it actually became the banner school of the county, taking the greatest number and highest premiums in the educational department at the county fair, and gaining rich laurels at the State fair. From this school have gone out seven successful teachers. Eight have taken or are taking a college course. The farms are still improving. Wealth is increasing. Literary attainments and social refinement satisfy the aspirations of the young. And farm life, conducted on scientific, horticultural principles, is fast taking precedence of trades and professions in that community.

How many such hamlets scattered throughout the length and breadth of this Mississippi valley are waiting the magnetic presence of some common sense, energetic, unselfish family to stir them into life and give directions to willing hearts and ready hands. There is no place of equal size on the face of the earth better adapted to the highest perfection of horticulture than this magnificent valley, containing, as it does, the most wonderful combination of climate, soil, vegetables, flowers, trees, birds, minerals, animals, and every description of the choicest building materials—just the place where we may strive with a laudable ambition to regain the lost Eden. The successful continuance of this Association will be a strong factor in elevating the standard of horticulture by discussing and printing the best and newest and most profitable things to do, and the best way of doing them.

Scientific farming has developed a literature all its own. Some of the most ably conducted journals in this country and in England are devoted mainly to the interests of horticulture. These journals are often the entering wedge for high intellectual attainments. As soon as a community of farmers is made to realize the possibilities within their grasp, they naturally want to know the best way of doing things for profit and for beauty. This necessity creates a demand for a magazine club or a circulating library. Finding themselves impeded by a lack of early education, they no longer confidently trust their children to the care of strangers, who may possibly see more in their money than their children. They know for themselves whether a proper foundation is being laid for their sons and daughters. This, in turn, stimulates the young people, and literary societies and debating clubs are formed. They begin to take on refinement of manners; art is studied; farm decoration, house decoration and personal adornment follow in due time. Church and state, private charities and missionary interest receive attention and support. The whole community is transformed from a number of uninteresting, illiterate farmer families to a community of refined intelligence. There has been no lack of honest toil, but when we work with nature intelligently there is nothing to blunt the sensibilities nor dwarf the soul. Every day there is some new development of the creative power. The opening of the earth by the tiny leaf, the unfolding of a flower, the ripening of the fruit, the growth and perfection of an edible root—every thing is calculated to develop, elevate

and purify the mind and heart of man. And from such communities and such surroundings often come our strongest, truest, purest public men; men that the nation delights to own and honor.

Horticulture is progressive in a material sense. Scores of instances could be cited where a slip of geranium or begonia, given by a loving friend and placed in a teapot or old fruit can, has been the beginning of a grand success. The slip grows, and delicately suggests better quarters. A vase is procured. Then it lovingly hints companionship. One by one other plants take their places in the little window. Natural growth and successive additions soon call for more room. Then extra care and diligence are given to garden, field, fruit and fowl that extra dollars may be saved for the coveted bay window. It is soon radiant from top to bottom with the happy plants. The lesson of economical thrift is not lost. The intelligent cultivation and disposal of fruits, vegetables and grain, soon puts the farmer in condition to gratify the growing desire of the family for a new house with conservatory. This creates a quiet demand for choice plants, at quiet prices, simply covering cost. Cut flowers are freely given for festive and funeral occasions. The demand grows, and with it the necessity for market prices. The farmer sees there is money in it. A green-house is suggested and carried into execution. A lucrative business is established, which carries a benediction with it into thousands of homes.

In the *Floral Guide* for '83 a son of the late lamented Vick says: "Well do I remember the time when father brought his whole day's mail home in his pocket, the next morning carrying his seeds to the office in a small market basket; and published a four-page catalogue. Last winter we mailed nearly a quarter of a million of *Floral Guides*, 130 pages each; receiving some days over three thousand letters, and requiring several wagons to carry freight and express packages, and more than one wagon every day to take the seeds bagged and stamped to the postal car. All these changes he lived to see, and yet amidst all his cares he was never too busy to wear a cheerful face, say a kind word, or give a bit of friendly advice."

If any one department is more soul-inspiring or better calculated to draw out and awake to new life the spiritual nature, it is the cultivation and growth, or even the simple presence of trees. No farmer can afford to do without the educating influence of trees; not only ornamental and fruit trees, but a woodland, a grove, a forest; and if nature has not supplied these, or if the desecrating hand of man has shorn you of your richest blessing, then Gov. Furnas and Prof. Lazenby will give you definite instruction just how to proceed to secure this boon. It will require faith, patience and public spirit to start an enterprise that will take ten, fifteen or fifty years to complete. But aside from the important part it plays in our landscapes, and its usefulness in the arts and economies of life, and its climatic effects, every farmer's family needs the restful, heart-lifting influence of the forest. The groves were God's first temples, and they are just as pure to-day as when they crowned the hills of Paradise, and during all the intervening ages they have offered a sacred retreat where man may meet the heavenly influences.

The sacred writers and Christ himself were devout students of nature. Most of their incomparable illustrations and happiest truths were drawn from the sap reading tree, the cultivated field, the sower of seed, the household garden, the ripening fruit, the tender vine, and even the withering grass and the fading flower. The Sweet Singer of Israel seems to have found the highest place in the heart of nature. His inimitable psalms are fraught with her tender breathings and her bounding pulsations. The pure in heart are compared to a tree planted by the rivers of water, and the wicked to chaff. He sees the hill to skip like lambs and the trees to clap their hands in praise of the great Creator.

Thus we see that nature, intelligently interpreted, touches every part of our being.

Horticulture is a copartnership, with Nature as senior partner; and whatever dividends are declared, as the years go round, enrich the individual farmer and the world. As a rule the amount of this dividend depends upon the intelligent co-operation of the farmer. One law of Nature is order; the farmer must obey it. Another is methodical, systematic thoroughness. Due regard to this will prove the philosopher's stone, with which to secure the golden future.

As man's inventive genius continues to bring to his aid labor-saving machinery, almost automatic in its perfection, the compact rises in importance, and is commanding the admiration of the world. We seem to be entering upon a new civilization, which demands of us greater intelligence and a higher education to meet its requirements. This means a happiness in our homes, a satisfaction in our labor, and a prosperity in our calling far above what we now enjoy.

Then let us not hesitate, as an association, to raise the standard of culture high, and yet higher, until horticulture, in all its varied departments, shall universally be acknowledged as standing pre-eminent among the great industries of the world as an educator of the people.

Mr. Ohmer, of Ohio—Very many good and valuable papers have been read before this Society. None are more deserving than this. I move a vote of thanks for this paper.

A standing vote was called for, and it was unanimous.

The President—I think we should always give time for one or two papers from ladies. At New Orleans we had two papers of this kind, and we thought that hour was the best one spent there. I think you will consider this hour the best one spent in Kansas City.

Mr. Johnson, of Kansas—Several of us were afraid that a misunderstanding would grow out of the action, or want of action, this

forenoon, in regard to extending this Society to other localities. I present the following :

WHEREAS, Horticulturists recognize the entire world as their field, and all mankind as their fellow-workers; and,

WHEREAS, The great importance of the various branches of horticulture demands the fullest information obtainable from any and all localities having experience, that the greatest good may result to all lovers of "the art that doth mend nature;" therefore,

Resolved, That, to further this end, our President and Secretary be, and are hereby instructed to invite the horticulturists of every State, Territory and Province in America to co-operate with the Mississippi Valley Horticultural Society, and participate in its meetings and exercises.

The resolution was adopted.

The President—Now, ladies and gentlemen, the transition is rather a sudden one, from this most excellent paper of Mrs. Tryon to one which must discuss practical, every-day questions, and in which there will be no room for anything but business. We must devote time now to fruit packages.

E. T. Hollister, of St. Louis, was introduced and read the following :

THE BEST FRUIT PACKAGES.

BY E. T. HOLLISTER, OF MISSOURI.

Next to the successful production of fruits and vegetables, the most important matter to be considered by the horticulturist is how to place them upon the market so as to realize the greatest amount of profit from them, and to do so he must ascertain the kind of package that will carry them to market in the best condition, and be the most acceptable to the purchaser, for he is the one from whom your income is derived, and the one who really dictates what you must produce and how you must handle and pack it; and it has now become an almost absolute necessity that the horticulturists of all sections of the country should adopt a uniform style of package, so that a dealer in ordering goods from any market may know exactly what he is going to get, thus avoiding the losses and disappointments that are liable to occur from the use of different styles and sizes of packages.

The most important article upon our list is the apple, an article that is to be found in the market at all seasons of the year, is wanted in almost every market in the world, and enters into more general use than any other article produced by the fruit grower.

Years ago, when almost the only fruit growing district in the West was what is now known as the "Alton District," the lime barrel containing ten

pecks, being the most convenient low-priced package to be obtained, was adopted as the standard apple barrel, and, as other sections of the West came into line, the same sized barrel was used, making the two and a half bushel barrel standard in the country bordering upon the Mississippi river.

Gradually the facilities for transportation increased, and our apples yearly came more and more into competition with those from Indiana, Michigan, New York and other States, where the three bushel barrel was in general use, and the Western dealer soon learned that it was impossible for him to sell his "pony" barrel by the side of the full sized package, and that he was forced to take a back seat and accept a price much below that of his Eastern neighbor, principally because of the fact that the transportation companies had agreed upon a standard of one hundred and fifty pounds weight for a barrel of apples, and the buyer who wanted to ship his fruit a long distance was enabled to transport twenty per cent. more fruit for the same amount of money, and always refused to accept the small barrel except at a price sufficiently low to overcome this difference in transportation.

Then commenced a contest between the dealer and the producer, the former demanding three bushels and the latter declining to furnish over two and a half bushels for a barrel, until the dealer was forced to purchase his apples by the bushel, thus accomplishing the same end, until the producer became accustomed to the full sized package, and at the present time the barrel in use all over the country is the size of a flour barrel, containing three bushels of apples.

Therefore we will say, always pack your apples in bright, new, and if possible, flat-hooped, three bushel barrels, lining both heads neatly with the cut head liner, which can be obtained in almost every city of any size, and the result will be seen in the increased size of your pocket book when your fruit has been disposed of.

The pear is shipped in various styles of package, according to quality and the demands of the market in which they are to be sold.

Our experience has taught us that fine selections of this fruit, such as are in demand for the fruit stands or table use, sell best when wrapped and packed in the style of box used by the California growers, which has a head eight and a half by twelve, and slats nineteen inches long, while the culls and common varieties may be shipped in third-bushel boxes or barrels.

Peaches, for long distance, carry best in third-bushel boxes, as that style of package will stand more rough handling and carry the goods to a distant market in better condition than any other; but fine peaches, not intended for reshipment, may be matured upon the tree and carried to market in peck baskets, covered with tarleton, and enclosed in light frames or crates, to prevent the fruit from becoming bruised, in which shape they are almost sure to meet a quick and remunerative demand.

Strawberries, and that class of fruits, should be packed in full dry-measure quart boxes, twenty-four in a case, as that is the most convenient size and

weight for transportation, and not too large for any dealer of any consequence to dispose of to advantage.

In making up the quart boxes, the tacks should always be driven upon an iron surface, so that the points shall become well clinched; and, when the Hallock or square box is used, be certain to use a sufficient number of tacks to prevent the bottom from falling down, making the box appear to be slack filled, crushing the berries in the lower box and greatly depreciating their value.

When making up the Leslie, or long box, always place the checked side of the bottom upward, otherwise it is liable to break down with the same result. Berry boxes should, in all cases, be made up a sufficient length of time before they are needed for use, to enable them to become thoroughly seasoned, otherwise they are certain to arrive in the market in a heated condition, making it impossible to sell them, except to a second-class trade at a second-class price; and many a poor commission merchant has been accused of neglect or dishonesty because of the lack of a knowledge of this fact upon the part of the shipper; and here permit me to say that all fruit and vegetable packages should be thoroughly seasoned before being used, for the same reason.

The red raspberry, being of a more delicate nature, should be packed in the shallow pint box, and is now almost universally shipped in twenty-four-pint cases.

Plums, apricots, nectarines and other articles of this class, carry and sell well in the third-bushel box, and tomatoes should always go to market in the same style of package.

For grapes, the most convenient and best selling package known is a ten-pound basket with a wooden cover that extends over each end, tucks under the hoop, and is fastened with a tack. These baskets may be piled one upon another without crushing the grapes, and are now in almost universal use in all the large grape-growing districts.

String beans and green peas should be shipped in bushel boxes, and cantaloupes, or nutmeg melons, in crates containing one dozen melons, the size of the package being determined by the size of the melons.

In all cases avoid the use of return packages, as they are expensive, requiring a considerable outlay at the beginning of the season, and are seldom returned to the producer until the season is over, and then in a dilapidated condition, making it necessary to repair and store them until the next crop is ready for market, when they have become so stained and weather-beaten as to render them uninviting to the eye of the purchaser, and, consequently, an unprofitable package in which to market your products.

The third-bushel box that is the best adapted to the use of the horticulturist is the one of which the side is composed of a single piece, as the openings at the corners afford sufficient ventilation, and the fruit is not so liable to become damaged as that packed in the box with two slats upon the side.

When placing your fruits or vegetables upon the market, always place

them in new, bright, well and neatly made packages, avoiding those of odd size, shape, or second-hand, never permitting your barrels or boxes to be exposed to the effects of the sun or rain; ever bearing in mind the fact that your goods must be exposed for sale in competition with those of other producers, and that a neat, bright package will, in every case, attract the eye of a buyer before that of your less careful neighbor, is the first to sell, and usually at the best price.

The President—This paper is full of weighty subjects.

Mr. Munson, of Texas—I would like to propose a vote of thanks for this paper. It will afford information, if heeded, which will do fruit growers more good than any other paper I have heard.

As the report of the Committee on Packages was not ready, the discussion on this paper was deferred for awhile, and a paper was read by E. H. Williams, of Indiana.

Mr. Williams—At the meeting at New Orleans was, perhaps, the first time commission men and horticulturists were brought together. There I got the sobriquet of crown-borer, from some remarks I made, so I am in favor of the Committee on Nomenclature.

THE VALUE OF CAREFUL PACKING AND HANDLING.

BY E. H. WILLIAMS, OF INDIANA.

The subject assigned me is not of my own selection, and is one that would seem useless before a convention composed of such men as are here assembled. Yet it is given me as the task to the "galley slave," and I am expected to present a paper upon it, although it may be as poorly prepared as some of the fruit consigned to us. Yet it is a subject that has a very important place in horticulture.

I also realize the fact that we are but a representative body, and that the information gained by the papers and discussions in this convention pass under the hand of our able Secretary, and are carefully compiled in book form for the benefit of the amateur and imperfect horticulturist, so that if what I may say is of but little information to those present, it may be to others.

A man becomes a self-made fool when he *thinks* he has learned all there is to learn. But while not in that condition, we are all liable to pick up truth and information from almost any one and on any topic, as few have ever been exhausted. We must all agree in the old adage, "that what is worth doing at all is worth doing well," and there is nothing this more aptly applies to than the handling of fruit.

It is not so hard a matter to raise fruit as to prepare it for market. How

often do we see orchards filled with the finest of fruit and not marketable. The grower, perhaps, may have tried, but the poor results, owing to the fact that he had no knowledge of how to prepare his fruit, has discouraged him. When we realize that from one-fourth to one-third of the selling price of our fruit is added to it by preparing it for the market we see its importance. Much of the fruit received in market bears evidence of having been fine fruit, yet the way in which it was prepared destroyed largely its value. And from this arises much of the dissatisfaction to the shipper. He claims his fruit to be as good as his neighbor's, and yet the returns are much less, and at once the commission man is denounced as dishonest and has to stand the blame that should rest on the consignor.

Then there is another class that endeavor to practice economy by using old, or rough, irregular packages, and seem to think because their fruit is fine it will require no pains in putting up, all of which takes from instead of adding to its value.

Let your wife or sweetheart dress in neat, clean attire and she is admired by all, but attired in a slovenly and dirty manner, and no one admires. So with your fruit. Display it in neat form and it is desired, otherwise it is not.

No, gentlemen: there is no part of fruit raising pays so largely for the labor as putting it in shape for market, and in that lies much of your success. Don't be afraid of spending money for neat packages, as it adds more to the fruit than it costs.

THE GATHERING OF FRUIT.

The strawberry should never be picked while wet. The picker should be provided with a tray holding from four to six quart boxes (if they can be shaded the better). All over-ripe fruit should be put in a box by itself, for home use or market, but never for shipping, the small, imperfect berries in another, and kept separate. When brought in, the boxes should be inspected, filled up full, and set in as cool a place as you have until ready to crate. Then each grade of fruit should be crated by itself, and the stencil of the consignee placed on each crate, also a stencil No. 1 or 2, designating the grade of fruit. The number of your stencil soon becomes known, and the reputation of your fruit becomes established according as you are honest in putting it up.

Let me say in this connection that I doubt the propriety of branding with your private stencil, for this reason: Your commission man always goes by the number of your stencil, and then your address is often copied by unreliable parties, and you get into trouble. He makes you large quotations, and tells you his facilities and advantages over all others for getting high prices, and persuades you to change just at a time your fruit is becoming established in the hands of your regular house. He makes you big returns, and gets you to solicit others on the strength of his good sales, until he has your confidence, and you find out only too late that you have been beaten. I do not say this is always the case, but many times it is. Any good, reliable

house will make you more money in the end, than to keep changing as each may flatter you with big prices. The better way is to select your houses in such cities as you expect to ship to, and continue with them through the season.

I leave this, however, for discussion. After your fruit is carefully crated and marked, it should be taken to point of shipment in a spring wagon, and never in a jolt wagon, as the latter jolts and packs the fruit down, bruising it, and thus rendering it less liable to carry safely. Care should also be taken with the fruit while awaiting transportation, that it does not sit either in the sun or rain. It should enter the car in as dry and cool condition as possible. What has been said of the strawberry will apply to the raspberry, except to the red, which should be shipped in pint boxes, with same surface as the quart box.

Grapes ship best in five or ten pound baskets; or, for long shipment, when properly packed, they carry and sell well in stands of four trays each—a tray containing twelve to fifteen pounds. The dry grapes should be picked off, and where the bunch is poorly filled, it is best to discard it, and the good ones packed in with care, and as tight as possible without bruising.

Peaches, pears and early apples sell best in one-third bushel boxes. Peaches and pears should be carefully picked, and all over-ripe fruit discarded, and each variety packed by itself, and of uniform size. The fruit should be laid in the boxes carefully, pressed in so that when the lid is nailed on the fruit can not move. When so packed it carries a long distance. This style of packing will also apply to tomatoes, always bearing in mind that it is dangerous to pack either fruit or vegetables while wet.

I find many raising early apples, and some even later varieties, who allow them to drop off or shake them, which only indicates want of knowledge in the business, or a degree of carelessness that a few ventures ought to remedy. Fruit so gathered seldom realizes enough to pay for handling.

Fall and winter apples should be carefully picked, and packed in new barrels, placing the first layer in the bottom of the barrel, with the stems down, using only average sized fruit; then fill up carefully until full, shaking the barrel gently once or twice while filling. Fill well to the top of the staves; put on the head, and press into place with lever or screw. After the head is nailed in, turn the barrel and mark plainly the variety of fruit. No fruit or vegetables should be mixed in packing, as no two varieties cook or eat alike, and it only diminishes the value of your goods.

Great care should be observed in marking, so that when received by your commission man, he knows at once the varieties, and puts on sale without delay those least liable to keep. If not marked, he has no knowledge of his stock. A customer comes in and calls for certain varieties, but the seller does not know whether he has it in stock or not; in a short time he discovers some ripe varieties, which could have been sold if known to be in stock, decaying badly, and they are at once rushed on the market, only to be slaughtered.

Apples should never be poured in a barrel loose, as they shake around in the barrel and open up slack filled, bruised and unsalable. A very little pains in packing adds much to selling of your fruit. To illustrate: A party shipped us four barrels of Maiden's-Blush, in sugar barrels, poured in loose. When received they were badly bruised, yet showed that it had been fine fruit. A price was placed upon it, but it was rejected as not being worth the money. After standing around all day it was rolled into the house, carefully assorted and repacked in ordinary apple barrels. After throwing out the bruised and discolored fruit, there was enough to fill four ordinary barrels, which were put on sale the next morning and were taken, in a short time, at one dollar per barrel advance of what was asked when received. The work of repacking was the work of about thirty minutes. I wrote the party, complaining of his packing, and his excuse was he did not have time; yet we made four dollars for him in thirty minutes. Now I don't know what he was engaged in, but if he could make more than four dollars in thirty minutes it must have been profitable work.

A case, almost similar, occurred only last week. I might say, though, we do not make a practice of repacking our shippers' fruit, but sell it for what it will bring in the condition in which it is when put up.

Fruit, poured into a barrel, all varieties mixed together, only shows a slovenly and unprofitable way of doing business; and a man so shipping seldom realizes what he expected for his fruit.

Another radical evil we have to contend with is dishonest packing. The fruit is put up with every evidence of being fine stock; but after taking about a half bushel out of the barrel, it only reveals the deception, and is not worth one-half what the first impression would convey. To such an extent is this practiced, in apples especially, that in many markets it is hard to go and buy an honest car of fruit. Some States, however, seeing the injurious effect of such practices, have been grading their fruit into firsts and seconds. Fruit, so packed, meets with ready sale at good prices. This practice is becoming quite common in Michigan, and should be followed by all other States.

I know of but one way to remedy the evil, and that is for commission men receiving such stock to sell at the price of the lowest grade, and when the shipper learns that deception is a losing game he will discontinue it. Much of this fruit, however, has been purchased by innocent parties, and they are compelled to carry out the deception or lose money.

It also has a bad effect on the market, not only in creating distrust, but largely diminishes sales. Parties who retail such fruit say they invariably lose money. They find after selling out a part of a barrel the fruit is so inferior that their customers will do without before paying even cost price, and in this way consumption is largely reduced. This deception is not only in apples, but is practiced in other fruits, especially box fruits.

I believe the horticultural interests of this great Mississippi Valley demand of this Society a severe rebuke on all deception, and that we should use our best endeavors to remedy this evil, and when it is done, Mr. Presi-

dent, the relation between buyer and seller, between the consignor and the consignee will be much more pleasant and satisfactory, and I think I speak advisedly when I say that any commission man will take pride in giving his shipper all the information and assistance he can in aiding him to prepare his fruits and vegetables for market. The idea that commission men are all thieves and rascals is a mistaken one. That there are dishonest and unreliable ones is true, but with proper care it is not necessary to fall in with such. But a true commission man knows his interest and success is identical with the grower; what militates to your success adds to his.

And I believe, Mr. President, that the success of this Society and the advancement of horticulture is to be brought about largely by the united effort and the interchanging of ideas, and this, sir, between the grower and the seller; and I am glad to know that in this association are men of broad views and large experience, and that in the no distant future we shall see the horticultural interest in this great valley second to no other branch of agriculture, and that through this association it will be elevated to that position that our boys, yea, our girls, will delight to engage in it as one of the most pleasant, honorable and profitable of pursuits.

NEW ORLEANS EXHIBITION.

Ex-Gov. Furnas, of the Committee on New Orleans Exhibition, submitted the following report:

Your committee, appointed to report on the matter of the New Orleans Exposition, waiving usual formal preambles and resolutions, recommend for adoption as follows:

1. The approval and indorsement by this Association of the New Orleans Exposition, as also the action and labor of our President, Earle, thus far in connection therewith, fully believing that none other than great good to the whole country can be the final result; to this end,

2. The Governors of States, not having already done so, be urged to appoint commissioners, as provided by act of Congress, and in addition one or more agents or managers in each State, whose duty more specially it shall be to work up an interest and collect products designed for exhibition.

3. That all interested be reminded that under the law appointments of commissions must be made on or before February 10, 1884.

4. That all States be earnestly recommended to place on exhibition all products of soil, art, manufacture, etc., in which they are respectively interested; especially that agricultural and horticultural associations do so.

5. To remind pomological organizations that with present cold storage facilities, especially as provided in New Orleans, and with care received in gathering and shipping, many of the earlier varieties of fruits can be carried into the winter exhibition, as well as those naturally belonging to that season.

6. That as soon as may be, the earlier the better, the Director General be invited to convene commissioners and others representing various State organizations and

interests, for consultation, that concert of action and good results may be the more certainly secured.

7. That as local societies and organizations of themselves can do but little, comparatively, in this enterprise, that aid of State authorities be earnestly invoked.

8. That the attention of States seeking population and capital be called to the many advantages obtained by the taking part in and exhibiting produce on such occasions as the coming exposition, as has been practically demonstrated by statistics of certain States exhibiting and not exhibiting at the late United States Centennial Exposition, namely, Kansas and Minnesota. The former wisely expended about \$40,000 in exhibiting and advertising at the Centennial. The latter did nothing. At the end of five years following the Centennial Kansas added 403,050 to her population, Minnesota 283,366; Kansas to her taxable wealth, \$122,723,391; Minnesota, \$39,204,799. Comment would be unnecessary.

ROBERT W. FURNAS, Nebraska,
 OLIVER GILLIS, jr., Minnesota,
 S. H. NOWLIN, Arkansas,
 L. A. WILLIAMS, Iowa,
 C. W. GARFIELD, Michigan,
 A. D. WEBB, Kentucky,
 J. M. SMITH, Wisconsin,
 W. C. BARRY, New York,
 J. E. PORTER, Tennessee,
 J. J. COLMANT, Mississippi,
 E. H. HART, Florida,

GEORGE Y. JOHNSON, Kansas,
 J. C. EVANS, Missouri,
 D. S. GRIMES, Colorado,
 N. OHMER, Ohio,
 S. JOHNSON, Indiana,
 D. W. BEADLE, Ontario,
 T. V. MUNSON, Texas,
 A. C. HAMMOND, Illinois,
 S. M. WIGGINS, Louisiana,
 MAL. GAINES, Alabama,
 P. S. BERCKMANS, Georgia.

Mr. Gibbs, of Minnesota—The comparative figures given, between Kansas and Minnesota, can be made more apparent by giving the rate of increase in wealth in the two States.

Col. Colman, of Missouri—One point I wish to speak of. I conceive the importance of this exhibition. I have met New Orleans gentlemen and they recognize its importance. From their talk, that is going to be a most wonderful affair, perhaps the best ever made on this continent, and as far as fruit is concerned, the best in the world. I think we have the right man in the right place at the head of this Society to encourage it, the Earl of Horticulture. If there is any State which surpasses any other, I think it is Missouri. But here is one trouble, our legislature will not convene until after this exhibition is held. We have no way of raising funds. It requires money and men. I am satisfied, if our legislature was in session, we could raise at least \$1,000, and sister States could do likewise. Kansas might raise several times that much, for they seem not to know the worth of money. Our State Society will make a display, but how will we keep up with Kansas when

they have money? I expect they will eclipse us; yes, more, they will come here to get the fruit, and eclipse us with our own fruit. [Laughter.] I only throw out this because I expect you will surpass us, but we will do our best. I hope, if I live, I will meet you all there. It will be a visit which you will never regret.

The President—I wish to suggest that the management of the exhibition, seeing that there will not be legislatures in session in most States, depends on other measures. This World's Exhibition has been recognized by different governments. Director General Major Burke, of New Orleans, will go to Washington and try to get \$1,000 for each State in the Union. It is the duty of you here to try to influence Congressmen, that we may be able to get this. I am told that some States have made appropriations. Texas, I hear, has. Now, if you will all take hold of this, you can do much toward getting Congress to act for us.

Judge Newman, of Kansas—Col. Colman says that we, in Kansas, do not know the value of money. I think we have shown that we do by the way we have used it. He speaks of our coming to Missouri to get fruits. If we can come here and find better fruit than the people of Missouri can, and exhibit it and get the glory of it, I think it is all right. [Laughter.]

Mr. Gibbs, of Minnesota—I move that the papers of this city publish this report in full, with the signatures of the committee, and bring 200 copies of each paper, and we will take them off their hands.

By motion, the report was adopted.

On motion of Maj. Nowlin, of Arkansas, the following was adopted:

WHEREAS, We recognize the importance of the coming World's Industrial Exposition, to be held in New Orleans, to every State of the Union, and especially to the Mississippi valley; and,

WHEREAS, It is impossible for many of the States to secure appropriations from their legislatures in time to be made available for the purpose of making exhibits of their resources on account of having no session of their legislature; therefore be it

Resolved, That it is the sense of the Mississippi Valley Horticultural Society, that the Congress of the United States should make sufficient appropriation to each State and Territory of the Union to enable such State or Territory to make a creditable display of its resources at New Orleans, and that the Representatives of the States comprising the territory of the Society should cordially support that measure.

REPORT OF THE COMMITTEE ON FRUIT PACKAGES.

Mr. E. T. Hollister, of St. Louis, chairman of the Committee on Fruit Packages, submitted the following:

Your committee, to whom was referred the subject of fruit packages, would respectfully report:

That a uniform size and style of package has now become an almost absolute necessity, and after consultation with parties from the various sections within the jurisdiction of this society, would recommend the adoption of the following sizes and shapes as the best adapted to the general wants of the modern dealer.

Barrel, the size of a flour barrel, 28 inch stave, 17½ inch head.

Bushel box, head 8x13 inches, slats 22 inches.

Third bushel, head 5x8 inches, slats 22 inches.

Quart box, 5x5 inches wide, 2½ inches deep.

Pint box, 5x5 inches wide, 1½ inches deep.

Grape basket, an oblong ten-pound basket, with cover.

While your committee, in this report, have recommended the adoption of the Hallock or square quart berry box for the sake of uniformity, having ascertained that a great majority of the boxes in use are of that variety, we find the Leslie, or long box, finds favor in a great many markets, and, if properly made up, we know of no objection to that style of package, except the inconvenience of storing boxes of different sizes and shapes in the cars for transportation.

We would recommend the entire abandonment of return packages.

DISCUSSION ON FRUIT PACKAGES.

The President—I would like to ask Mr. Hollister if there is a patent on the grape basket he recommends. If there is, I do not think we should name it here. Otherwise it is all right.

Mr. Hollister, of Missouri—I have mentioned it as it is known generally. That is the name of the basket. The patent may have expired; I do not know. They are made in several places.

Judge Newman—There are two sides to this question, that of the producer and that of the consumer. What has been said sets forth very fully the interest of the producer. There are two maxims, one to sell in the dearest market; the other to buy in the cheapest. I am a consumer. I have to submit to the customs of the producer. Do you not discriminate against any interests?

It was suggested that Judge Newman have the privilege of buying second class fruits, if he prefers it.

The Secretary—I think the name of the basket should not be connected with this discussion. It is sufficient that Mr. Hollister has mentioned it in his paper. Any legitimate reference in his paper is all right.

Mr. Bayliss, of Missouri—The two-and-a-half bushel barrel is called a pony barrel. I think the three bushel one might be called a draught horse. I think a two-and-three-fourths bushel barrel, a kind of trotter between the others, would be best.

The Secretary—I think Michigan probably acted first in this direction. I think they adopted the flour barrel size. We want to establish a uniform system of measures. We want to use the same everywhere. I think we should adopt the three bushel barrel.

Mr. Bayliss—I think the apple is worthy of a case of its own.

Mr. Ohmer, of Ohio—We in Ohio have not succeeded in raising enough apples for our own use. Apples come to Dayton from Kansas, Missouri and other States, and I think many of the barrels scarcely hold two-and-a-half bushels. We ought to compromise and adopt one uniform size package for the Mississippi Valley. Commission men have often told me, "Give us a small barrel of pears, and we will give as much for it."

Mr. Williams, of Indiana—Mr. Ohmer's fruit is so well known that people will take it any way. I have handled fruit for twelve years, and my experience is that a small barrel will not bring as much as a large one. I would adopt the flour barrel, for most barrels are of that size. Where apples are not grown very much it would be harder to get any other size. The idea that you get more for small barrels is erroneous. All such assertions have a tendency to injure the business.

Capt. Diehl, of Kansas—I fail to see how we are going to compromise, there are so many kinds now; therefore I think it should be left for each State to decide for itself.

Gov. Colman, of Missouri—I think we had better strike out all relating to barrels in the report. We can recommend, but a man can put his fruit in whatever barrel he prefers. But it is best for us to have a standard. We would do well to gradually come to such.

Mr. Gilkerson, of Missouri—I think if our Society can do any-

thing to establish a standard it should do it. We want our barrels to be uniform.

The Secretary—I think it is extremely desirable to reach a uniform measure. Any legislative body is more liable to make a mistake on this subject than we are. I think it is the duty of this Society to recommend a uniform standard.

Capt. Diehl—I heartily indorse what our Secretary has said. I find I can ship three bushel barrels as cheaply as other sizes.

Maj. Evans, of Missouri—Our State Society tried to agree upon a uniform size. Our State legislature has a three bushel barrel law on its statutes. I think the legislatures should leave this subject to this Society.

Mr. Johnson, of Kansas—This is about as important as any discussion we have had here. The apple is king of fruits. We would like when we ship a barrel to know what it will be counted when it gets to its destination. The recommendation of this Society is the best way to get a uniform measure.

Mr. Smith, of New York—New York is not free from this same difficulty. The size adopted by our legislature is a little less than three bushels, and since that act was passed there has been dissatisfaction.

Prof. Robson, of Kansas—We have listened to a valuable paper this afternoon on the educational power of horticulture. I always thought that horticulture was a synonym of gentleness, honesty, etc. I hope we will turn over a new leaf and not be concerned so much about what is contained in a barrel, but give good measure, heaped up. I wish to allude to what we see on the wall (pointing to the letters on the wall, M. V. H. S., in memory of Dr. J. A. Warder). He did not know that he had a pocket.

Maj. Ragan, of Missouri—I have been shipping apples for nearly forty years. We used to have the two and a half bushel barrel. Sometimes I had to take flour barrels. There was not so much competition then, but there was some confusion from having different sizes. There are two reasons for preferring the three bushel barrel. First, if I get rates for shipping at so much a barrel, I can ship three bushel barrels as cheaply as the two and a half. Then there

are certain gauges for cutting barrel heads. If you vary from this there is some trouble to get material. A person writes me for so many car loads. I say I can furnish them at so much a barrel. If the barrel is a small one, he may refuse to take them. I think this Society should adopt a standard. It will have its influence. We are better fitted to do it than the legislatures.

Mr. Ohmer—This same subject was discussed at the last meeting of the Ohio State Society. It was referred to a committee. If New York and Michigan are packing in three bushel barrels, and this Society adopts the same, I think it will decide it for Ohio. The fact that a flour barrel can be had anywhere is a great item. I sold my pears at so much a bushel. The man wanted them put in small barrels and he had to wait, because he could not get small barrels. I mention this to show that it often causes trouble and delay.

Mr. Durand, of Missouri—As three bushels can be shipped as cheaply as two and a half, and the barrels bought as cheaply, I favor the three bushel barrel.

The President—Will you indulge me a short time? I proposed this reform yesterday because I thought it important. I am sorry there are no commission men here from Chicago. It is the largest apple market in the world. As they are not here I will speak for them. I do not think there are any on Water street that would not indorse the recommendation of the committee. The two and three-fourths or two and one-half bushel barrels are given a back place in the stores. Unpopular packages are going to be left, while those which meet the popular approval will be sold. I think it is poor policy to adopt any but the one which now has the majority. This will not be compulsory. It is simply educational.

Ex-Gov Furnas, of Nebraska—You have said nearly all that I intended to say. We are not a legislature and can only recommend.

Gov. Colman—I would like to hear from Mr. Bayliss.

Mr. Bayliss—My experience is, that many going out to purchase apples by the barrel, always stipulate for two and a half bushels to the barrel and furnish three bushel barrels to be filled.

Mr. Williams, of Indiana—What has been said by Mr. Bayliss

may be true, but it only goes to strengthen our side of the question Three bushel barrels will sell more quickly. It is of no interest to the commission men, only they can give better satisfaction if they have uniformity.

Mr. Hollister, of Missouri—I want to say one word, which will naturally follow what we have had, in regard to harvesting fruit. I have known so much fruit damaged in taking from the tree. [The question was asked “How?”] Every one knows the difference between picking fruit and knocking it off with a stick. Always put the name of the fruit on the package. Dealers want to know as soon as they get fruit what it is. Unless the names are on the packages they can not have time to find them out. One more point. I think a box with two slats to the side is more liable to damage the fruit than a box with one slat. What I say is based on my own observation.

All amendments were lost, and the report was adopted by a large majority.

FRUIT TRANSPORTATION.

The President—The next subject in order is that of transportation. We have a Standing Committee on Transportation, the chairman of which is not present. I have here a brief report made by a committee of this meeting. Also, written reports from Dr. H. E. McKay, of Mississippi, a member of the standing committee, and F. A. Thomas, of Chicago, chairman, which I will read.

I will first read the brief report, which would have been made longer, but we were hoping for Mr Thomas' arrival.

The Committee on Fruit Transportation offers, as its report, the following suggestions:

First. The necessity of railroad companies furnishing suitable cars both for summer and winter transportation of fruits and vegetables.

Second. The necessity of absence of delay between terminal points and prompt delivery to consignees on arrival at destination.

Third. The necessity of careful handling and prompt delivery to railroads in less quantities than car loads, and loaded and unloaded by them; nursery stock, as well as fruits and vegetables, included.

JOHN BUCK,

E. Y. TEAS,

F. WILLHOUSE,

L. A. GOODMAN,

Committee

REPORT OF DR. M'KAY.

MADISON STATION, MISS., January 21, 1884.

Mr. Parker Earle, Pres't Mississippi Valley Horticultural Society, Kansas City, Mo. :

DEAR SIR—In looking over the Report on Transportation, made by President Smith, at our New Orleans meeting, I do not find anything that can be said at this time that would be of special interest in transportation, more than is embraced in his report. Both freight and express authorities promptly recognized our committee, and have been very courteous, and I think much disposed to do all they can to benefit and encourage our interests. I think we will this season succeed in getting most of the suggestions offered in that report carried into practice. Our State Horticultural Society instructed me, at the meeting last week, to ask the express companies to give more attention to keeping windows and ventilators in a proper condition; to keep fruit and vegetables separated in transfer; to furnish route agents with sufficient additional help to carefully replace all articles, and pack them in tiers with inch strips between each tier, and avoid transfers when possible.

The President—I think we can't spend time better in this connection than to listen to a paper from Mr. Thomas. What is the use of growing fruit if we can not get it to market. Mr. Thomas is a commission man, on Water street, Chicago. He handles more fruit than any other man in the world; so I regard his opinion as weighty.

REPORT OF F. A. THOMAS.

Gentlemen of the Convention :

Having been called upon for a paper on transportation, I will do the best I can.

Last year there was a committee of six appointed, three North, three South, with the President of this Convention as chairman of the whole. The members of this committee, being widely separated, have had no interchange of views to my knowledge. I never had time to write them when I thought of it, and when I had time, never thought of it. This, I presume, is the case with the other members.

Upon receiving notice from the Secretary that a paper was expected from me, I addressed a note to both of the Northern members, asking their views. One made no reply, the other could only say, "he knew freight and express rates should be cheaper, so that he could get his products to markets that he was now cut off from by high rates."

This can not be called a committee report, so I can only give you my own views.

I must confess (myself) to the habit of putting off what I dislike to do, and have not departed from it in this case; have given myself but little time, and am afraid the matter will be very crude.

If it could be, committees of this kind should be near together, where they

could meet, consult, and so devise ways and means that would be of benefit to all. Individuals, isolated, can do practically nothing, and, as in this case, never work. To have any marked effect, the committee should be much larger, and not less than three at each large shipping point, or railroad center, composed of men who have a direct interest in shipments, both to and from such points: the inclination would be greater to work, and the members would have an influence upon transportation companies, that no individual could. These branches could correspond with each other, and frequently be at work at both ends of the line at the same time. It would do but little good for a committee in Chicago to work to benefit shippers in New Orleans, but the branch there and in Chicago working in unison might work to good effect. The country North, South, East and West, so far as transportation is concerned, is divided into sections or centers, where railroad and express officials are located, who either have power to act, or have influence enough to make their recommendations felt at headquarters. These men are generally good men, well acquainted with the members of whom such a local committee would be composed: would give them credit for good intentions and good sense: would desire to please, and recommend such changes as would be consistent: such recommendations, going from different points about the same time, would, I think, have an effect that nothing else would.

Railroads as a rule are wide awake to their own interests, and are ready to adopt any and all means to enlarge their traffic. They may not see the necessities, as soon as those interested, in one particular branch, but show them where they fail in proper accommodation for that branch, and that it will pay them to furnish such accommodations, and they will provide them. There is no doubt but that all the roads greatly lack in properly constructed cars for fruit and vegetable carriage. My own opinion is they do not know of it, and all the influence this Society collectively possess will be needed to make them properly understand and supply the need.

Refrigerator cars, as cared for by the railroad companies, are not the thing to carry tender fruits in hot weather, as remarked by your committee in their report last year. Only one person has to my knowledge made it a success. This I attribute to being under one man's control from beginning to end, and he not allowing the temperature to run too low, so when the fruit was removed the change was not too great. This care will not be given by railroad companies' employes, nor must it be expected. To get the benefit of it, in fact, not to do tender fruits a positive damage, the cooling must begin as soon as the fruit leaves the vine, to take out any heat that will cause fermentation in the smallest degree: my own theory being that fermentation begins almost as soon (in berries) as the supply of sap is cut off. If this be so, for the general uses of the shipping trade, refrigerator cars are not only not good, but are positively bad. Facts are better than theories: Last summer I concluded to give it a trial. The Chicago, Milwaukee & St. Paul Railroad ran a refrigerator car daily to St. Paul; ice and care were supplied by

the company. I found that the fruits in the refrigerator car arrived there looking better than those by express, but as soon as taken out and exposed long enough to get warmed through, went to pieces very fast. I gave it up, and directed all of that class of goods kept out of refrigerator cars. Peaches by ordinary freight kept longer and better than by refrigerator.

Being fully satisfied that fruit gathered, packed and shipped in the usual manner, and fruit shipped from the distributing centers, can not be successfully transported in refrigerators, we come to the questions, what do we want? What can we get? The great need of the fresh fruit and vegetable trade of today is cars properly and thoroughly ventilated; not with a *show* of ventilation but *ventilated*: ventilated at top and bottom of sides and ends, and roof as well. Ventilated so that a train in motion will drive a continuous current of air through the car, and goods so piled in cars that the whole load will get the benefit.

They have such cars on the roads from Mobile, north. The fault I find with them is, the air openings are not large enough by half. Such cars should be double roofed to protect from the direct rays of the hot sun. All such cars can have the openings protected by wire screens to keep out cinders; can have sliding doors inside, and so in five minutes convert them into an ordinary tight box car. Every road should have such a supply of these cars, that one or more could be attached to each train and reserved for tender fruits, to accommodate as many towns as possible. All of this has reference to goods by freight.

We have, unfortunately, a much worse element to deal with in the express companies, and much harder to reach in the way of reform. They run from one end of the country to the other, often passing over many lines of roads to do so. They contract with these roads to furnish them cars, and have to take such as the railroad companies furnish. If they built, owned and run their own cars, they could, and no doubt would, do all in their power to have them properly constructed. They now fold their hands and say they can do nothing. The old maxim, "where there's a will there's a way," holds good as well in this as in any other case. A thorough, systematic and general effort is needed to accomplish anything here. Their general offices and general officers are out of our reach. We can only be heard through their local agents and superintendents. No attention will be paid to your complaint or mine as individuals, but this Society can make itself felt if these companies can be made to see that it represents the fruit interest of the Mississippi valley. Every express company should contract to have furnished them, at all times, proper cars to transport fruit. The fruit trade, every one knows, is large enough now to warrant that interest in demanding from the express companies every accommodation a reasonable man would ask.

It is perfectly reasonable for us all, growers, shippers, buyers and consumers, to demand that these tender products of the soil should be laid at our doors in the best possible shape and at the lowest reasonable cost. This can

not be done without, first, suitable cars. The express companies ought to see, without being told, that the more perfect they can deliver fruit to the consumer the more will be used and the more money they will get. They do not seem to be fully alive to this, and do not take the trouble to have such cars provided. If the express companies of the West and Southwest insisted that railroads should provide such cars as they needed, it would not be long before they had them. Suppose, however, the railroads should refuse; does any one who pays the charges suppose the express companies could not well afford to make the changes needed at their own expense?

These companies must be used, to a great extent, for long distances by us all. If we could avoid their use they would have provided everything needed long ago; they would now be running after you with new devices, trying to convince you it was to your interest to use them. Now they seem to think there is no need that they should take particular care of what they get, as they will get it any way. This is their mistake, as now, within any reasonable distance of Chicago, dealers have come to know, by experience, that even tender fruits shipped to-day reach them better by freight to-morrow than by express to-day, though they go in common freight cars. How much better they will go and how much further they will carry when the railroad companies give us better cars, you can readily see.

They make another mistake, also. If they would deliver the fruit in all cases at all points in the best possible shape, they would largely increase their business in this line, as dealers would order again and again, and increase their orders when they could do so without the losses they suffer under existing circumstances, whereas, many times they give it up in disgust, being satisfied they can not follow it without loss. They should also remember that fresh fruit is peculiar to itself; each day's consumption closes with that day. We do not eat twice as much to-morrow because we had none to-day. If we get none to-day, the profit on what might have been used is gone irretrievably. Giving it the care it should have, will induce constant orders from all parts of the country. Constant orders means daily consumption and more gain to all parties, transportation companies included.

There is, however, a question of right and wrong coming in here which no one should ignore. We all believe that express charges are more than they should be; this may or may not be so; they ask it, and get it, and make money. They are common carriers, and should of their own free will do all that could be done to transport the goods intrusted to them in the best possible manner. After the matter has been properly presented to them, and time enough elapsed, and no disposition shown to remedy the evils, it is a question, if it were not possible to collect damages through the courts for loss and damage by neglect. Money is said to be the soul of corporations. Plenty of good cases can be made up in Chicago on Mississippi strawberries and green vegetables. The case should be a common one, as all are interested.

Express cars transporting tender fruits and vegetables from the South to the North, and through the North, in the early spring, when the weather is

warm South and cool North, should have bulkheads across one end of any car in which a fire is used, so that the fire heat can be shut away from the fruit, and the messengers keep warm at the same time. Until cars reach Cairo, say, no fire is needed; farther north it is colder; the messenger must keep warm if the fruit spoils: result is, car closed up tight, hot fire going, fruit half spoiled between Cairo and Chicago, with weather cool enough to keep any fruit good if shut away from the heat.

Express companies should furnish the cars needed, and then should see that their messengers were impressed with the idea that it was as necessary for them to deliver the fruit in their charge *in good order*, as to deliver the money in their safe—equally vigilant in both. They should be taught fruit *must be kept cool*. But the companies must not expect a cold man will refuse to build a fire when he has a stove and wood at hand.

So we can come to this, all express cars should have the most thorough system of ventilation, that can be opened and closed at will by the messenger. Where fires are used, convenient bulkheads put in, and all fruit placed where it can be kept away from the heat, when not needed to protect from frost, and messengers with knowledge and a disposition to keep careful watch of it.

You must not think, from these remarks, I have any personal feeling of animosity toward the express companies. I use them to a greater extent than any of you, and am a personal friend of the agents and division superintendents. So far as I know them, each and all would do all they could for me, and would for you. I know where they fail, and believe it as much for their interest as any of ours, that attention should be called to it in such a manner that the principal agents and division superintendents throughout the West may be able to convince the general officers of the companies (whom we can not reach) of the reasonableness of our demands.

I am told, and believe, that the express rates on fruits are as low as the companies can reasonably make now. But the fruit trade has, within a few years, grown to such an extent, is now of such proportions, that express companies should demand and get of the railroad companies much better figures than they now have, and so be able to give lower rates themselves: also increased accommodations. I believe, if this matter of transportation is taken hold of by this Society, reforms will come quickly. You all know it is not second, even, to growing. It should be your *first* interest; it is the one on which all your success depends. No matter how good your fruit at home (if you grow it for market), unless properly transported it is a failure to you. The consumption of fruit in the North and West is immense now; it would be much larger if the losses entailed by careless handling in unventilated cars could be avoided. I believe a very large percentage can be.

You, as growers, must not try to make transportation companies responsible for your own faults. Poor fruit, with the very best of transporting facilities, will not arrive in good order; and, many times, the weather is against us. Remember that ill-grown, ill-packed, over-ripe fruit of any kind, can

not be transported long distances. It never should be shipped; it is a nuisance that should be abolished. But the best of fruit will not always reach its destination in good order with our present accommodations. Know your fruit is good—A No. 1; know it is picked at the right time; know it is packed as fruit ought to be, and delivered to transportation company in prime condition; and then *try to know why* it does not reach its destination as it ought. Your commission man can probably tell you.

From large growing districts where cars can be filled, I do not doubt but contracts could be made direct with the railroad companies to furnish cars with the air-brake and Miller platform, to be attached to any passenger train and come through on express time, at much better rates than by express. I believe the fruit trade has already so outgrown the express companies' accommodations, that railroad companies should put a car of their own on their fast express trains running to and from large distributing points, and make much lower rates, as they could well afford to do. Such cars in the season would be well filled, and it would largely increase the trade. Express cars are often so overloaded that the fruit is fairly cooked; this has been so where my own fruit was concerned, and I know of what I speak.

An agent of one of the express companies called on me just now; I laughingly said I would read my paper to him, and he could see just what I thought of the express companies. He frankly stated that my strictures were just, that they fully recognized the faults in their system of carriage, that they were powerless to reform them. He also made the request that when this paper was read and printed (if it shall be), he be furnished with a dozen copies, and proposed sending them to their head officials. "I will do all I can to put these things through," was his remark.

This paper is much longer than I expected it would be when begun; if it contains matters of interest to you I shall be glad; if it leads to reforms, the time devoted to the writing and listening will be well spent. I thank you for your kind attention.

DISCUSSION ON THE REPORTS.

Gov. Colman, of Missouri—These reports are very temperate and sensible. Mr. Thomas has had much experience, and I move that copies of his report (published separately) be sent to the proper officials of railroads.

Mr. Folck, of Missouri—I am in the nursery business and not so much in fruit, but this fall I was compelled to spend \$1,500 for things which I ought not to have bought till spring, because I could not get them in time in the spring. Delays then would injure them.

The report was adopted.

On motion the Society adjourned.

Third Day—Thursday.

EVENING SESSION.

The Society was called to order by President Earle at 7:45.

The following paper was read by Mr. L. A. Goodman, of Missouri:

MARKET FRUITS OF KANSAS CITY.

BY L. A. GOODMAN, OF MISSOURI.

The idea of this subject, I suppose, is to find out what are the best fruits for the markets of the West in comparison with those of the East; to find if the same class or quality of fruits have as good a market here as there, and to find the differences, if there are any, and what those are.

I take it also that this subject does not limit itself to simply what sell the best, but that we are to take into consideration the hardiness and productiveness of all these fruits as well as just the selling qualities; for we all know that the yellow Bellflower, for instance, will always bring high prices, but, as well we know, that it is unprofitable. We will then take our best fruits in the reverse order of ripening, and give a few reasons why we claim them as our best market fruits, then some of the market fruits of other countries, as they are seen in every large city.

I take it that a market fruit or the best market fruits of any city are those which bring the most money; but some good market fruits will be noticed besides those for money alone; for it is believed by all fruit growers that the time will come when quality will be of very prominent consideration in our market fruits, as now beauty and size is the most prominent feature. How long it will be before people's tastes will be educated up to this idea it is impossible to state, many believing that it is the duty of the horticulturist to grow only the best fruits, and educate the masses up to the standard, while others think we should supply what the market demands without reference to any of our concern what they want.

I suppose our market here at Kansas City is rather peculiar, not for a Western city, but would be in comparison with an Eastern city. Here we have buyers coming from the whole Western country, the Southwestern country, the Southern country and the Northwestern country.

Last fall, before we gathered our apples, I received numerous letters from Nebraska and Iowa of the North, from Colorado and the mountains of the West, and Kansas and Texas of the Southwest, all wishing to know where they could get good large red apples. This is a type of what the market of Kansas City is expected to be. Many of these parties I saw later, and it was impossible to make them believe that they should take some of the other poorly colored fruits with the bright colored ones. Yet we in every instance found it impossible to convince them that a Janet, a White Winter Pearmain

or Roman Stem (some of our best varieties in quality), should be taken with the large Ben Davis, Willow Twig, Winesaps, Jonathans and Pennsylvania Redstreak.

It is hard to convince a man against his own eyes, and say what we may, we must pander to the beauty of an article and to the eye, if we want a market fruit. It is not only so with fruits, but you find it so in every walk of life, in every business, in every trade.

In the lumber business once I found this just the same as in our markets of to-day. Take a pile of good lumber and have it scattered promiscuously and you will hardly find a buyer; but pile it up nicely and ten chances to one if the next man will not make his purchase from it.

Our merchants in our stores know this matter perfectly, and they do not seek to educate the people to a different standard, but use this hold they have of people to pander to the eyes. So you will see the displays every where, and every one of us will buy from such an one, before the one who tries to convince us against our sight.

But one says we must keep growing better and more sensible in this matter, and yet this very horticulturist will have his apples in bright, new barrels, with planed heads and a nice stencil mark on it; he will have his berries in good new boxes, clean and not stained either by berries or mould on the boxes; and why is it? simply to please the eye, nothing more, nothing less. Send your apples to market in old salt barrels, and then in bright, new apple barrels, and see if the same fruit will bring the same prices; pack one with three layers of apples at the head and the other with none and see if you will get the same prices for the same apples, and yet no buyer believes that the whole barrel is layered like the top. What is it for? Simply to please and attract the eye; nothing more.

In spite of all we may say against a fruit as to its poor quality, etc., yet we can not preach successfully against the eye.

Our market then at Kansas City demands for the apple a good size, bright red color and good keeper. The apples that fill this bill are the Ben Davis, Winesap, Willow Twig and Rome Beauty, for the winter varieties, and Jonathan and Pennsylvania Redstreak for fall. These are the market apples, because they are hardy, productive, and good color and good size; because they sell the best of any others and sell the easiest; because they bear well and full, and because they bring the most money of all others.

The Ben Davis is the best market apple for Kansas City; pays the most money per bushel, bears the most and sells the easiest, and pays the best per acre of all other varieties.

The following are ten reasons why it is the best market apple:

1. It is a good grower in the nursery.
2. It makes a handsome tree in the orchard.
3. It bears young.
4. It bears oftener and better than any other.
5. The apples are usually large and fine.

6. They always sell.
7. They cook well before they are ripe.
8. They cook well when ripe.
9. They are the best for drying purposes.
10. There is more money in them than in any other variety.

The Willow and Rome Beauty follow it. The Jonathan and Redstreak are of the best also. Only one exception among apples can be noted—the Huntsman. Taking these points, it will not be hard to tell the market fruits of Kansas City.

The pear must have some of these choice characteristics to be a market fruit of our city. The Bartlett fills these wants, especially if they are red cheeked, as many are on the south side. The Flemish Beauty and Howell are choice for this market, as also is the Buerre d'Anjou and Sheldon. The market of our city demands a highly colored, large size and beautiful pear. The Bartlett is so well known everywhere that it is hard to dispossess it of its advantage. A finely colored, large California pear will sell for more than our best pears, although deficient in flavor. Size and beauty sell it.

The peach is the same as with the apple. Quality has very little to do with the sale unless it be to families and those who know the variety and call for it. If you do not think so, just try to sell a white peach which has a clear skin without a particle of color to it, at the same time offer one much inferior in quality, but beautifully marked and colored, and you will soon find what the market demands.

For home use and among those who will believe you when you tell him a peach is of excellent quality, you can easily sell some of the poorly colored peaches; but for market in general and where large quantities are wanted by shippers, you can not teach them.

The Amsden peach never would have had the sale it did if it were not for the bright red cheek. Say what you will, Kansas City would never have bought those poor flavored peaches had it not been for the attraction to the eye. Try a bright Crawford Late peach and a Ward's Late, or even a Smock and very soon our market will make a distinction.

Ask any fruit grower and he will tell you that the Smock lacks color to sell well; that the Heath cling would and does bring double when you select those specimens that have a beautiful red cheek. The eye must be pleased as well as the palate. The market peaches and the ones for money here, are Amsden, Early York, Mt. Rose, Crawford Early, Old Mixon, Crawford Late, Smock, Salaway, Heath.

The plum, apricot and nectarine are nothing with us for money, except the Wild Goose and Weaver plum, which are very profitable and in good demand.

The grape would seem to us to be the exception to the rule, if there should be one, for it seems that our market demands a white grape and one without color, no matter if it is poor. A white or flesh colored grape seems to attract the eye more than one of the most beautiful of purple or black grapes,

and yet many of them are very poor in quality. An example is seen in those poor, tasteless California white grapes that are seen on our markets everywhere. How they do sell, and yet they are poorer than our poorest, while some of their colored ones are excellent. People are turned about in this matter, and as a general thing the finest colored grapes are the best, yet the market demands those without color: while with the apple generally the finest colored are the poorest and those without color the best, and yet the market demands the opposite.

The raspberry, red, as in most markets, those that will ship the best will sell the best, and the same with the black cap. A bright solid color will sell the best if they are firm enough to ship five or six hundred miles.

The Thwack, a very poor berry, has a good sale, because it will carry to the mountains in perfect order. At home, for private use or market, it is too well known for poor quality to be of much demand. Our home market demands something better for its use.

The blackberry, nothing but the Kittiting. The strawberry wants good size, fair flavor and good color, to make a first-class market fruit, if it is firm enough to carry a fair distance.

The Charles Downing is a fair sample of what we want. The Crescent is rather soft, but it will carry some distance, if picked when firm.

Our market, therefore, demands not only fruit for home consumption, but the greater, by far, demand is for good shipping fruit, and this is found only in fruit of good size, good quality, fair quality only, and a good shipper. These are the demands of the Kansas City market.

DISCUSSION ON THE PAPER.

President Earle—Gentlemen, the author of this paper names a good many varieties of fruits, and gives opinions on them. The subject is before you for discussion.

Maj. Holsinger, of Kansas—The gentleman said we were a little fastidious in our taste. I would say I got more for Thwack than for the excellent Turner, though it is inferior. The Turner will not ship well.

Mr. Johnson, of Indiana—That speech fits Indiana.

Maj. Ragan, of Missouri—I take exception to the writer's views on the red apple. A year ago, on this market, I could sell Huntsman Favorite and Bellflower at much better rates than the highly colored apples. I think, on this market, there is a preference for yellow apples manifested.

Dr. Gregory, of Arkansas—I have been a member of this Society for two years, and have not said anything; and I suppose it is

time now for me to speak. I take exception to what was said about the white grape. I think, in Arkansas, we can grow as fine grapes as they grow in California, and superior in quality. I shipped white, amber and dark grapes here. When I shipped white grapes I got eight or nine cents a pound, amber colored ones I sold at eight and one-third, and dark ones brought twelve to thirteen. I think the gentleman is mistaken when he speaks about this market demanding a light grape.

Mr. Goodman, of Missouri—I speak with reference to fruit growers about Kansas City. Our Martha and Goethe will bring nearly double what the Hartford will, and the Delaware will bring treble as much.

Dr. Gregory—We do not grow the Hartford, and hardly consider the Ives worthy. I spoke too soon, as I see the gentleman was only speaking of those growing right here, but we are not far off.

Mr. Durand, of Missouri—I would ask Maj. Ragan if he would recommend the Huntsman and Bellflower as profitable apples?

Maj. Ragan—The Bellflower, to be successful, must be grown on poor soil. The Huntsman, I believe, is a good bearer, not like the Missouri Pippin and some others. The Newtown Pippin is not grown much here. I like it, but I think it requires age and rich ground.

Mr. Durand—I have been raising apples some, and I came here to get information. The Ben Davis seems to have the general run all over the country. One gentleman says it is the best for drying. I do not consider it a good drying apple. It is too light, not yielding enough pounds of dried fruit.

Mr. Webb, of Kentucky—I wish to ask about the Thwack raspberry. I fruited it and was pleased, except that it was too feeble in plant. Is that characteristic of it?

This was answered in the negative.

Mr. Williams, of Kansas—I would like to ask Mr. Goodman about the Missouri Pippin, if he discards it?

Mr. Goodman—No, I did not aim to give a full list of desirable varieties.

Mr. Johnson, of Indiana—Our Committee on Nomenclature has

recommended certain reforms in names. Why not adopt the suggestions here? One gentleman spoke of Huntsman's Favorite. I move that Favorite be dropped.

It was also moved that Pippin be dropped from Missouri Pippin, which motion was adopted.

Maj. Holsinger, of Kansas—Some one has said the Ben Davis was not a good drying apple, that it would not make a good yield of dried fruit. Mr. Lewis, of Wyandotte, Kansas, makes ten pounds of excellent dried or evaporated fruit to the bushel of fifty pounds. I would like to know what variety can give a better record than this?

Mr. Masters, of Nebraska—I would take some exception to the idea of color expressed in the paper. I have had considerable experience in this. I will give an illustration as to how we cultivate taste. The Red June used to be very much called for. A man came to me once and wanted all my Red Junes and did not want any others. I could not supply him without giving him some light colors. I gave him some of the light colored apples and he continued to want them, and did not mention Red June again. I can sell more Cooper's White in our market than any other. I think if people will cultivate taste red apples will not be called for so much.

Gov. Colman, of Missouri—One gentleman said it was impossible to ship the Turner raspberry long distances. I have seen hundreds of cases come to St. Louis in as fine condition as any I ever saw. I do not know that I ever knew but one man that could pick them just at the right time and get them in such condition, and that is our President. When I was at the Pomological Society two years ago, I called attention to the Thwack. It got a kick from most every one but those from Missouri. Mr. Johnson, of Indiana, was the one who kicked the most. I am glad Missouri has furnished a raspberry which he can recommend. I expected to hear an apple recommended which has not been. Much as I esteem the Ben Davis as a market variety, I find the Smith's Cider better. I only plant the two varieties.

Mr. Hale, of Connecticut—While this discussion of raspberries has gone on, I am surprised not to hear of the Cuthbert, the one best raspberry in the country. Everybody in the East speaks well

of it. The color is not as bright as some, but it is worth more. It was shipped to Boston and brought seventy-five cents a quart, and there was room for more. So far as we get reports from the West it is well spoken of. It is moderately firm. It is as hardy as any. I know of none perfectly hardy. In black raspberries the Gregg has superseded all other late varieties. It is too late for best prices. The Souhegan and Tyler are valuable with us. We are growing Hopkins to some extent. One objection to the Cuthbert is, it is a little late. The Reliance is good except in color. Lost Rubies is a good family berry. It must be grown by other varieties.

Mr. Pierce, of Minnesota—I have heard more scolding about Ben Davis than any other apple which comes to Minneapolis market. They say they can't bake them without sweetening them. The Janet is the best you send to our market. Your raspberry is one we do not like. Some grow the Philadelphia just because the market is not supplied with better. It will not be there long. The Turner is an excellent berry. The Cuthbert is a good berry for shipping and in quality.

Gov. Colman—If you set out Ben Davis you are sure of getting two dollars a barrel for all your apples. If you plant Janet you will get one dollar a barrel, and have them bear every other year.

Mr. Pearce, of Ohio—It seems to me the world is laboring under a mistake, if those speaking against Ben Davis are right. People would not buy it if it was not a good thing. Those other varieties are not reliable; we can not depend on them.

The Secretary—In the early days of the Ben Davis, Dr. Warder recommended it but acknowledged its rather poor quality. Some one asked, "Why do you raise it, then?" Answer, "To sell." It was asked, "To whom?" Answer, "To fools." To which a wag remarked, "Yes; and, Doctor, we are raising fools much faster than Ben Davis apples."

Prof. Burrill, of Illinois—Once there was a company together who knew what they were about. They had fair taste, but were not horticulturists. Certain varieties were passed around, and they were to give an opinion on them. They were the Ben Davis, Janet, Winesap, Jonathan, White Pippin, and perhaps one or two others. The Ben Davis stood first and the White Pippin next.

Mr. Johnson, of Indiana—In answer to Gov. Colman I would say, I had the Thwaek one year, and did not like it; but it has grown in my favor. I told Gov. Colman, privately, I would take back all I had said against it.

Mr. Holsinger—The Cuthbert we have tried to our sorrow. I know of but one person here who has succeeded with it. In every condition I have tried it, it has done poorly. It is a rampant grower but winter-kills.

Mr. Williams, of Indiana—In regard to selling apples, I think many are laboring under a mistake because they are not acquainted with the market. A commission man realizes that certain markets want certain kinds. Where they are wanted for culinary purposes, they want quality; but in the South they want color.

Mr. Ohmer, of Ohio—I had about a thousand bushels of Rome Beauty, Bellflower, etc. A man came and wanted Pennoek. He wanted no other, and the Pennoek I would not have on my place.

Mr. Hollister, of Missouri—Of late years I find northern markets want red apples, too. There are exceptions. The Bellflower, Newtown Pippin, etc., are wanted, but they are shy bearers. I find a big red apple is getting more in favor. In regard to raspberries, the Turner I have handled successfully. The secret is to pick them at the right time. I have reshipped those sent to me from Illinois to Kansas and Nebraska with success.

Mr. Durand—I still hold to the ground I took in reference to the common sense of the people. I want to supply what they want. If a whole company, as was said, takes Ben Davis in preference to others, I would supply them with Ben Davis.

Mr. Gibbs, of Minnesota—I am satisfied that the contradictory reports that we hear about color, texture, flavor, etc., are on account of the pollen, and I believe when we come to know this rightly, the discussion will be cut short on this subject. I will call attention to one thought of Darwin. He states that Thomas Andrew Knight, in hundreds of crosses, failed to show that there was any immediate influence on the apple. It affected the seed first and then showed its effect on the apple in the next generation. But there were facts which satisfied Darwin that there were immediate effects. In the case of the St. Valory apple, which he thought authentic,

the stamens were abortive. Children would bring pollen and put on certain blossoms, and then come and get fruit according to the kind of pollen they put on. I have come upon a line of facts I can't otherwise account for. I wish you would notice these things.

The President—Allow me to suggest that this discussion, though it is rather interesting, will look rather peculiar in print, swinging back and forth from apples to raspberries.

Mr. Munson, of Texas—The heading of the paper is "Market Fruits of Kansas City." That will cover all kinds. I want to make a remark as to quality. Are we to stop with the Ben Davis? When it comes into Texas it will bring four dollars a barrel, while Huntsman will bring six. We have mentioned this fact that when quality is known that sells, but otherwise, color. The point in my rising is to mention fruits demanded in our country from here. The Jonathan outsells the Ben Davis. I see here and highly recommended the York Imperial and Missouri. They are ahead of the Ben Davis. Why not grow them? The Ben Davis we would rather not have if we can get something else. It is a choke.

Gov. Colman—As to why we do not grow something else, Ben Davis makes the most money. It comes into bearing early. Those who have planted it find it a regular bearer. It has high color; the tree does not blight. It is a good shipper, and brings more money than any other. Any one can plant Ben Davis or Smith's Cider and make two dollars where he can make one with most others.

Mr. Greisa, of Kansas—I recognize Gov. Colman's point about the Ben Davis. Awhile the Janet was first, then the Winesap, then the Missouri, now it is the Ben Davis. The Ben Davis brought more in New York this season than any other. We should, of course, grow what will grow best. I suppose in a few years some other variety will be ahead.

Capt. Diehl, of Kansas—The York Imperial is far superior to the Ben Davis. I think it is the coming apple. It comes into bearing very early.

Mr. Holsinger—I have had the York Imperial for some years. I had only two trees of the first planting. They were liked so well there has been a continual drain on the trees for scions so they could

not do so well. It bears in about four years from planting. I first found it up the Shenandoah valley. I believe it originated there.

Mr. Johnson, of Indiana—These discussions are interesting. I am sorry I have not my family here so we could stay a month. But all good things must come to an end.

The President—We will now hear the report from the Committee on Fruits on Exhibition by *Mr. Gibbs*, chairman.

REPORT OF COMMITTEE ON FRUITS EXHIBITED.

The undersigned, Committee on Exhibits, beg leave to report, that they find on our tables two large collections of apples by State Horticultural Societies—one from Missouri with one hundred and thirty-seven varieties, and the other from Nebraska with fifty-seven varieties—both being very creditable displays, especially in the large size, good condition and fine color of the fruit. Of the new and promising varieties in the Missouri list there are the Ingraham, by William Griffith, of Carthage; the Gano, by W. G. Gano, of Parkville; and a sweet seedling, by J. A. Bayliss, of Lee's Summit. In the Nebraska list, the Otto Redstreak and Barnard, the Warder and the Wilder, by J. H. Masters, of Nebraska City.

In the Missouri collection there are twenty-five varieties that have lain in cold storage since September last, whose good quality and condition at this time, although many of them are early fall apples, are important facts as showing what can be done to carry our fruits through the exposition next winter at New Orleans by the cold storage facilities offered there.

Dr. J. Stayman, of Leavenworth, Kas., shows a handsome red apple said to be a seedling of the McAfee, by the late *Dr. Howsley*, of Leavenworth. *Dr. Stayman* also has a seedling of his own production not yet named.

We find a few plates of apples from Iowa and Minnesota, including fine specimens of the Wealthy from both States.

The floral decorations of the hall are the contributions of *Robert S. Brown*, of Kansas City, and we recommend a vote of thanks therefor.

The few plates of Prentiss grapes are exhibited by *T. S. Hubbard*, of Fredonia, N. Y.

The Plummer Evaporating Company, of Kansas City, makes a large display of their products, to which we invite special attention, as the industry they encourage is an important factor in the problem of how to market our surplus apples, and the fine samples of apple cider of *William Byers*, of the Steam Cider Works, of Kansas City, are also worthy of notice in this connection.

We discovered this afternoon, on one of the tables of *H. C. Garth*, of Kansas City, a collection of what appear to be some mammoth tropical citrus fruits; but, as upon the basis of disclosures made at this meeting upon the wonderful results of crossing and hybridizing in fruits and vegetables, these things may be some new monstrosities of mixed lemon and pumpkin parentage, we forbear to commit ourselves upon them.

In conclusion, your committee recommend that in future exhibitions of this Society the growers of new fruits produce all the evidence obtainable as to the pedigree of the varieties they show, to the end that we may add to our knowledge as to the laws that govern variations and improvements in pomology through seedling production.

Upon motion of Mr. Pearee, of Ohio, complimentary mention of some Niagara grapes on exhibition, which had been overlooked by the Committee on Exhibits, was added to the report.

The report was adopted.

Maj. Z. S. Ragan, of Missouri, was introduced, and read his paper, as follows :

HORTICULTURAL EXHIBITIONS—HOW TO CONDUCT THEM.

BY Z. S. RAGAN, OF MISSOURI.

Upon the receipt of a notice from the Secretary of this Society a short time ago, stating that I had been drafted into the service to tell "how to conduct exhibitions," my first impression was that it was a work of supererogation, and that I ought to decline, from the fact that if I were to make an attempt before this great convention of practical horticulturists, that I might be placed in a similar dilemma with the man who, while standing out on a limb, made the fatal mistake of cutting the limb off between himself and the tree. Result, a sudden fall. Not a very enviable situation for one to be in on such an occasion as this. Yet, horticulturally speaking, when I call to mind that nearly half a century ago it was my fortune to join in horticultural meetings with such men as Dr. Warder, Henry Ward Beecher, Reuben Ragan Joshua Lindley, James Sigerson, Aaron Aldridge and other pioneer horticulturists, of whom I received my early lessons in the science, and having also been a veteran in army life, it would seem like outright cowardice to shrink from duty; to express it in the mildest terms, insubordination.

Inasmuch as the able Committee on Exhibitions, Maj. Nowlin, of Arkansas, T. T. Lyon, President State Horticultural Society, Michigan, and J. S. Beatty, President State Horticultural Society, Kentucky, will doubtless come to my support, and add whatever may be wanting in my attempt to advance suggestions as to best rules to govern exhibitions. Claiming this aid and your indulgence, I assume the responsible task imposed upon me.

It will not be expected of me at this time to treat of the respective duties of the corps of officials that it may require to conduct a fair, nor of their several duties. This will be the work of a provisional committee, etc. Neither will it be expected of me to enumerate the duties of those controlling the various classifications of departments, presuming that under superior direction these arrangements have been made, and by the Secretary or otherwise the books have been prepared with proper headings, classification, etc. To

perfect, facilitate and give creditable displays and satisfactory decisions, it is all important that printed circulars containing general rules as to the perfection, handling, proper entry, etc., are furnished exhibitors. I do not know that I can do better than submit for consideration a set of rules gotten up some years ago with great care by the Missouri Valley Horticultural Society, and which subsequently has been adopted by the Kansas and Missouri State Horticultural Societies.

GENERAL RULES.

1st. The general appearance of the fruits, care in its selection and taste displayed in arranging, *each entry* being distinct.

2d. In every group or single plate (never more than one plate of any variety allowed) lists of names of varieties must be attached to entry cards.

3d. The *same plates* of fruits can not compete for different prizes; they must be duplicated.

4th. When the number of specimens for a plate is given, just that number must be shown.

5th. In general collections of fruits where several are specified they must all be shown. Where the number of varieties are given, just that number must be shown, no more or less.

6th. In all cases of best collections (1) *number of varieties ranks first*, *other things* being equal, (2) *quality ranks second* (3) *condition ranks third*, (4) *taste in display ranks fourth*.

We take then on a scale of ten, example:

100 plates, number	10
Quality, inferior	5
Condition, poor.....	5
Taste in display, bad.....	5
	—
	25
90 plates, number.....	8
Quality, good	8
Condition, perfect	10
Taste in display, good.....	9
	—
	35

The second would take the premium.

In *single plates we would* have 1st, Condition; 2d, Form; 3d, Size; 4th, Color; 5th, Quality.

This can be scaled the same way.

SPECIAL RULES.

Apples and Pears.—1st. *Condition* of fruit, which should be in its natural state, not rubbed, nor polished, nor specked, bruised, eroded, nor wormy, with all its parts, stem, calyx, segments, well preserved, not wilted, nor shriveled, clean.

2d. The *size* should be average and the specimens should run even.

3d. *Form* should be regular, and the lot should be even.

4th. The *color* and markings should be in character, not blotched nor scabby: in fact, a perfect fruit.

5th. *Texture* and flavor are important.

Peaches and Plums.—Four points: 1, form; 2, color; 3, flavor; 4, condition.

Grapes.—Give points: 1, form and size of bunch; 2, size of berry; 3, color; 4, flavor; 5, condition.

Currants.—Four points: 1, form and size of bunch; 2, size of berry; 3, flavor; 4, condition.

Gooseberries.—Four points: 1, size; 2, color; 3, flavor; 4, condition.

Cherries.—Four points: 1, size and form; 2, color; 3, flavor; 4, condition.

Strauberreries.—Six points: 1, size and form; 2, color; 3, flavor; 4, firmness; 5, condition; 6, productiveness. Stem and calyx adherent.

Raspberries and Blackberries.—Five points: 1, size; 2, color; 3, flavor; 4, condition; 5, productiveness and hardness.

In using the scale, use 10. Where the totality of marks do not exceed fifty per cent, it must be passed as unworthy.

A plate shall consist of *four for large specimens* and *five for small specimens*.

No person shall be allowed more than one entry for any one premium.

Where *best* is used all things shall be taken into consideration.

Where *quality* is used it shall mean quality alone.

In judging flowers and plants, the quality and value of the plants shall be considered, except where specified for some special object.

Where best 12 varieties or best bedding plants, those that are best suited for general purposes should be considered.

Where bouquets are shown, quality takes precedence unless arrangement is noticed.

At our Society premiums, the person must be present who makes the exhibit, and all fruits and flowers shall be on hand by 12 o'clock, so the committee can act before dinner.

In addition to the foregoing rules, there are two, if not more, things to be considered for the credit of the Society and satisfaction of exhibitors. When awards are offered for *greatest* and *best* display, this should not only comprehend or include best and perfect specimens, but in addition, most *artistic* and *tasty* arrangement for display.

The better to accomplish this, there should be a printed list published for information and furnished the exhibitors. There are minor considerations to be observed in all regular and well conducted horticultural societies that will claim the attention of those conducting them, that it would be superfluous to attempt at this time to give extended and specific rules or directions for.

Before concluding I will impress the importance of selecting awarding committees. These committees should be *competent* and *impartial*, and strive to give correct decisions, accompanied by written reports, giving reasons sustaining their decisions.

OTHER PAPERS.

The Secretary—I remember from long experience that papers appear awkward when published unless they have some attention shown then by the Society. I hold in my hand several papers which are not represented here by their authors. I have an excellent paper on "Grape Rot," by Professor William Trelease, of Wisconsin; another on "Grape Growing in Missouri and Kan-

sas," by Samuel Miller, of Missouri; and still another from that veteran grape grower of Ohio, George W. Campbell, on "The New Grapes." I have also one from Dr. Charles Mohr, of Alabama, on "Ornamental Trees and Shrubs of Alabama;" one by Prof. W. J. Beal, of Michigan, on "The Ornamentation of Private Grounds;" and a paper contributed by David B. Woodberry, of Maine, on "Cross Hybridization in Floriculture." Under the recommendation of the Committee on Order of Business, these will go into the Transactions without reading.

The President—Two or three of the papers promised and not here will be furnished for publication. Mr. Garfield's will not be. He intended to come, but he has overworked himself, and writes me he will have to give up all literary work for some months. Mr. Lovett's paper is doubtless on the way. Mr. Beatty's paper will be on hand for publication. We have solicited papers from the best men, and that means the busiest men, and so some are not here. We made allowance for this in making a large programme. Captain Porter, of Tennessee, was to have prepared a paper, but he is sick. These statements are due the parties and due you. We have not heard from the California paper. Now the subject presented by Maj. Ragan is before you.

DISCUSSION OF FRUIT EXHIBITIONS.

Mr. Masters, of Nebraska—It has been my lot for a good many years to be one of a committee to examine apples and pears, and I have sometimes been annoyed. In consequence of this I have tried to systematize my exhibitions. I make out a list to show apples as best I can according to my taste. I make a list so by taking it the committee can find any apple by counting the varieties and rows. A system of this kind will save much trouble. The committee are often compelled to hunt up the exhibitor to find varieties. I suggest this Society adopt something of this kind.

Mr. Munson, of Texas—The remarks I desire to make may be inappropriate, but they occur to me now; that is, about our proceedings. The President remarked to me that these papers we have here are the best ever presented at any horticultural meeting in the

country, and I think the newspapers should be requested to speak of them as such.

Mr. Williams, of Iowa—I indorse what Mr. Masters has said. I think if you would examine his manner of exhibiting, you would find it a great help.

Mr. Peffer, of Wisconsin—Sometimes in our exhibitions I have seen forty or fifty exhibitors. Our system is a good deal as has been described, but we have them arranged into so many classes. The name and number must be on every card, so the committee can go through a great lot in one day. This gives satisfaction.

On motion the Society adjourned.

Fourth Day—Friday.

FORENOON SESSION, January 25.

President Earle called the Society to order at 9 o'clock.

The President—I will announce the name of Oliver Gibbs, Jr., of Minnesota, as an addition to the Forestry Committee. That committee, I understand, is ready to make a report. As you know the chairman, ex Gov. Morton, had to leave on account of ill health; but the committee has prepared a report and will now give it, Mr. Gibbs acting as chairman.

REPORT OF THE COMMITTEE ON FORESTRY.

Your committee, to whom was referred the portions of President Earle's address relative to the forests at the headwaters of our rivers, the resolutions of the Horticultural Society of Kansas and Minnesota on the timber culture act, and the resolution of this Society regarding the subject of experimental stations and the importation of trees planted from other countries, beg leave to report recommending the adoption of the following resolutions:

Resolved, That voicing the opinions and wishes of the people of the West, and speaking in behalf of the interests of the whole country, this Society calls upon the United States government to establish in the West experimental stations in horticulture and forestry, and equip them with land enough and means enough to work out the problem of adaptations of trees and plants to the climate and soils of the Mississippi basin and the method of culture to make forestry and fruit growing successful therein; that, as a matter of detail, we believe a board of forestry and horticulture should be created in the West to direct and control such a station;

that said board should be authorized to establish a sub-station in each climate belt or district, and that suitable persons, expert in forestry and pomology, should be immediately sent to foreign countries to search out desirable trees and plants to be found in regions where the conditions affecting vegetable life are similar to those of the West, and to obtain seeds, scions and roots of the same for propagation and trial at such stations and for general distribution, especially that the countries of Russia and parts of China should be explored for this purpose, with the view of completing the work already done in this direction; and when results in pomology and forestry in some parts of the northwest are now sufficient to warrant the conclusion that immediate relief from the peculiar climatic difficulties involved in the growing of fruits and in the covering of our dry plains with forest trees of proper adaptation can be obtained, that the president of this Society be requested to appoint a committee of seven, whose special duty it shall be to draft a bill for presentation to Congress to accomplish the objects herein sought, and to press the subject upon the attention of that body; that to said board of forestry and horticulture, when organized, should be committed the subject of the conservation of the forests at the headwaters of our great rivers, as recommended in President Earle's address; that the government of the Dominion of Canada should be invited to join with said board in sending commissions to Russia and elsewhere for the explorations herein suggested. And further, that President Earle, of this Society, be requested to act as a member of this Committee on Legislation.

Resolved, That the Committee on Legislation be requested to communicate with the American Forestry Congress or their committee and pool their issues; also,

That the Governor of the State of Iowa be requested to ask the board of curators to make it possible for Professor Budd to be present at Washington with this committee.

Respectfully submitted,

R. W. FURNAS, Nebraska.

OLIVER GIBBS, JR., Minnesota.

NORMAN J. COLMAN, Missouri.

PROF. S. M. TRACY, Missouri.

GEO. H. WRIGHT, Iowa.

GEO. Y. JOHNSON, Kansas.

This report, after the following discussion, was adopted.

DISCUSSION ON THE REPORT.

Prof. Burrill, of Illinois—There is only one point I wish to speak of. I heartily agree with the report. Now, it seems to me where we lack is in not having an efficient way to carry it out, and the only trouble about that is a lack of money. Can this be put through without money? If members of Congress can be interested, it may go; if not, who will put their hands into their pockets and put it through? Is there any hope for it?

Mr. Johnson, of Indiana—My opinion is that it is not necessary

to go to Washington. I think correspondence will do the work. Address letters to our congressmen. They are interested enough in their constituency to pay attention to letters.

Gov. Colman, of Missouri—I can tell you, after considerable experience, that Prof. Burrill is hitting the nail on the head every time when he speaks of the importance of having nurses at Washington. I know how congressmen are influenced by persistent personal effort. If we had a few men there like President Earle to work it up, it might get through. Simply writing a letter, which will be laid on the table, will not do a great deal. There are certain States so interested that their members in Congress may be impressed with the importance of the subject. If, however, we could raise a fund to send two or three men to Washington, I believe a great deal could be accomplished. I only regret that we have not the money. I agree with Mr. Johnson that we must write, but I feel that unless we have men there at the wheel it will not go through. I hope a committee will go from this Society and prepare a bill, and be there to see it through. I suppose there will be two bills—one for the New Orleans exhibition and one for forestry. Our congressmen do not generally appreciate these things—they are bent on politics. Farmers or horticulturists are not the ones we have in Congress. They are politicians and lawyers; more than nine-tenths are lawyers, not interested in these affairs. I hope the time will come when those things which underlie the prosperity of this country will be impressed on Congress.

The Secretary—It occurs to me that we are assuming a great deal of expense and labor which does not belong to our Society alone. This work covers all the ground of forestry, pomology and horticulture. Should we not ask of other associations their co-operation and aid in these matters of such general interest?

The President—I will announce the committee called for in this report now. It is our desire to have a committee, every member of which will go to Washington. We have to consult political affiliations, location, etc. It is the western part of the country that is specially interested. I have made the appointment with these considerations in view. It should represent seven States; but I have thought best, for some reasons, to appoint two men from Nebraska.

COMMITTEE ON LEGISLATION.

J. Sterling Morton and ex-Governor R. W. Furnas, of Nebraska ; Oliver Gibbs, Jr., of Minnesota ; Prof. Budd, Iowa ; Col. Norman J. Colman, Missouri ; Geo. Y. Johuson, Kansas ; Maj. S. H. Nowlin, Arkansas ; Parker Earle and Robert Douglas, Illinois.

Prof. Burrill, of Illinois—If the committee will furnish me some documents, I think I can get the influence of one congressman.

Mr. Day, of Nebraska—I think one from our State will be in our favor.

Mr. Grimes, of Colorado—This committee, working in connection with the one appointed by the forestry congress, will have great influence. There are none feeling the need on this subject so much as we in the West. Many of our mines are almost compelled to shut down for want of timber. We also see the effects in our streams.

Mr. Gibbs, of Minnesota—This report was drawn up hastily, and one thing was omitted. I move that the Committee on Legislation just appointed be authorized to operate with the one appointed by the forestry congress. Adopted.

The President—I hope also this committee will co operate with the one on the New Orleans exhibition, and the Director General may help this Committee. It may be reciprocal.

Mr. Gibbs—I move that the President of the Iowa State Agricultural College and the board of that institution be requested to arrange so that Prof. Budd can meet with us. Adopted.

CAUSE OF BLIGHT ON FRUIT TREES AND BLOSSOMS.

BY GEORGE P. PEPPER, OF WISCONSIN.

There has much been said and written by our eastern, as well as western, fruit growers, on the subject of blight, about the cause or origin of the same, on the pear as well as on the apple.

Some have held that it was the forcing of the sap upwards through the stomata in the tender sap cells of the young leaves on the new wood growth of the new shoots ; others, by punctures caused by insects on same, and some by cold or freezing and thawing, thereby destroying and rupturing the cell structure of the cambium layer by expansion ; and some by the pressure

of the sap circulation to give an over supply in rapid growing trees; and some by electricity or electrical disturbances of the air, when the trees are growing very fast; and others by spores of fungi and bacteria floating in the air and going from tree to tree, etc.

All of these may cause blight, except perhaps the last named. Although these spores are found in blighted trees it does not prove they cause it, as they only subsist on dead substances, as far as has been proved. Although it can be inoculated on healthy trees by insertion, it does not prove that it is contagious. Still it may be so, but we doubt it. As the cellular structure of the cambium layer, or the conversion of the water as drawn up by the succulent roots and conveyed through the cell tubes up in the sap wood or ducts, provided for in the last year's new cambium layer, under the bark on the body of the tree to the new shoots, to be converted into sap and to build the leaf structure, or cell after cell, and the action of the sun, warmth and air act upon the leaf or evaporate the water or crude sap (as Mr. J. W. Robson has remarked in his paper on the circulation of the sap in trees and plants), to fit it for distribution and dissemination on its mission to facilitate the growth of the tree or fruit.

The action of this is interrupted by some cause in its working up of this water (or crude sap), or in converting it to the proper consistency of food the tree requires at a particular stage of its growth. Excessive heat or sun scald will cause this. On a healthy and fast growing tree it will require from 94 to 98 degrees of heat to interfere with the action converting this food into a sort of jelly (or thickening up of sap), which can not disseminate, hence a stoppage in the cell structure, and fermentation commences (here it is, where bacteria commences to work and, as soon as decay is visible, fungi) in the new leaves.

But on a tree not perfectly healthy, such as those injured by deficiency in foliage, either caused by insects, mildew, or a hailstorm, or an early frost in the fall, or by late growth, whereby the ripening-up process was interrupted, the new wood or cambium layer is watery and not ripe, the severe cold in winter will affect it more or less, and rupture it: 90 to 94 degrees will have the same effect.

To illustrate: A few years ago we experimented on apple blossoms, and observed that the petals on the flowers wilted during the day when the trees were about in full bloom, but before they would naturally drop off. (We had at the time a southwest wind, and the thermometer ranging from 90 to 96 in the shade.) They did not recover or straighten out during the nights, and we found on close examination they were scalded or burned, as it were, and in a few days looked like fire had run through them, from this blight.

Trees that had no blossoms open, or had no blossom-buds to open, were not in the least affected, neither then nor during the summer—only those that were all out in full bloom on those three hot days perished.

It looked to me, then, that so much surface of so much bloom and leaves were not supplied fast enough with sap, to allay the evaporation going on during the time, to keep the petals from wilting or scorching.

Now, only the trees blossoming so full were affected, but why not those that were not in bloom? It seems that the cell structure of the flowers is somewhat different from the cell structure of the leaf, and appear more like the cells of the cambium layer, or cells that form the bud and new wood from the evaporated sap. It must contain more or less starch, and the action of the heat converting it or thickening it, forming a sort of glucose, and fermentation follows at perhaps a lower temperature than is required in the structure of the leaf.

Now here is a cause of blight where no parasitic fungi, or spores of fungi, or even bacteria, could have anything to do with it so early in the season, but it set in as soon as fermentation commenced. The leaf turns dark and finally black, the rotten sap or poisonous fluid runs down the petal to the calyx, along the little apple, then the stem of the little apple to the base, where all the fruit stems started out of the flower-bud, and then all are affected, if they had not been before. On most of the apple trees it only runs down to the old wood and stops there, while on the crab or pear it is apt to run down the older wood, and so extend until the tree is killed.

A tree we will compare to the city water-works, and call the cells formed from the last year's cambium layer in this tree, clear in the roots below ground, the suction or supply pipes, the body of the tree the pump, the warmth and sunshine the pump buckets, as the roots or rootlets act like a sponge, and draw in the water, warmth, acting on the body and limbs and twigs of the tree, works the buckets, or cells, which we will compare with a lot of glass tumblers standing on top one of another. The cells that were last formed on the returning sap, or when the leaves dropped in the fall, are tumblers right side up, and filled full with the ingredients to form the sap-wood. Now, by the actions of warmth and sunlight, the cells, or tumblers, seem to be upside down, or have upper and lower valves in the spring, and act like a suction-pump bucket, by which the water, or crude sap, is forced up into the new leaves, which we will call the reservoir, where the pump forces it, and where it is kept for the distribution and uses through the pipes in all parts of the city at any time, or where the action of the sun and air warm the water, or crude sap, and evaporate, and fit it for the growth of the tree, or wherever it is needed, either to form new wood, buds, or fruit and seeds.

Although the water in the reservoir is calculated to supply the city at all times, cold, freezing weather will sometimes burst the pipes; also, if the supply pipes are clogged or are injured by some cause, the pumps (although they are in good order) can not furnish a full supply; or in hot weather, more will collect and fill the distribution pipes and clog. The supply is cut off and repairs have to be made, burst pipes replaced and others cleaned. With the trees, the leaves are the reservoir. The water is held in round globules, like round balls laid close together. These are covered on the upper surface with a thin air-tight film or skin, but the lower side is open, or held together with a net-work like a fine spider web, where the air can come in contact with the globular cells and the little hair-like tubes act like valves. They swell and shrink and close up in damp and cold weather by swelling,

and open by shrinking in warm and dry weather. Now, by this process, heat or warmth will open these valves and evaporate the water in these globular cells and fit the sap for distribution, and the warmer the air the faster the work goes on and the faster the tree will grow, until an excess of heat or cold deranges the working of this machinery. An over-supply by cold, damp weather gives rust and mildew; an under-supply blight or sun-scald. Now, the water-works have to be repaired if out of order, and so have the blighted trees to be attended to when it is first discovered.

1. Remove the affected parts as soon as possible by cutting off the limbs a little below the colored sap under the bark, or cut off where it is sound and healthy.

2. Mulch the ground under the tree or have a crop of clover or grass, or any other crop that will shade the ground, thereby controlling sap circulation.

3. Plant trees when quite small, or better still, plant your seeds where you want your trees to stand, so the main roots will go down deep into the sub-soil, thereby retarding and equalizing the new wood growth, so that a sudden change of air will not stimulate overgrowth. This mode is particularly advisable for planting the pear.

Avoid stimulating manure and high cultivation unless the second and third remarks are followed.

The President—I presume this paper will be well considered after hearing a paper by Prof. T. J. Burrill, of Illinois, on "The Trunks of Apple Trees."

Prof. Burrill, of Illinois—I too wish we had a blackboard here this morning. I am so much of a school teacher I am almost lost without one, whether I use it much or not. I think there is much misapprehension about the sap passing through the cells in summer. We all know the tree is made up of cells. In spring, before the leaves put out, the cells are full of water, but in summer there is no water in them. It soaks in the tissues of the tree, as water would in the brick walls of a room. No sap goes between the bark and wood. The bark separates easily because the cells are young there.

TRUNKS OF APPLE TREES.

BY PROF. T. J. BURRILL, OF ILLINOIS.

Throughout the Northwest orchardists have found, especially during the last three years, the trunks of apple trees, in one way or another, seriously injured or diseased. Sometimes the difficulty is limited to a small area, and sometimes extends so as to ultimately kill the tree. Thousands of apple trees have in this way perished in our own and adjoining States. It seems that no

kind, age or size is exempt, though some varieties upon the whole suffer less than others, and on some kinds of soils and exposures less damage occurs.

In studying the matter somewhat closely, four principal kinds of injury have been found, viz: by insects, rabbits and mice, by blight and by frost. Of the first and second nothing is to be said in this place, except to mention the *wood borers* and the so called "woolly aphid" as the insects specially referred to. The third must also be dismissed with a few words. I have elsewhere argued that the so-called "sun-scald" is really blight, produced by bacteria, and this opinion is here further insisted upon, a large number of recent examinations making it impossible to do otherwise. In this case the bark adheres firmly to the wood, at least until it is quite rotten. Not unfrequently new bark forms beneath the old, and so heals the wound and saves the tree. The injury occurs on any part of the trunk and on any side, but is much more common on the south or southwest side, and a tree that leans to the northeast is much more liable to suffer. This is the reason that many have attributed the damage directly to the sun, and have kept in vogue the popular name. In one sense the effect of the sun is a cause of the mischief: but it may be confidently asserted that the injury now considered is in no sense a scald, produced by heat. The same thing can be artificially brought about by inoculation with blight bacteria—has been done—and the inoculations succeed as well on the north as on the south side. But the influence of the sun upon the outer bark of trees is well known to every one who has frequented the woods without a compass, and to every one else who has been sharp in his observations. The outside corky envelope, old and dead, is much more deeply cracked and furrowed on the south than on the north side, and it does not usually take long to discover if one looks, especially in early summer, that many of these cracks extend to the living cells, which are thereby exposed to the contagion of blight. So long as the bark of young trees remains smooth, and is otherwise free from wounds, we do not find this affection of the trunks. When trees lean from the sun the rays of heat fall more nearly at right angles to the surface, and are thus more effective in destroying the elasticity of the outer protecting bark. Rains, too, may more readily wash fine material into the cracks and thus in numerous cases be the means of infection. Beginning from without, it is not very uncommon for blight to be confined to the living cellular layer outside of the bast. In case the cambium layer is not invaded new bark may be formed, and the tree saved as already said. Evidently keeping the tree erect or leaning to the southwest, and providing a shield of some kind, winter and summer, to protect the bark from drying and cracking, are protective measures, and they are the best we have.

We pass now to the fourth cause of injury, namely, freezing; and shall enter more into detail.

The injury due to frost, so far as the trunks of our trees are concerned, is of two kinds. In one case the wood and bark is split so as to gape open while frozen, though the crack may be closed after warm weather comes again. Sometimes only the bark thus cracks, and then there is left a more

or less considerable wound, which becomes much more evident as the new layer of growth pushes out the torn edges. These cracks are much more frequent on the south or southerly side, but sometimes are otherwise located. Numerous kinds of trees are known to suffer in this way, and among others the following have, in my observation, been quite commonly cracked: Apple, sweet cherry, plum, box-elder, hard maple, butternut, iron-wood (*carpinus*), chestnut, occasionally the black walnut, white willow, tulip poplar, several oaks and linden have been seen similarly burst. No doubt the list can be greatly extended. But this form of injury is not nearly so destructive as the next to be mentioned. Trees are rarely severely checked in growth, and probably never through this cause alone killed, though the wound may be deep and long and slow to heal.

The second form of injury by frost is from the separation of the bark from the wood, occurring for the most part near the ground, and also usually most common on the side next the sun; but very often, much more so than in the former case, seen on any side or entirely around the trunk. This is the injury which has been most disastrously destructive in the apple orchards throughout a wide area of our country within recent years. It no doubt occurs in other trees, but I have seen it, since specially looking for it, only in the apple and the white willow. When only the bark cracks, as in the first form of injury, a bare strip of wood is often exposed by the shrinking of the bark and by subsequent enlargement of the trunk by growth; but this need not lead any to confound the kind of injury directly done by frost with that now considered. In the latter, the bark may or may not be split, usually not in any conspicuous degree: but separation from the wood is more or less complete over the affected area. Very often there is for months no external evidence of the injury, and the sickly appearance of the leaves, perhaps after mid-summer, first attracts attention. The bark itself is not always killed, and there occurs an irregular growth of wood on the inner side but separate from the older wood-layers.

The same sort of separation sometimes occurs between the annual layers of wood, and what are called "wind shakes," are often no doubt really due to frost acting in the manner now described. Sometimes these injuries take place in very old and very large trunks, but whether the splitting occurs near the surface and is afterward thickly covered by other layers, or occurs in the heart-wood as such, is not known to me.

Having thus endeavored to describe the injuries, I now attempt an explanation, based to a considerable extent upon studies bearing directly upon the problem, but admittedly inweaving more or less of theory, and thus liable to be partially incorrect. In the first place some facts need to be stated.

Water freezes at the temperature marked by 32° in Fahrenheit's thermometer: that is, the exceedingly minute, ultra-microscopical, but solid and firm particles (molecules) composing liquid water, at this temperature arrange themselves in certain regular positions with respect to each other, and cohere so as no longer to be as before, freely movable upon each other. What was a liquid is now a solid, though the component molecules are not in them

selves changed in respect to composition or hardness. They have simply arranged themselves in regular and fixed order, like the bricks of a tower, and a crystal is the result. To attain this arrangement more or less of molecular movement is required, and anything whatever that tends to prevent this movement tends to prevent the water freezing at the temperature stated. Indeed, only pure water freezes at the degree marked on the thermometers. If a little salt or sugar is added, the temperature must be below 32° Fahr. for crystallization to take place; and the lower, the greater the proportion of salt or sugar. Water, saturated with salt, may be cooled down to 4° Fahr. before ice is formed. When ice is produced on such a solution, it is, as before, the arranged molecules of water which form the crystal, the foreign molecules being excluded from the structure. The ice is therefore pure water, save that impurities may be mechanically caught and held among the crystals.

Passing now to another series of facts pertaining to the structure of the solid parts of organic bodies, it may be first stated that water forms an essential part of the texture. In plants, with which we are now concerned, all the solid parts are composed of cells usually only to be seen with the microscope. These cells have walls or sack-like membranes which often enclose various substances more or less mixed with water. Sometimes the cell cavities are full of liquid water, forced up from the earth by the roots. But aside from this liquid water contained in the cells, the molecules of water help form the solid parts, as of the cell-walls. This last is perhaps difficult to comprehend, but it is exceedingly important that we should understand the fact in order to rationally acquaint ourselves with what takes place when a plant freezes. It has already been said that water is really made of minute *solid* particles called molecules. The substance of the cell-walls, known as cellulose, is likewise composed of molecules, but of more complex structure and undoubtedly of considerably greater size than those of water. In the natural composition of the cell-wall the cellulose molecules may be represented by the bricks in masonry, and the water molecules by the grains of sand in mortar. Between these different kinds of molecules there is a strong attraction or adhesion which binds the whole into a solid substance. There is plenty of water present, but no liquid. The water molecules are as truly a part of the structure as are the cellulose molecules. Ripe seeds have no liquid water in them, nothing but this water of structure, and comparatively little of that; so of the other parts of many plants in certain normal conditions of their existence; while, on the other hand, more than nine-tenths of the weight of rapidly growing shoots is water in both liquid and molecular states.

Let us remember that every solid is made up of invisibly small molecules, and that these are held together by the attraction that exists one for another; that the force or effect of this attraction varies inversely as the square of the distance. This distance, at most, is so minute that *any* variation makes considerable, perhaps very much, difference in the result. It is this molecular attraction that binds the cellulose molecules together with the water mole-

cules into a cell wall. The molecules, however, do not actually touch each other. Each is wondrously endowed with motion and swings back and forth in a limited path of its own, not unlike, on an infinitesimal scale, the planetary bodies: kept asunder by motion, but held from farther separation by attractive force. In the living plant the swinging water molecules always separate from each other the cellulose molecules to a certain limited extent; but if by any abnormal cause the water molecules are once forced out and the cellulose molecules approach so near to each other that their own attractions are greater than that between the cellulose and the water, the latter can not get back; the organization is destroyed; the tissue fails in its physiological functions; the plant, or the injured portion of it, dies.

There is still another series of facts which, though more familiar, must be included for use in the explanations to follow. It is known to all that bodies shrink in size as the temperature decreases and expand or swell with heat. The rails of the railway are perceptibly shorter in cold than in warm weather; the mercury in the thermometer sensitively obeys the heat changes upon the same principle. The tissues of trees form no exception to this rule. The variation in the circumference of an apple tree over four inches in diameter can be readily demonstrated by a common tape line. A box elder stick just cut, three and a half inches in diameter was found by myself to be a fourth of an inch greater in circumference between zero and plus 70° Fahr. In a large trunk the difference is much greater. It is also well known that water from plus 39° Fahr. to plus 32° Fahr. is an exception to the general rule, and expands as the temperature decreases from the first named degree. In the act of freezing, further expansion takes place and in both cases with, what may be designated, resistless force. Iron pipes are split like fragile reeds; the thickness of their walls constitutes no safeguard; the iron itself shrinks, the water within expands, and bursting follows. If we should bore a hole in the heart of a tree and fill it with water, exactly the same result would follow upon a decrease of temperature below 32° Fahr. A tape line would indicate a constant decrease in the size of the trunk with the decrease of temperature until relief from the enormous pressure finally came by a longitudinal split. But such splitting does not take place in living trees, no matter how much water they naturally contain, until the temperature is far below 32° Fahr. The reasons for this have already been given and reference may now be made to our salt solution; but further discussion must first give place to still another peculiarity of the freezing process of aqueous combinations.

The plant tissues, in common with other things, containing water in a state of molecular association with other molecules, are subjected to certain low degrees of temperature, the outside or exterior water molecules first freeze or arrange themselves to form a crystal. The temperature at which this takes place depends upon the molecular attractions. When the amount of water is sufficient to fill the molecular interspaces to saturation, the crystal begins to form at very little below 32° Fahr.; but when the proportion is much smaller than suffices to equalize the attraction for the water molecules, the crystalline arrangement of the latter begins at the surface of the organic

structure only, and at a much lower temperature. If a limb is cut from a living tree, hardy in our climate when the temperature is at zero, and has not immediately preceding been much lower, neither the bark nor the wood will ordinarily be found frozen. A separated sliver is still flexible, and no ice crystals can be seen with the microscope; but a drop of water applied to the surface, even soon after the stick has been taken into a warm room, instantly congeals as it does on similarly cold iron. Yet in this green stick there is forty per cent. of its weight water, existing there unfrozen at zero, Fahr., not as a liquid, but capable of being evaporated from the tissues at the temperature of boiling water.

When this water does freeze in some of our trees at about -12° to -20° Fahr., a minute thin plate is first formed on the surface of the structure, or rather multitudes of such thin plates of regular shapes, are thus formed near together. With a little further decrease of temperature, other water molecules are wrested from their attractions in the woody structure and arrange themselves beneath those first formed, and in so doing push the latter outward. This escape of some of the water from among the cellulose molecules causes the latter to approach nearer each other, and at the same time to hold with stronger power the remaining water molecules which only join their fellows in the crystal at a still lower temperature. As, however, the cold increases, the crystal pushes out, not gaining in diameter, but increasing in length by constant additions to its base, just as we may conceive of the erection of a chimney by successively placing bricks under those already laid and pushing upward the whole structure. The final length of the crystal depends upon the amount of water and the degree of cold. Sometimes frozen succulent plants may be seen thickly coated with a crust of such crystals a fourth of an inch or more long, but so slender that a magnifier is needed to identify individual ones, the whole presenting to the naked eye a somewhat velvety appearance. Similar crusts are formed in the interior of the tissues on the surfaces of certain kinds of cells and pushing into cavities caused by the shrinking of the material.

We may now consider that we have the chief facts upon which the explanation of the two forms of injury to tree trunks by freezing rests. We have compared the splitting of the trunks to the familiar bursting—too familiar—of iron water-pipes and water-pitchers. It is only necessary that a sufficient amount of water in the liquid state exists in the central parts of the tree, and that a sufficient degree of cold be reached, to shrink the woody fiber and congeal the fluid. If the water, though as a liquid in the ducts, cell-cavities and intercellular spaces, contains substances in solution like sugar, earthy salts, etc., freezing will be more or less below 32 Fahr.; and this is normally the case. If the water exists only in the imbibed state in the cell-walls, a much lower degree than this will be required to produce crystallization, and this is the normal winter state of a hardy and sound tree. It is only in spring-time, or in a spring condition of things, that any liquid water exists in such trees. On microscopic examination in winter, no water as

such can be found in the cell-cavities or other openings of the living tissues: yet by heat under 212° Fahr., forty per cent. by weight of water can be driven off. It is molecularly distributed among the elementary bodies of cellulose, protoplasm, starch, etc., all of which are much too minute to be seen with our best microscopes, but which as certainly exist as do worlds beyond the reach of telescopes, and both are as certain as human knowledge at its best.

I append a table of the proportions of water determined by evaporation in an oven kept below 212° Fahr., in the trunks of several trees cut in December, 1883. Where two numbers are given in a column the first shows the water in the inner portion, and the second in the succeeding ring of growth:

Trees.	Diam. In.	Per cent. of Water Heart.		Per cent. of Water Sap.	
Hewes' Virginia Crab, No. 1.....	4	43.05		44.67	
Hewes' Virginia Crab, No. 2.....	4	42.29		42.75	
Wilson's Sweet.....	6	44.30	46.00	42.30	43.80
Box Elder.....	4	41.92		40.85	
Box Elder.....	5	41.18		41.36	
Box Elder.....	3	33.46		38.18	
Soft Maple.....	4	45.35		38.95	

In the spring some of these trees would contain a greater per cent. of water, but I have no figures for the amount. What has now been given may be a surprise to many, and the query would hardly be unnatural, "Why do not all the tree trunks burst when exposed to a freezing temperature?" If, however, the internal wood is sound—rotten wood soaks up great quantities of water—and the spring activities of the roots have not commenced, it is not likely that the trunks of any trees will burst by the swelling of ice formation; whether or not the shrinking of the tissues by cold without concurrent freezing is with us ever sufficient to cause the longitudinal cracks we observe after the manner of shrinking by drying, I can not tell. Probably the bark may sometimes part through this cause. The tendency to such cracking by the change in size as the temperature decreases is just as certain as by the change through drying by heat. The only question is as to the amount of contraction by such cold as we have. Probably no trees ever burst until the thermometer marks zero or below, and then only when the heart is more or less rotten, or after the roots have started to absorb quantities of water from the soil, as in springtime.

But this cracking open of the bark, or the latter and the wood, does comparatively little injury. It simply makes a bad wound without in the least

otherwise destroying the vitality or healthfulness of the tree. I shall, therefore, only add an explanation of the crack so commonly occurring on the south side or that most exposed to the sun. If this splitting of the trunk can be properly compared to the bursting of a water pipe, how can it be that the points of the compass have anything to do with it? The rupture of an iron tube always occurs in the weakest place, and no amount of thawing and freezing on one side, with the other less subject to such changes, can make any difference in the result. Action and reaction are equal, pressure southward means equal pressure northward, and so of east and west. Now so far as the outer layer of bark is concerned the south side is the weakest, because of the drying effects of the sun; cracks always being more numerous here than elsewhere, and this difference in strength, slight as it is, should be sufficient to cause the southern crack, if all other parts were exactly equal. There is, however, a far more effective cause for the phenomenon. Every change in the temperature of the tissues of a tree affects the quantity of water in the cells and spaces. Indeed it is largely by such alternating changes of heat and cold that liquid water gets into and accumulates in the trunk of a tree, mainly through the contraction and expansion of contained air. The corky bark is almost impervious to water and air, and forms a kind of sealed tube whose lower end only is open in winter. If air at first occupies all the cavities in the wood, as it does in summer, and a reduction of temperature occurs, this air very considerably contracts in volume, making a vacuum, or would do so were they not concurrently filled by the upward flow of air and water from the roots, and through them from the soil. When the air again expands pressure is produced, and gases being more mobile than liquids, the air rather than the water is forced down or in any other direction, leaving another condensation by cold to act as before. In this way the tissues of the south side of an exposed trunk of apple or other trees gains more fluid than those of the north side. The increase of water and the consequent dilution of the dissolved substances causes earlier and greater congealing and its effects. I submit the following figures obtained by Mr. Hewes, a student of the Illinois Industrial University, in April, 1883, from experiments upon a soft maple (*Ace dasycarpum*) about forty feet high and nearly one foot in diameter of trunk:

No. of Observation.	Specific Grav.	Per cent. of Sugar..	Am't of Liquid.
10	N 1.013	3.3341	
	S 1.011	2.6485	
11	N 1.012	3.2279	
	S 1.008	2.0004	
12	N 1.011	2.9569	
	S 1.0088	2.2731	
13	N 1.006	4.4967	
	S 1.006	3.5150	

If the south side of the trunk is well shielded from the sun, splitting may occur, and then on any side; but the injury would not be so liable to happen. The condition of the heart of the tree must be an important item in the effect, but the last season's growth, whether vigorous or not, makes little difference.

Passing now to the much more serious injury—the separation of bark and wood—we may say that neither the swelling of the interior nor the shrinking of the exterior layers of tissues can be accredited with the disastrous results, for these crowd the parts together instead of forcing them asunder in a radial direction. Neither is it in any way the undue shrinking of the interior and extension of the outer portions, because no such thing occurs. The heart of a tree always freezes first. No change of temperature is sudden enough in the open air to cause the bark and younger wood to freeze before the pure water of the heart wood congeals, popular opinion to the contrary notwithstanding. The very heart of a healthy tree has more water in it, susceptible of freezing, than has the sap wood and bark, and, if vitality counts for anything, its influence retards the freezing of the outer rather than the inner parts of a tree. During the present winter an excellent opportunity has been offered for observations on this point. When the thermometer first reached zero in December, I examined the twigs of many kinds of trees without finding any of them stiffened with ice, except the very immature water sprouts of apple trees and the tall growths of the tender catalpa. The same was true at -6° . At -12° the pith of some last season's growths was hard and rigid, and ice was readily seen with a hand magnifier. This was observed in apparently fairly ripened twigs of pear—Bartlett and an unknown variety—of some apple trees, of several raspberries, including Turner and Mammoth Cluster, of some shoots of Concord grape (not of those best ripened), of hybrid perpetual roses, etc. On the other hand, the wood and the bark of all these, except water shoots, were still flexible and without ice, while the twigs of most trees, as a whole, were unaffected by ice. At -28° , in a considerable number of instances, the twigs and the separated wood snapped like icicles, and were found, more or less, crowded with ice crystals; yet in a greater number of cases the living parts were still flexible and tough. In very few species was the living mature bark, during the coldest period, found frozen—never in ripened apple limbs—and these are accounted somewhat tender kinds, such as tulip poplar, the manolias, various roses, peaches, raspberries, etc. The May cherry twigs have at no time during the winter been brittle by freezing.

It is, however, essentially certain that the bark of apple trees has been forced off by frost, the formation of ice in or near the cambium layer. It has not been my fortune to actually observe the phenomenon for the purpose of verifying the conclusions otherwise reached; it is difficult to find the affected trees or areas until long after the injury is done and the operating cause removed, and no artificial experiments have been tried. I venture, however, the assertion, that it is the growth of the forest of ice crystals from

imbibed or molecular water heretofore described, together with the consequent shrinking of the tissues, that pushes off the bark, with or without a radial, longitudinal split. Such a crystalline growth does take place in the tissues of plants, and is readily seen by microscopical examinations of frozen succulent stems. The cause is amply sufficient for the result, and the only point upon which to hesitate is: Does this kind of ice formation really occur in the tissues between the bark and wood of the apple trees? We may positively say that, under the usual favorable condition of things in our climate, it does not. It can not readily be found this year after a temperature of -2° Fahr. But, after all, may not the phenomenon occur under certain and peculiar unfavorable circumstances or combinations of circumstances?

Having pretty well examined the problem, from what the courts call circumstantial evidence, I submit the following as the chief factors in the combination of causes leading to the unwelcome result: If, in mid-summer, a severe drouth occurs, the tree is checked in its growth so far that the stimulating influences of a warm, moist, spring-like autumn starts afresh the activity of the cambium cells, and if growth of new cells does or does not occur—usually it does not—in the cambium of apple trees, though shoots start, the solution of the stored materials and undue absorption of water puts the tissue in condition to freeze in the manner mentioned, when exceptional cold follows in winter. The more severe the drouth the more the likelihood of such an autumn, spring-like start. Florists know very well that to cause a plant to grow out of its season, nothing so prepares it as a preceding rest, brought about by withholding water. Without such rest the same stimulating influences will not operate. In its normal season maturation may result instead of new growth, under the attempts to secure the latter. There can be no doubt but that apple trees are more or less checked, in many situations, by the want of water during the dry times of July and August, and more in some soils and situations than others. Neither can there be any doubt of a responsive activity to the effects of a warm and wet autumn. The buds swell and burst into shoots or flowers in many cases, and in the southern latitudes of Illinois are sometimes very conspicuously developed. With a corresponding activity of the cambium and a subsequent hard freeze, it is little wonder that damage is done.

The evil consequence then, of the summer's drouth, is what we should in the first place strive to avoid. This may be accomplished in several ways known to us all, and I may only mention such as the choice of site, deep drainage to favor the penetration of roots into soil likely to be moist in summer, good surface cultivation during dry times, extensive mulching, selection of varieties possessing [powers of withstanding drouth. Of these only the first will be here further discussed.

In my own region of country, Central Illinois, I have been greatly struck with the comparative healthfulness of apple orchards on the flat lands, while upon the high ridges, usually most esteemed for fruit trees, decided unhealthfulness is the rule. In view of the foregoing, is it not probable that an im-

proper choice of location has very often been made for the orchard? It can not be said that the highest lands are always most susceptible to drouth, but this is generally true in the region mentioned. The soil of the lower grounds is richer, at least in partially decomposed vegetable matter, and this aids greatly the retention of moisture. For other reasons one would not choose for an orchard site a place relatively very low; but there is much difference between flat land and low land. Certainly no one would select a slough as the most suitable for orchard fruit. Too much water at other times of the year is as bad as too little in summer. Land that is, however, too wet, may be so improved by tile draining that it may become the very best for apple trees, being rich and light, with no standing water, but moist enough at all times for the healthful development of orchard trees.

The apple crop, in 1883, in Champaign and adjoining counties, was very good, thousands of bushels of fine fruit being gathered; but the difference in orchards differing only in the nature of the site, and as far as could be made out, in the relations concerning water, was very remarkable. Nearly all the apples worth anything came from land having very little slope and which, though not usually drained, would be much benefited thereby. A few orchards on the higher ridges were abundantly productive, doubtless due to the peculiarities of soil and subsoil, while by far a greater number so situated produced nothing fit for market. The attention of those who contemplate planting trees has been forcibly drawn to the subject and the old ideas concerning selection of site have been thoroughly overhauled. Doubtless mistakes will yet be made, and possibly now on the opposite side from those of previous years. We shall do well to remember that it is the excessive dryness of the soil in summer that is to be avoided, not necessarily the highest grounds.

DISCUSSION ON THE PAPERS.

Mr. Peffer, of Wisconsin—I have listened with the greatest interest to the paper just read, and it really gives more light on this subject of tree growing and the destruction of trees than any paper I ever heard before. We have never looked far enough. Really the cause of the damage done in '81 was that it was dry the summer before and the warm fall started the trees again. In November the mercury fell below zero. In the spring the trees leaved out nicely and in July they showed that they had been damaged in some way. I could not see how my trees were damaged until I looked below the surface of the ground. There the bark was separated from the wood. That convinced me it was the sudden change in temperature. We found the cause as soon as we looked at the roots. They were mostly dead. It was the same way in '55 and '56.

Mr. Munson, of Texas—Prof. Burrill, in reading his paper, stated

that he had not known an actual case of freezing and bursting the bark. We had a cold wave when the trees were in leaf and the trees were killed. The bark was loosened at the collar. I found many trees in that condition. When it is entirely lifted from the tree they usually die. In Arkansas it was worse than with us.

Prof. Burrill—I was hesitating as to whether ice could actually be found.

Mr. Munson—By examination I found the ice. We have a weed which shows this very well. Sometimes curled ice crystals three inches long come out of it.

Dr. Gregory, of Arkansas—This is a very interesting paper to me. It is very scientific. I appreciate it. Reference has been made to the cold snap of '81. At our State meeting I was on the committee to report the damage done by that cold wave. My observation was that, contrary to the suggestion that the heart freezes first, it freezes outside first. Below the snow belt the tree was protected; above, the tree was killed and the bark sloughed off. The southwest side was damaged worse, which is in keeping with what Prof. Burrill states. Our report was that seventy-five per cent. of the fruit trees had suffered so as to produce death sooner or later. I lost about 1,200 bearing trees in one belt in my orchard. I have about sixty acres, and in that belt not one escaped, while outside of it all escaped. The difference was not in varieties. There is, perhaps, a little difference in the soil. The mercury was from eight to ten below zero. When the freezing commenced the trees were in leaf and were opening out in bloom. I do not see how we are to avoid these injuries.

Mr. Pierce, of Minnesota—The rupturing of the bark, both in spring and fall, is the only fear I have of trees dying. A perfectly ripened tree will stand thirty or forty degrees below zero. When my trees were killed it was in June. They were in full leaf and perfectly healthy. They withered before twelve o'clock. The rupture of the bark does not occur higher than about a foot with us. (Some one remarked he had seen it six feet high.) We use building paper, putting it around the trees before freezing in the fall. Prof. Burrill sustains my views in regard to trees perfectly ripe standing the cold. One word in regard to digging a tree before it

is ripened up in the fall. It may have made its growth, but if not ripe there is not starch but water in the cells. The hardening commences when cool nights begin, and continues till cold weather. A tree will not come out well in the spring if dug too early. There can be no action in the tree unless there is starch in the cells.

Prof. Tracy, of Missouri—At Cincinnati, a few years ago, this same subject was discussed. Dr. Warder spoke of the damage done to orchards in Ohio in '81, caused by freezing and loosening the bark. The injury through Ohio seemed universal. Dr. Warder stated that on a few occasions he had examined trees immediately after their being damaged, and he had saved them by nailing the bark back on the tree. He did not know how far this could be carried.

Prof. Burrill—If trees were in leaf, I think possibly they might freeze outside first, but not otherwise.

Mr. Munson—We want to know how to keep trees from being damaged. The Ben Davis was the only tree that stood in Texas. (Dr. Gregory remarked it was so in Arkansas.) Some other varieties almost escaped. If trees are killed up when bursted it will often save them.

Dr. Gregory—I have saved some by taking off the bark and putting a plaster on.

The President—We will have to stop this discussion for want of time, for there is another paper for this morning.

Prof. James Cassidy, of Colorado, read the following paper:

HORTICULTURAL EXPERIMENTATION FOR COLORADO.

BY PROF. JAMES CASSIDY, OF COLORADO.

Never before, perhaps, in our history as a nation, has so much interest been taken in the products of the garden and in everything that it takes to adorn life and make it better worth living for, than at the present day. The prosperity of our manufacturing industries depends indirectly as well as directly on the prosperity of the various departments of agriculture, and this fact is intensified and comes home more forcibly to us every day as the country acquires age. In Colorado, agriculture in its broadest sense, is in the pioneer stage. Crops are planted with a view chiefly to immediate returns, taking no account that a day of retribution is at hand; but all this is a necessity too often, and peculiar to the settlement of a new country. The early settlers

were formerly engaged in marketing the natural products of the country (some are doing so still); now it is necessary to plant in order to reap, to breed and feed cattle in order to have meat. Farmers and horticulturists are prosperous or the reverse, according as they think and experiment for themselves, and so become familiar with facts they can rely upon and put in practice. We live in an age of thought and action. Close competition, the host of enemies that thwart our most cherished efforts, the failure of once much valued varieties of fruits and flowers, demand that we sow intelligent thought in the garden without stint. But these failures are perhaps in accord with the laws of universal nature, that nothing really good and beautiful in the highest degree can be said to be permanent. The future of horticulture is involved in the present, and just in proportion as we are intelligently informed, as to the laws underlying its practice, so will our success be measured. The want of the hour is facts, scientific facts, such as are deducible from successful practice, and no other. These we can take hold of and incorporate into our work. And this brings me to observe that our power of observation must first be awakened and stimulated before we can experiment to any purpose. To merely observe, however, involves but little effort of the mind, but to plan and carry out an experiment implies a pre-arrangement of the conditions of an experiment, and, as might be inferred, precedes the former for scientific purposes. By observation, then, we note anomalies as they occur in nature; but in putting a question to nature, we arrange our conditions beforehand.

But very few people appreciate the difficulty to be surmounted in the conduct of an experiment. On horticultural matters almost every one thinks they have a special mission in that direction, and it is very generally the case that those who know the least about it are the most anxious to ventilate what they do know, and are too often reluctant to admit the possession of knowledge in others. I apprehend that but few will differ with me when I say that nature makes experimenters; that the most comprehensive knowledge of nature, careful training and ample scientific and practical knowledge will not make accurate experimenters of some people. No man, I firmly believe, can be successful in this line of human effort who is careless, slovenly and loose as a practitioner. An experimenter should be the opposite of this, a careful, accurate and methodical thinker and worker. In fact a man of "gumption" who can handle details. No person ever became a successful horticulturist who could deal only in large results, and just here there is a broad margin between the farmer and the gardener. The person who can not condescend to little matters in the conduct of an experiment, is paving the way for a failure. Wherever a large measure of success has been attained in the practice of this profession, all those who look beneath the surface will see that the result is largely in the ability of the individual to measure details at their value. An experimenter should be a man who possesses sufficient acquaintance with his profession as an art, supplemented by such a wide range of general and scientific knowledge as will make his work as

effective as possible, and add if possible to the summation of real science; all of which will help much in encouraging his ability to rightly interpret the results of his work. Misinterpretation and wrong conception of the results of such work have brought much odium on experimental horticulture. The experimenter must be able to cull the grains of truth in a series of observations, and to excel here he must be a good observer, for his knowledge of nature and cause and effect should be complete. Nor must he be above recording a failure, because every experiment is not a success. The mere unfolding of truth is not the absolute measure of success in any undertaking.

The records of our failures may often be as instructive, as necessary and useful as the record of the grandest success. So it will be seen that to place and carry out an experiment or a series of them, requires a peculiar combination of qualities in the individual and which every experimenter should possess, more or less, but more especially the scientist. Now the question arises: What is an experiment? A German writer says that an experiment is a question put to nature. Now, for an experiment to mean any thing, it should be so simple and eliminated of all entanglements, sources of error and complications, such as would arise from attempting too much, as to elicit an unequivocal yes or no. Too many of the experiments recorded in the public press are misleading and negative as to results, either because they lacked simplicity, plainness and directness, or there is a general assumption from local premises, incompleteness in the presentation of essential facts and failure to note the qualifying effect of modifying circumstances. There are results without reasoning and facts without philosophy. Two persons may conduct an experiment and too often differ widely in their interpretation of the result, both at once correct from the standpoint of each and both equally wrong in deducting a rule for general practice from facts of merely local importance. The lesson taught us is, that we need to observe more closely, investigate deeper, analyze more keenly and deduct with more wisdom, and by so doing the result will not lead astray those who would follow our instruction. No matter how accurately and oft-repeated an experiment may be made, it will avail nothing if our methods are defective, because we can never reach an accurate conclusion. The effort and desire to discover and apply useful laws in the practice of horticulture is laudable, but in regard to results that border on the doubtful, we ought to be silent, rather than publish them so as to mislead others. We should deliberate when doubtful, seek for knowledge when ignorant, and hesitate to proclaim a discovery upon hasty data. It is quackery in horticulture experiments that has induced so many people to look on this work with disfavor. Impracticable theories, erroneous deductions and much vaunted, pretended fertilizers have been thrust upon us so that people rebel and look on science as a pretentious innovator.

WHO SHOULD EXPERIMENT?

As I look at it, experiments are necessarily of two kinds; 1st, those that agricultural colleges may perform in regard to determining natural laws,

and 2d. those that the private individual may conduct and which may be called tentative experiments. I am of those who believe that our agricultural colleges should not only educate young men for such opportunities as may occur to them in this line when they leave school, but also institute such experiments, as are demanded by their immediate interests, and while if possible, positive value to local interests only may, nevertheless, from the flexibility and universality of nature's laws, be of general application in many cases by way of comparison. Horticulture offers such a wide field for experimentation, that no doubt each State, or section of the country will decide what the term horticulture means to them particularly. So that in discussing the work of the college, I will chiefly have an eye single to the particular horticultural wants of the people of my own State. There is some doubt as to the meaning of the term horticulture. In most cases pomology is meant. Horticulture has to do with fruit culture, but so has agriculture. Whether it should be treated from the agricultural or horticultural standpoint, depends on its special treatment. Horticulture on this continent covers a wide range of topics, depending on the varying latitudes, climatic conditions and special wants of the people. The definition of horticulture is no doubt expanding rapidly, and in a period not very far distant will mean as much at the West as it does to-day under the wing of the Massachusetts Horticultural Society. Horticulture then in Colorado, means, as might be inferred, very largely pomology and forestry, with a growing taste for market and landscape gardening. It must be obvious to the veriest tyro in such matters, that the college, and it only, can carry out scientific experiments worthy the name. And that to experiment to some purpose, one must be acquainted with the work already accomplished so as to avoid unnecessary repetition. But in Colorado, possessing as we do, skies of Italian clearness, with an abundance of water, old experiments, it seems to me, would be well worthy of repetition, owing to the opposite conditions and positive advantages we possess over the Eastern States.

What Colorado needs especially to know, is what varieties of the orchard fruits will succeed under the peculiar climatic conditions prevailing there, which are an excessive dryness of the atmosphere, warm sunshiny days, with but very little snow on the ground in winter. Many methods of cultivation that are standard in other States here require modification. We may, for instance, ignore the law that exotic seeds should not be sown before settled warm weather. Seed rarely or never dies there; in consequence, weeds are in great abundance, and grow until frost from the great abundance of water. The apple, pear, cherry and plum have been planted in abundance, but of varieties in most cases unsuited to this altitude, and too often left to take care of themselves, as though foreordained to succeed any way. The want would seem to be met by varieties of hardy, vigorous habit, possessing a leaf adapted by nature to the climatic conditions of the plains. The Russian apple may furnish these, or seminal varieties of those fruits raised on the plains.

And not only this, but we need methods of cultivation to correspond. We need also to know, more definitely, as to the amount of water and the frequency of its application, to perfect any given crop, whether in field or garden; taking into consideration the slope and character of the soil, and the special crop under treatment. And we need to determine the desirability of growing even hoed crops in our orchards. The work of the college should enable us to determine this, as well as the adaptability of our climate for the production of special crops in horticulture and agriculture, as the hop and tobacco.

In the glades and recesses of the Rocky Mountains, occur the native fruits in great abundance—the plum, the cherry, several varieties of the currant, gooseberry and raspberry, with many deciduous shrubbery and a host of annuals and herbaceous perennials, all affording possibilities of future excellence, either by superior cultivation or through cross-fertilization. Already the Colorado Agricultural College, although but a young institution, has done a work in the hybridization of wheats that has given it an international reputation; but wheat can not always be paramount in any system of agriculture based on its progress as an art. But the present aspect of the field shows what a work remains undone, by the chemist, in the analysis of soils, of water and forage crops; by the farmer and gardener, in determining on a diversified system of agriculture, in the originating and adapting of improved field and garden products to the exigencies of irrigation and our peculiar climatic conditions, and in recuperating the already overtaxed energies of the soil, which in all the newer States is being rapidly depleted of its store of plant food.

All of these questions present their peculiar claims, demanding varying arrangements, and facilities for their elucidation. All science, however, must stand the test of actual application. The motto of the Royal Agricultural Society, England, is "Practice with Science;" but that of the Maidstone, England, Farmers' Club is "Science with Practice;" explaining the choice of position to science, by saying, provided it can be followed with a view to profit. In forestry, too, the field is fallow. The climate of the plains calling for walled gardens, shelter-belts, groups of trees, and shrubbery. The tree planting of these plains is the great problem of the age to the people who live on them, and no doubt when they come to realize its importance and know what they can do in this direction, and providing legislation continues favorable, these plains will be dotted with a luxuriant vegetation. At the college the soft maple, the walnut, hickory, several ashes, the catalpa, white elm and sweet chestnut are known to succeed. But further experiment is urgently needed. Through trees only, so far can man hope to influence the meteorological conditions of this country in his favor. To what extent they will influence the rainfall, perhaps can not be told; but we do know that they conserve moisture and snow wherever it falls in their shade. The plant in its successive growth and decay is the salvation of the soil from the vacuum of sterility. The despised weed in its decay quickens the germ-

inating corn. The lichen and vine live their brief existence, and in their death and decay furnish a nidus which rears the solid oak, illustrating at once the activity and compensating power of nature. The Rocky Mountains are at once the fountain head and conservers of the water supply of the State; but continue to destroy the timber in their canons and gorges, and water will be a minus quantity when it is an imperative necessity. In the possession of water, experimenters control one very important factor in the conduct of an experiment to a definite issue: especially so in the testing of fertilizers. In Colorado the horticulturist knows that each succeeding day will bring him sunshine almost without fail, so that neither cloudy days nor mildew have any terrors for him. The water for the sustenance of his crops is deposited in the shape of snow in the majestic Rockies; canals and irrigating ditches convey the fruitful waters—fruitful in all the elements of plant food—to the thirsty land. The laws regulating its distribution are as equitable as the best engineering skill and catholic statesmanship could desire. While all this and more might be said for it, yet water may be a dangerous ally in the hands of those who unskillfully use it. The influence of carefully kept meteorological records in enabling the college to be the center of a series of local experimenters, situated in various parts of the State, would be invaluable, especially in a study of the varying effects of meteorological conditions, and the ability of different varieties of plants to withstand the eccentricities of heat and cold, and to which the people of the State could look with confidence.

And finally, what is especially needed in regard to the college experimental work is, that the different colleges work in unison, and so save a vast amount of time, money, energy and materials, while at the same time reaching more definite results, and be educating public opinion to the importance of this kind of effort, for there should be union and sympathy between horticulturists and those who make scientific experiments their business. No one, I think, now-a-days questions the value or importance of the work done at these stations, the only question in doubt being as to their maintenance, the topics investigated and by whom conducted. The best agricultural colleges are those which send forth from their laboratory's, workshops, fields and gardens a band of successful cultivators of the soil, admiring nature because familiar with her laws. And the most successful teachers of horticulture are those who present their knowledge in the aspect of their gardens, and which their own intelligent skill has developed into a thing of beauty and usefulness. And what an opportunity occurs in the management of such an institution for its president to give it vitality and character, and to impress his personality on the work of its faculty and students, and for the agriculturist and horticulturist, too, by an intelligent and scientific application of the best methods of their art in developing the best possibilities, resources and proper surroundings of a happy home. Owing to the great diversities of soil and climate incident to this State of Colorado, it is necessarily impossible to make any general application of the results of experimental work to any considerable portion of the State.

So that, upon individual effort and upon that of local horticultural societies, must devolve very largely the development of the horticultural resources of their several localities. Individual effort, then, must not lag. The horticulture of no people or country is settled. Many things that are valuable in our fields and gardens is the result of the thoughtful care of some lover of horticulture. In imitation of the mechanic the horticulturist must exercise close and constant observation, and bring to his own observations in the garden the advantages to be derived from the successful experiments of others. There are people who would separate thinking from working horticulturists, and which is both mischievous and untenable. The most practical men are the best thinkers, and the true theorist verifies all science by his own practice, or that of others. Too often, I think, do horticulturists ignore, from preconceived prejudices, the useful, practical lessons of successful thinkers. But this is an everyday experience, and it has ever been so.

Almost every great invention that has lifted humanity to a higher plane of comfort and usefulness has at the outset been assailed by calumny. What was but an enthusiastic dream in the days of Elizabeth is to-day driving vast cargoes of the products of this continent across land and sea; but the intelligent horticulturist is held by no such bonds; he knows that he is a monarch among the achievements of nature. The average individual, however, has not the time, means, skill, nor training for scientific work. He knows, if he be an intelligent man, that this kind of work belongs to the trained man of science. But he can carry out many practical experiments, if he be a thinking man, and while they may lack the accuracy of the trained and educated thinker, may nevertheless contribute much to his material prosperity.

A German writer says experiments are not easy, but are within the power of every thinking husbandman. Individual effort, then, we think an important step toward horticultural progress, and closely allied with this lies associated effort, as in horticultural societies. The work of the college, and of the individual, will concentrate here and crystallize into a power for good. A live, flourishing society will ever give an impetus to united effort among its members. The numerous public and private gardens in the Eastern States are no doubt largely due to the influence exercised by the horticultural societies of Philadelphia, New York, Massachusetts, Cincinnati, and Dayton. These societies are a rendezvous where new and rare garden products are exhibited for comparison and competition, and if worthy, receive the indorsement of the Society, but if unworthy, can never fail of its condemnation. Carlyle, perhaps, justly remarked, "There is no nation in the world where there is so little happiness and so little misery as in America. In the pursuit of wealth and practical science we have lost sight of wants that calm and restore. How many costly buildings are there not, near all our large towns and cities, rendered conspicuous by the absence of a refined taste, and where vulgarity is ever thrust forward in the shape of culinary vegetables, invading what ought to be lawn and flower garden, all this telling too plainly the mushroom origin of their shoddy owners, and illustrating

Lord Bacon's maxim, "that man will ever build stately, sooner than to garden finely, as though the latter were the greatest perfection." But what a field have we not in horticultural pursuits for mental and moral stimulus: work must be done well and in season, or profitable results will not be ours. Then, too, in no profession, unless it be that of medicine, are constant observation, quick perception, a cultivated eye, and ready resource, more important than here. Our success will depend on our ability to adapt ourselves to surrounding circumstances, and to decide quickly and readily on the exigencies of the hour. The horticulturist, too, must love his profession, and between himself and his living charge there must be an understanding that can come only from familiar acquaintance.

DISCUSSION ON THE PAPER.

The Secretary—I have been thinking, especially during the reading of the last two papers, of a letter I received from a man who did not know much about our Society, in which he wished to know if it was to be captured by business interests. I tried to assure him to the contrary. This gentleman is here now. He will certainly see that it is for the interest of horticulture in general, and not for personal interests. We have had several most excellent papers, such as those by Prof. Forbes, Prof. Robson, Prof. Burrill, Prof. Cassidy, and Mrs. Tryon. These would have graced any lecture course. I wish to compliment our Society in thus bringing together such able talent.

Mr. Patterson, of Missonri—I did not come here to speak, well knowing I should expose my ignorance if I did; and I have succeeded pretty well so far in keeping quiet, but I can't stand it any longer. I am one who has not had the advantage of training, but I am willing to learn, and acknowledge I have received much benefit here. I acknowledge I have been paid for coming to hear Prof. Burrill's paper alone, although I could have gotten it in the Proceedings.

Mr. Day, of Nebraska, suggested that the name of G. P. Peller be included in the list spoken of by the Secretary.

The President—I am myself greatly delighted at the success of the Society, not only here but at New Orleans, in bringing together such papers and the men who have read them. I think such a volume as we have the material for will be appreciated. I hope we will go on and hold other meetings as good as this. I solicit your co-operation in its welfare. It occurs to me that the Committee on

Forestry and Legislative Aid had one great omission. I will add the name of Robert Douglas, of Illinois. There is no man who has a wider reputation than he. No man has done more in this direction.

The Society adjourned at 12:20.

Fourth Day—Friday.

AFTERNOON SESSION.

The Society re-convened at 2:30 o'clock.

Secretary G. C. Brackett, of Kansas, read the following paper :

ORCHARDING ON THE PLAINS.

BY G. C. BRACKETT, OF KANSAS.

The early efforts to push the industry of orcharding out onto prairie regions was at an early day regarded as a doubtful and risky investment, and by a very large portion of the public, among which were found many of the prominent horticulturists, as an enterprise only to be followed with disaster and failure, and when carried into a region which had for years been accepted by all as a barren waste, success was among the impossibilities. It was only recently that we find scientists who had explored this region—in their studios—uttering the following pronouncement as a warning to the adventuring pioneer with reference to its possibilities relating to its forestry interests.

“Trees can not be made under any circumstances to grow there, because beyond the belt where trees grow naturally.”

This is precisely the opinion held in years past with reference to orcharding throughout the extent of the great Mississippi valley, and especially of the prairie States. Still later such were the conceptions of the possibilities of regions lying west of the Missouri river, and extending into Kansas and Nebraska, that even the success of agricultural pursuits was considered very doubtful, and attendant with ruin and starvation to whomsoever should dare to attempt their development on these Western plains. What is the present status of these industries but a monument of refutation of the folly and fallacy of such theoretical predictions, and which has equal force when considered in relation to horticulture in its various branches.

The practical American does not readily yield to what some may class among the impossibilities. He graciously accepts the situation and overcomes the apparently impracticable by a substitute of practical means, and thus wins success.

'Tis true that the first efforts made to establish the industry of orcharding on the Western prairies was confronted with serious and complicated difficulties. The influence of a peculiar climate upon the productive elements of an untried soil had not been determined. The methods of culture and varieties of fruit which had proven reliable in the more eastern sections when applied to these regions failed to respond to satisfactory results. The experience of time was required to solve these questions. Here then was opened up a field for extensive experimentation in which would be required the skill of the most intelligent culturist.

The work of determining a system of successful processes was one necessitating a line of effort starting with the first principles. How well this work has been done will be seen as we proceed.

Returning to our topic of orcharding on the plains: What means this term, "on the plains?" I can well remember when a lad and attending school, the geographical authorities applied this term to all sections embracing prairie countries, and which then included the States of Illinois, Iowa, portions of Minnesota and the broad territory extending westward to the Rocky Mountains. Still later its eastern boundaries were commonly accepted to run about with the ninety-fifth meridian, or the eastern line of Kansas and Nebraska, and afterwards to recede westward to near the ninety-sixth, and still later to the ninety-seventh, and to-day, if you chance to converse with the settlers living about the ninety-eighth meridian, they will tell you "the plains" are to their westward. How then shall we apply ourselves to the subject: certainly not as bearing upon territory lying east of Kansas and Nebraska. There the pursuit has already become an established industry, and successful methods for treatment and a list of reliable varieties have become familiar as household words.

The same may be said of Eastern Kansas, Western Missouri and Nebraska. Why, Mr. President, the product of the orchards within this belt for 1883 bears on its face uncontrovertible evidence of the success of orcharding on the plains, if we are to accept such sections as a part of the plains. In Nebraska, Otoe county alone produced 70,000 bushels of apples in 1883. In Kansas there were quite a number of the older counties which produced over 100,000 bushels of apples each, and on one day in November, says the Denver papers, twenty-one cars loaded with this product arrived in that city from Kansas. Omaha authority says a train loaded with apples grown in Brown and Leavenworth counties, Kansas, passed through that city the past fall *en route* for Idaho and other points West. This city in which we are convened has annually for years past been a depot of supply for the Western and Eastern markets of thousands of barrels gathered in from its State and the contiguous plains. The years 1882 and 1883 witnessed the unexpected as well as surprising occurrence in the trade demands of thousands of bushels of apples being sent Eastward and into Southern markets, the product of these "plains." I might pursue this line and add further material evidence to show that orcharding has become a profitable industry on the plains, but I

do not deem it necessary, for I hardly think any one familiar with existing facts will endeavor to controvert these statements, so far, at least, as applied to orcharding in Missouri, Eastern Kansas and Nebraska. But the question here arises, how far out on the plains will the industry prove successful. Here let us examine the records. Referring to the county reports on file in the Secretary's office of the Kansas Horticultural Society, we find that in every county lying between the eastern boundaries of the State and the ninety-eighth meridian west, which includes nearly the eastern half of the State, all classes of orchard trees common to other and more Eastern States are being successfully grown and fruited, excepting the peach, which has not been generally successful north of latitude 39° , and is most abundantly productive in the range between 37° and 38° of latitude, which embraces the two southern tiers of counties. Beyond the ninety eighth meridian west, most of the orchards are yet young and not up to a bearing age. The wood growth for 1883 is reported good and healthy, and in several counties strong. The counties of Jewell, Smith, Mitchell, Lincoln, Barton, Rice and Reno report the first product of apple orchards in 1883; all of these counties are in the belt between the ninety-eighth and ninety-ninth meridian, and include nearly the entire width of the State north and south. Pushing on to the west of the ninety-ninth meridian to the one hundredth, we take in a belt containing fourteen counties, all newly settled, and hence not much advanced in any of the industries relating to the culture of land. Yet more than half of these counties report a successful planting and growth of orchard trees.

At Hays City, located near the one hundredth meridian, in 1882, it was my privilege to examine the orchards of the Hon. M. Allen, which showed every evidence of healthy development, the cherry being in fruit at the time, and which in quality was equal to any seen in the most eastern counties. Following the Arkansas valley westward the same year, I found a condition of orchard trees equal in health and vigor of growth to that generally found in eastern counties of the State. At Sterling, in Rice county, on the farm of J. B. Schlichter, the previous and current year's wood growth of apple trees was, on an average, strong and very stocky. Passing on this line and in connection at Great Bend, in Barton county, Garfield, in Pawnee county, at Dodge City, in Ford county, and skipping Gray county into Sequoyah at Garden City and Larkin, in Kearney county—the last two being under a system of irrigation—we find evidences sufficiently encouraging to warrant further efforts. Trees were doing well wherever intelligently treated. At the third annual fair of this Society, held at Topeka, in September, 1883, the county of Republic, lying on the extreme northern limit, and Saline, at about a central point and adjoining the ninety-eighth west meridian, and Washington, Riley and Davis, on the ninety-seventh meridian, exhibited in contest a product creditable to any county. Being from young trees which were in a high state of vigor, they would have excelled in many respects the product of the best orchards in the eastern counties of Kansas or any State to the east. There is a force in the soil of these western plains that produces a remarkable de-

velopment and peculiar fitness of the climate for the finishing up and maturing of the apple especially.

At this fair a display was made of apples grown at Great Bend, in Barton county, the first born fruit of that remote point on the plains. The collection included the Fameuse, Milan, Wagener, Red Winter Pearmain, Willow Twig, Rawle's Jenet, Missouri Pippin, Wine, Pennsylvania Redstreak, Ben Davis and Kaighn's Spitzenberg. These were well grown and remarkable for perfection in form and beauty of color. They possessed a firmness in flesh seldom found in fruit of so warm a latitude.

In conclusion: It is an established fact, that orcharding in quite a large portion of the plains, as accepted in 1860, has become a successful industry, affording profitable returns, and especially is this true of the eastern portion of Kansas and Nebraska.

The rapidity of its progress in area, the superior character and extent of the product, have surprised the most hopeful enthusiast. The first planting in Kansas, so far as we have been able to trace, outside of the Indian missions—some of which date back to 1837—was made in the spring of 1855, by T. M. Pierson and Judge Wakefield, in Douglas county. The total of these plantings did not exceed 300 apple trees. To-day we have the following statistics bearing upon the progress of development through the short period of twenty-eight years. Of apple trees there are under successful management 6,939,062; of pears, 279,679; of peach, 10,668,624; of plum, 584,990; of cherry, 1,629,295; or a grand total of trees in orchard form of 20,071,740.

These statistics, Mr. President, are to be accredited to the authority of our State Board of Agriculture.

That the product of a large proportion of this immense showing is not co-equal in magnitude is clearly traceable to the following two causes, and not directly to the soil or climate:

1. The ignorance of planters as to the adaptability of varieties, being governed largely by the prejudices formed in the more eastern States.
2. That nine-tenths of the total number of trees, and particularly of apple, have not yet reached an established bearing age, having been planted since 1877, being about the time of a determination through experience of a productive list of varieties for the State.

This industry is being rapidly pushed out onto the more western plains each year, and each year brings the intelligence of faithful work being rewarded with success.

I can well remember when the public were as incredulous as to the adaptability of the eastern portions of the State to fruit growing as it ever has been with reference to the more western plains. But it may be safely calculated that where forest trees can be as successfully grown as they now are on the greater portion of the "western prairies," that the intelligent planter will find a successful method for growing his orchards.

It has been my privilege to be prominently connected with this industry in Kansas from the first efforts, which were made in the eastern counties, and

to aid in its extension westward onto the plains. It has been with deep feelings of concern and anxiety that I have watched every feature developed, favorable or unfavorable, in its progress; and it is from the records, dating from the first effort in each county, and the annual reports of the progress of the work therein, together with its results each year, that I am enabled to present to you the present status of orcharding on the plains.

DISCUSSION ON ORCHARDING ON THE PLAINS.

The President—This paper of Mr. Brackett's—statements in which would seem to settle the question as to whether orchards can be grown on the great American deserts—is before you for discussion.

Judge Newman, of Kansas—T. C. Henry, of Abaline, at a horticultural meeting in Kansas, read a paper, saying that tree culture in the West could not be a success. He did not think the soil adapted to it. The facts are, trees do grow in Kansas.

Mr. Masters, of Nebraska—I feel under obligations to say a word. I am fortunate enough to be an inhabitant of Nebraska, and have been for twenty-eight years. The possibilities have not been overdrawn. I do not know just how far west fruit has been grown, but trees have been grown successfully beyond the one hundredth meridian. One person spoke of the soil not being adapted to the trees. If that is so we must hunt trees adapted to the soil. That has not been done, and it has been the source of a great many of our failures. A man coming from the East wants an eastern apple. He does not go to the nursery but buys of an agent, where he can get any variety, and he gets what does not suit the place.

The President—If you have no further remarks we will pass to the subject of "Pear Culture in the Southwest," by Maj. S. H. Nowlin.

Maj. Nowlin, of Arkansas—Ladies and gentlemen, I suppose I owe you an apology for not having a paper. It was my intention to prepare one; not that I knew anything about the subject, but that I wanted to know. I intended to write to others, and by correspondence find out what I could. As I did not do that, I can only say what I do not know. I know there are many important points in regard to pear culture. In our country there are not many orchards. Some have been successful and some have not, and among

the latter is mine. The first crop I had were Bartletts, B. d'Anjou, etc. I lost about one hundred Bartletts from blight. My friends were similarly afflicted. I talked to a friend of mine about it. He asked me about my soil, and I described it. It seemed to me to be a good place. I finally told him there was a solid stone stratum underneath. He said the roots ran down to the rock, and the trees died of cold feet. In the eastern part of the State we have a gentleman who had 1,000 trees and they have done well. I tried to find out why. The only solution I could find was that the soil was good and there was an under stratum of sand. I know trees which have for fifty years borne well. They were planted by the French. They are seedlings. Some other places there are trees which have not been blighted, and have borne well for an equal time. I do not know whether there are pear trees, except seedlings, in other parts of the State which have done well or not. I should like to have this subject discussed.

DISCUSSION ON PEARS.

Mr. Greisa, of Kansas—I would like to inquire if those seedlings are of the same quality?

Maj. Nowlin—They are of different sizes and qualities. They are all of fair quality. The largest pears I have ever seen grew in Arkansas. I saw one that weighed thirty-two ounces.

Gov. Colman, of Missouri—We all have our theories about blight. For thirty years this has been discussed, and we are not any nearer a remedy than at first. I think there are other horticultural subjects about which we can talk to more profit. If we could come at any remedy it would do.

Mr. Peffer, of Wisconsin—The gentleman says we are no nearer a remedy than ever. I think we are. From Prof. Burrill's experiments and others, we have found that it is when the sap descends from the leaves the damage is done. At that time, if the wind and heat are so severe as to evaporate the sap, there is a sort of jelly formed which chokes the cells and blight ensues. About seedlings. Those seedlings stand in our State which seem to be on the place where they have grown from seed. They have not been transplanted. There is one orchard that has stood for a great many years, but it is

where the roots go down to water. I have trees planted in 1851 and they have not blighted; but those of mine which have been transplanted have been blighted more or less.

Mr. Johnson, of Indiana—We are near the close of our interesting meeting. I am satisfied it will close with better feeling if we drop this subject.

Mr. Ohmer, of Ohio—I have been growing pears for sixteen years, having some 4,000 trees. During the first half of the time I lost 500 or 600, but I do not think I have lost more than ten within three years. Pears can be grown successfully near Dayton, though they may not be at other places. I am situated about 200 feet above Dayton. I have a sandy soil, and below that there is gravel. I never use manure of any kind for pears. I sow clover and let it stand three or four years, and then turn it under. Where I continued to cultivate my pear orchard, or in one instance used stable manure, they blighted some. Some varieties are more healthy than others.

Mr. Williams, of Kansas—*Mr. Peffer* spoke of pears having to go down to water. We grew them in Arkansas where they bored for an artesian well and broke the auger in dry ground.

Mr. Munson, of Texas—I am glad *Mr. Ohmer* opened this sore afresh. I am sorry to pass a criticism on my seniors, but what do we come here for? Are we to back down? *Mr. Ohmer* has struck the key for us. At Houston there is an orchard which has not blighted. It was not cultivated after the first season. The man puts his orchards in Bermuda grass. A *Mr. Bowen* planted an orchard of 7,000 trees. He cultivated that orchard and the trees blighted. Trees planted in waste places do not blight; where cultivated they do. They want to hunt food for themselves.

Mr. Peffer—I think the last speaker is correct.

Mr. Peffer showed a pear seedling with six inches of top and about three feet of root, like a string.

Maj. Nowlin—I would like to have some information about *Keiffer's Hybrid* and *LeConte*.

Mr. Pearce, of Ohio—I took special pains to inquire about the *Keiffer* at the Pomological Society. I talked with *Mr. Satherthwait*

and others who have been growing them. They did not claim for it good quality, but, like the Ben Davis, they will do to sell.

Mr. Hale, of Connecticut—I have fruited it for two years, and for several years have tested samples. While the tree is a good grower and the pears beautiful, I never saw one that I thought was fit for any human being to eat.

Mr. Munson—About the LeConte in Texas. I have seen them blight where cultivated, but not where uncultivated. The fruit is ordinary and will do where we can't get better, but I think we can get others more valuable.

Mr. Latimer, of Kansas—I have the proceedings of the Georgia State Society. In it a man says it has blighted there.

Mr. Pearce, of Ohio—I have seen accounts of the Keiffer blighting.

Maj. Ragan, of Missouri—Though I am a fruiter of pears, I am just going out of the business. But still, from what has been said, I do not like to see this subject scoffed at. I feel like it is too late in life for me to undertake it. The point I wish to make, which has been touched upon, is in regard to location. We want pears. It is our duty to trace out the locations where they will succeed, either by accident or by searching for them. They will succeed in other places as well as in Ohio. I made a mistake; my ground is not suitable for pears, it makes too much growth. I can raise as fine trees as grow, but when they get large they blight.

Mr. Cadwallader, of Kansas—I feel interested in this subject. I have found that most of the pears have not been a success. Some fifteen years ago my attention was called to two large pear trees, as large as I ever saw. I inquired about them. I found they were brought from Tennessee. They were brought as seedling sprouts. Last year I went there again, and found them loaded with fruit. I was told that they were sure to bear every year. Would we not better encourage the planting of seedlings. Those trees are on thin soil, and where they have not been cultivated; and whether this is the cause or whether it is because they are seedlings I do not know. On account of the soil the roots of those trees can not go to water.

Maj. Evans, of Missouri—I would like to ask if the gentleman knows the quality of the pears?

Mr. Cadwallader—They are only fair in quality. I have seen trees budded from those, and they are not blighted.

Maj. Evans—In my county there are trees fifty years old, but the fruit is not good.

Mr. Folck, of Missouri—My experience at first was a failure. My first planting was in Illinois, in '69. I moved to Missouri and planted on dry soil. I was so successful I thought I knew something about pear growing. I planted 1000 more trees, and they flourished till '79. Then I noticed blight commencing. I cut out blighted limbs. I finally had to cut out the whole orchard. I was afraid the blight would get into my nursery. It did, and cleaned out all the pears except one row of dwarfs, and it was in a slough. I concluded I would dry up that slough by planting willows in it. That row of dwarfs did not blight, but was not worth anything. I turned that piece of ground out, did not know what to do with it. This row is now where I get my pears. Blight is common around me, but that row still stands. Water overflows this ground every season. I have to prop up my trees, they bear so full. Those trees are not more than ten feet high, and are seven years old. They make slow growth.

Mr. Ohmer—That is it. Pear trees that blight first make a fast growth. My advice is if you want to plant pear trees try on a small scale. Give the trees a start and let them go to grass.

Mr. Scofield, of Kansas—I have lived where we have had pear blight from Long Island Sound to Kansas. At my place now the soil is of a sandy loam. My pear trees, which have no cultivation, and are tramped around every day, were planted some six years ago. They are making a slow growth and do well. My soil is a mixture of sand and clay with rock underneath.

The President—Gentlemen, if you are through with this subject we will pass to another. We will now hear from Gov. Colman, of Missouri.

NORTHERN SUGAR MAKING.

BY GOV. COLMAN, OF MISSOURI.

MR. PRESIDENT, LADIES AND GENTLEMEN: I did not expect to talk to you upon a subject which lies quite near my heart. I have made no preparation to do it. I know you are fatigued, and I will be as brief as I can. I acknowl-

edge that northern sugar making is considered an important question. This country is paying out \$140,000,000 for sugar every year, and if this can be saved it ought to be done. I told President Earle that if they got through with the proceedings and a few minutes were given me, I would improve the opportunity to show the importance of this subject. Two years ago when we had that horticultural meeting between Kansas and Missouri, I made a little talk. A man came to me and thanked me for it. He said before he was opposed to it. He went home and talked and wrote about the subject. The result was they made 200,000 pounds of sugar. The best quality brought eight and three-fourths cents a pound, and the second eight and one-fourth. The sugar I exhibited to one of the largest Southern sugar makers. He saw no difference between it and Southern sugar. I wish I could induce all of you to go home and do the same.

The State of Missouri alone pays out four or five millions of dollars every year for sugar which might be produced here. There is more than that much consumed here and in Kansas also. I want to see all our resources developed, and I know we can develop this. At Hutchinson, Kansas, an establishment was put up and 200,000 pounds were made. They feared they could not produce it there, but when they tried it they were successful. I say here to-day that you can no more certainly get cream from milk—flour from grists, than you can get sugar from cane. Many of us are prejudiced against sorghum. We look back to the old cane mills and evaporators and are prejudiced. All our syrups are made mostly of glucose. Even down in New Orleans, at the home of sugar makers, we were supplied with glucose. Gentlemen, I say right there is the home of this glucose. Planters do not make it, but others do. Everywhere they buy good molasses and add half or two-thirds glucose. If you want good molasses you must depend on sorghum. Now, can this be carried on successfully? In New Jersey they have made some 300,000 pounds, also at Champaign, Illinois. It is the process there adopted which is used in this State. We have made this year nearly 1,000,000 pounds of sugar. I believe, in my lifetime, if I am spared to a good old age, this country will make all its own sugar. Beets have been tried, but they are not successful. They are so costly, so hard on the soil; they have no compensating things. In sorghum you have the seeds, which are good for feed—equal to corn—it alone paying for growing. Southern sugar cane has no compensating things. Labor is at a low ebb in the South, too. Of our delegation which went down to New Orleans last year, all our Yankees from the North testified that one of our Northern men would do more work than three Southerners. With our improved systems we can raise ten acres cheaper than they can raise one of Southern cane. Our friends in the South, after seeing our sugar, appointed five men to come up and meet with us. They believe we will make more sugar and cheaper than they will.

I wish I had a voice loud enough to reach every farmer. Can't you see you are going to beat them in the race. If I had known I would have had this opportunity, I would have brought samples of sugar and syrups. You

would see that we are neglecting an industry which is calculated to distribute this wealth among us which we pay out. Of course not every farmer will put up a mill, but you can have some large ones, and farmers can make semi-syrup and sell to the large factories. They can store it away and make sugar all the year. That is the way they did in Champaign, Illinois. Is it not important for you to talk this up, to produce good food for your children, to encourage one of the best industries in the country.

Cane is not such an exhaustive crop. After several crops of cane, wheat or oats will grow so rank it will fall down. We are producing so much wheat that the time is coming when we can't get seventy-five cents a bushel. We should diversify our industries. We want sugar and we can make it. The time is coming when we will not only make enough, but we will export it and undersell the beet sugars of Europe.

I thank you for your attention.

Mr. Schlichter, of Kansas—Gov. Colman has alluded to me in his speech. I will testify to the truth of his statement. I think it was two or three years ago I heard him. I thought he was wild then, but I went home and talked the subject up. Just at that time the cereals of our place had failed. Business men took it up and advertised that they wanted a mill there, and we got it.

Mr. Pierce, of Minnesota—Our farmers are most all engaged in making sugar and syrups. They are having fine success. They say they can make more from sorghum than wheat. If we can, you ought to here.

Mr. Williams, of Indiana—It seems to me this subject can not attract too much attention. I am glad it is attracting so much. One thing I think Gov. Colman is mistaken in, is about New Orleans being headquarters for glucose. When we go to New York we find no genuine molasses. Bakers will tell you they can not make good cake with glucose. These demands may be met by sorghum. When we consider that so much money is going out of the country, we ought to see the importance of the subject.

Mr. Hollister, of Missouri—It is easy to explain why the people of Indiana and Missouri do not like glucose. They prefer corn in a different shape.

Mr. Johnson, of Kansas—I move that the Committee on New Orleans Exhibition, and the Committee on Legislation co-operate in their work. Carried.

Gov. Colman, of Missouri—I have two letters from Chas. Downing. He is anxious to have some specimens from this meeting.

Mr. Goodman, of Missouri—I have also received a letter or two from him asking for specimens. Some specimens have already been sent to him. He authorized us to name the Gano, a new apple originating near here. We have packed some more specimens to send to him.

VOTES OF THANKS.

The following motions were made by *Gov. Colman* :

I move that a vote of thanks be given to the press of this city, which has given such good and full reports of our meeting.

I move that the most cordial, heart sincere thanks be given to the President, Secretary and Treasurer, for their earnest, laborious efforts.

I move a vote of thanks to R. S. Brown for decorating this hall.

I believe the railroads have been kind to this Society. I move a vote of thanks to the various railroads for their kindness in giving us reduced rates.

We have had pleasure and honor in having reporters from the press in different parts of the country. I move a vote of thanks for their attendance and for reporting our Proceedings at considerable expense.

[Reporters were present from the *New England Homestead*, *Country Gentleman*, *Rural World*, *Rural Southwest*, *Rural New Yorker*, *Farmers' Review*, *Kansas Farmer*, *Prairie Farmer*, *Times-Democrat* (N. O.), and others.]

I move a vote of thanks to the hotels of this city for making reduced rates for us.

We have been honored by the presence of a number of ladies, and certainly no one can appreciate horticulture more than they. I move a vote of thanks be given the ladies.

All of which motions were unanimously adopted.

FIXING THE PLACE OF THE NEXT MEETING.

The President—Before we adjourn it may be well to fix a place to which we may adjourn.

Mr. Goodman, of Missouri—I move we meet next time at New Orleans.

The President—I do not think there is any way to keep us from New Orleans. The Exhibition will be in session then, and of course we will all want to go there.

Memphis was spoken of, but it was decided to go to New Orleans on account of the Exhibition.

The President—I hope we will all meet at New Orleans. I hope you will take your friends and your families and spend a good part of the winter there. It will be in the winter, and you will have leisure. It will be a World's Fair, and will be equal, I think, to the Centennial, and perhaps better. I hope you will all seriously consider the importance of it, and help it in every possible way. Now, before adjournment, allow me to tender my thanks for your kindness in the way you have borne with me.

The Secretary—Before adjourning, allow me to read the following resolution by request of the author, Mr. W. G. Gano, of Missouri :

RESOLUTION.

In the earlier hours of our meeting, Gov. Morton gave expression, as far as was possible in words, to our deep feeling of respect and veneration for him whom we were always proud to call our friend—Dr. Warder. It seems to me eminently appropriate that we still further express our feelings by placing upon his last home the floral tributes to his memory which have hung upon our walls during this meeting. I move you, Mr. President, that these emblems be placed in the hands of a committee for such disposition.

The resolution was adopted ; and,

On motion, a committee of three was appointed to pack and send the letters, as indicated in the resolution.

Committee—L. A. Goodman, W. G. Gano and Maj. Evans.

After which, the Society adjourned *sine die*.

MEETING OF THE EXECUTIVE COMMITTEE.

The Executive Committee met in the St. James Hotel, Kansas City, Friday evening, January 25, 1884. Present: President Earle, Secretary Ragan, Treasurer Evans, and Messrs. Nowlin, Pierce of Minnesota, Popenoe, Grimes, Tracy, Day, Masters and Johnson, of Kansas.

On motion of Maj. Nowlin, the Secretary was allowed three hundred and fifty dollars (\$350) as compensation for last year's services.

The Secretary was authorized to publish two thousand five hundred (2,500) copies of the Proceedings of this meeting in a style corresponding to that of Volume I.

On motion by Maj. Nowlin the President, Secretary and Treasurer were given the discretionary authority to publish five hundred copies extra if the patronage of the Society should seem to warrant the same.

A lengthy discussion concerning the New Orleans meeting, the duties of the Legislative Aid Committee and the salary of the Secretary ensued, in which no definite action was taken.

Bills were allowed as follows:

To W. H. Ragan, on account of expenses as Secretary for 1883.....	\$287 25
To W. H. Ragan, compensation as Secretary for 1883.	350 00
To E. R. Albertson, for reporting the proceedings of this meeting.....	41 00
To Kansas City Journal Company for 200 papers.....	10 00
	<hr/>
Total bills allowed	\$688 25

After which the Committee adjourned.

ADDITIONAL PAPERS.

The following papers, which, with one exception (that of Mr. Woodburry, a voluntary contribution), were regularly on the programme of the meeting; yet, owing to the absence of their authors, and for want of time, were not read, include some of great merit and each of value. For these the Secretary solicits a careful reading, and also offers an apology to their several authors for having, to some extent, abridged each in order to bring them within the limits prescribed for the size of our volume. SECRETARY.

BERRY CULTURE ALONG THE ATLANTIC COAST.

BY J. T. LOVETT, OF NEW JERSEY.

In attempting to speak to you on the subject allotted me, "Berry Culture Along the Atlantic Coast," I find the interest so vast, the territory so varied, and the subject itself so extensive, I am unable to do justice to the several classes of berry fruits, covering methods of culture, manner of marketing, varieties, etc. This would require a paper for each particular class. I have, therefore, resolved to give only a retrospective view of the progress of berry culture along the Atlantic coast, with brief comments on its present conditions. First in importance we have the queen of small fruits, the

STRAWBERRY.

Its culture dates back to an early period in the annals of American history. It was found growing wild when the country was discovered, and I find mention of *Fragaria Virginiana*, our North American species, being introduced into European gardens as early as 1621. The first strawberries sold in an American market were wild ones, brought from Hoboken Hills and Hackensack, N. J., to New York City. Then came the advent of Crimson Cone and Scotch Runner. (I am puzzled to know why this last received the name it bore, as it is not a variety of either of the European species, *Fragaria Vesca* or *Fragaria Elatior*, but our American species.) These were found profitable, hence neighbors of those who grew them planted also, and those who had plants planted more, until the hills of Hudson and adjacent

counties were covered with strawberry patches. This fruit was marketed in small hand-baskets, holding about half a pint which were strung on pieces of cord and thus "toted" to market; the fruit having the "hulls" removed in all cases before being placed in the baskets. Think of the labor that would be required to remove the hulls from all the berries grown by extensive cultivators of the present day; also of the injury to the fruit that such an operation would entail. The berries grown at that early time were so small, and the manner of marketing so primitive, the culture of the fruit spread slowly, especially as all were taught to select the poorest and most sandy soil for the crop. You who grow the large, beautiful fruit of to-day, select the deepest, richest soil and fertilize liberally at that; at least all growers do at the East. The introduction of Hovey's Seedling did more to advance the cultivation of the strawberry than any variety that appeared prior to the advent of that grand old sort—the Wilson. True this berry, like many grand men and women, who have left the earth better than they found it, possessed an excess of tartness, but behold what it has done. Not only has it given those at the North strawberries, but it has given strawberries to everybody, flooding the entire Atlantic coast with a crimson tide in strawberry time. Commencing beneath the sunny skies of Florida, where balmy breezes blow, and increasing in magnitude as the glorious wave advances northward, until it culminates in the vast fields of Virginia and Maryland, where plantations of hundreds of acres are to be found, then dashing against the mountains of the Blue Ridge and the Alleghanies, breaks and spreads in all directions, even to the bleak hills of Nova Scotia. Next in importance, as well as in season, is the

RASPBERRY.

To my favorite State I must again give credit for not only being the pioneer, but for much of the progress that has been made in the culture of this delicious fruit. I find it difficult to speak of the raspberry, as the various classes are so widely different in essential characteristics, adaptability to soil, etc. Were the "cap" varieties designated by their proper term, "Thimbleberries," my task would be much simplified. Cap raspberries, although grown in large quantities from Maine southward from the time of the introduction of the venerable Doolittle or improved Black Cap, have lost much of their popularity along the Atlantic coast in more modern times; the red varieties, by reason of their yielding greater profits for market and being preferred in most cases for garden culture, supplanting them, except at the South, where the caps succeed best. The old time prestige of the caps has, however, been in a measure regained since the advent of the Gregg, especially since evaporated fruit has proved so profitable. Large quantities of Gregg, Alden, Southegan, Tyler and other varieties suitable for drying are now being planted.

RED VARIETIES.

Prior to the introduction of the Philadelphia, the culture of red raspberries was confined to the gardens, as foreign varieties only were grown. This,

like most varieties of the American species, soon exhibited the true American propensity "to spread," hence, so to speak, "the garden wouldn't hold it." The result was that in a few years it became no uncommon thing to see plantations of red raspberries acres in extent, throughout New Jersey and adjoining States. The good work has continued with the introduction of the Bandywine, Turner, Reliance, Cuthbert and the Hansell, until red raspberries have almost become a staple crop from Virginia to Massachusetts; yielding in some seasons and under favorable circumstances almost fabulous sums of money. The two last named are by no means least, for in addition to being of untold value in the coast States, they are extending far into the South, even into the Gulf States. The cultivation of the noblest of small fruits, the

BLACKBERRY,

Dates back to the introduction of the Dorchester in 1842, by Josiah Lovett, of Beverly, Mass., but its culture as a market fruit and a market crop properly began with the advent of the Lawton. As with the Wilson strawberry, however, it remained for a blackberry bearing the same name to make the cultivation of the fruit universal and extended, and to this do the laurels belong. Just here I will digress to refer to a few facts connected with the Wilson strawberry and Wilson blackberry. 1. More solid cash has been realized from the culture of these two varieties of small fruits than from any other varieties of their respective classes. I question if more has not been realized from them than from all others combined. 2. Both are acid and of poor quality, but handsome, large, productive and firm, proving conclusively that firmness, size and beauty are properties of greater importance in a fruit for market than quality. When first offered in market the fruit of the Wilson blackberry sold at a dollar a quart wholesale. This very naturally created excitement among fruit growers. Planters sold their horses, mortgaged their lands, in fact, any and everything, to buy plants at a hundred dollars per hundred, and the strangest part of all to record is that all who bought at these extravagant prices made money by so doing. Right in the midst of this furore came the introduction of the Kittatinny, adding fuel to the flame, and blackberry culture received what in our day would be characterized as a "boom." The climax in the culture of this fruit along the Atlantic coast was reached in Burlington and Camden counties of this State about the year 1868, one grower having at that time as much as one hundred acres of the Wilson alone in bearing, from which it is said he realized a net profit of one hundred thousand dollars. Latterly, from double blossoming of the Wilson and other defects, and the fungus or "rust" upon the Kittatinny, the culture of the blackberry has subsided in a measure, and market growing in the section covered by the title of this paper is confined chiefly to the Wilson in favored locations throughout Maryland, Delaware and New Jersey. The dawn of a new era of successful culture of this profitable and health giving fruit is now to be seen in the horizon, produced by the Wilson Junior, Early Harvest and Early Cluster.

ORNAMENTAL PLANTING.

BY PROF. W. J. BEAL, OF MICHIGAN.

Begin by placing the dwelling house eight or ten rods from the highway, with the barn still further back, and a little to one side rather than across the road in front of the parlor windows. The vegetable and fruit gardens should be in the rear of the house and near the kitchen and barn. If you can not afford to devote much time or money at first to ornamental planting, be careful to start right and make no mistakes. Every stroke should count, and without experience and good advice your labor will be half wasted. About one-tenth of the cost of buildings should be set down for improving the grounds. It would be better to employ a person of skill to aid you, but if this is impossible, read the works of Downing and Frank Scott and begin to study trees at all seasons of the year.

HAVE A PLACE.

Once for all, in your head at least, or, better, on paper, and work to it persistently. Do little grading. Downing says: "We see all ignorant persons who set about embellishing pleasure grounds, commence leveling the surface. This is a fearful fallacy to eye and purse." Better emphasize inequalities by planting tall trees on the higher portions of large grounds, leaving the hollows unplanted. Provide for no more paths or drives than are needed for daily use. Guard against attempting too much in any direction. Too many trees, too much shrubbery, too many flower-beds, walks and roads—this is the common error.

A GOOD LAWN

Is the essential element about which the other graces cluster. For this rich soil, moisture and fine grass are needed. Do not divide or clutter up the lawn with too many trees, shrubs or flowers. Be sure to leave in planting several open spaces through the entire extent, so that from the porch or windows, as well as from points without, there will be an unobstructed view over the turf. This will give an appearance of spaciousness which can not otherwise be attained. Plant, according to the size of the ground, small trees and shrubs in small places. One Norway spruce or large cherry tree is often the ruin of a small yard. As a general rule, plant the large trees on the outside lines, with the smaller trees or shrubs nearer the house, or the lawn's center. Plant no large trees within from forty to sixty feet of the house. Such trees shut out the pleasant sunlight, scatter leaves on the roof, rot the shingles, spoil the water in the cistern, kill the grass, keep the walls and paths damp and shut out pleasing prospects. They may not be out of place when small, but after they have grown the owner has become attached to them and hesitates to take them out.

TREES IN THEIR PROPER PLACE.

Shelter the dwelling and barns from piercing winds; they add comfort and joy to man and beast, they economize the food of animals and save fuel in the

sitting room: they harbor birds, they afford shade in summer, they are the glory of home grounds and will serve for generations to remind those who enjoy them of the thoughtful and generous hand which planted them. They should not be set in straight rows or at equal distances. Even as a shelter belt on the exposed side of a house they are better arranged in groups which "break joints." Near the projecting points of this irregular line of foliage is a good place for single trees, like islands near a cape, leaving open bays of turf to flow between them into the deeper and more sheltered recesses. Avoid formality. Even in roadside planting, a row of trees will be marred sooner or later by vacancies or by unequal growth. Finer effects are produced by planting irregular, mixed groups at salient points. Plant so as to conceal from the best points of house and grounds unsightly objects near or remote. Plant trees or shrub groups on the concave side of sharp turns in walks or drives, and in the angles where paths and roads diverge.

EVERGREENS

Are more monotonous than deciduous trees, yet they are green when other trees look dead. Their cones and young spring growth add some variety. In winter they are darker, the bright color returning with the warmth of the early year. In autumn they shed the leaves which grew one or two or more years before. They are particularly charming when snow, which loads their limbs, is seen in contrast with their dark green leaves. A deciduous tree belongs to a higher type, and presents a greater variety of aspect—without leaves, with young leaves, with full grown leaves and with brilliantly colored leaves of autumn. The bark is smooth or rough, the twigs are few or many, the spray scatters into infinite diversity of form and color; the leaves vary in size, shape, color, direction—while in general form no two are alike, and the masses of foliage break into light and shadow in a distinctive way for each species, and almost for every individual. Some evergreens should be used, and more where there are few or none in the surrounding forests. Too many will make a place gloomy and sombre—too few will leave it with a cold and naked look in winter.

SELECTION AND CARE.

Choose nursery-grown trees, especially evergreens, which have been transplanted. They will have more roots and are more certain to make a vigorous growth. Do not select large trees, even at low prices. Avoid high-priced novelties until you have experience. Do not try too many kinds, nor more than can attain good development on your place. It is allowable to plant thickly at first for immediate effect, but if so, arrange for thinning out at the beginning, and remove remorselessly before the trees crowd each other. Select trees easily grown and of such species as have been proved thrifty in the region where you live. Do not choose short-lived trees, nor trees subject to the borer, like the mountain ash, nor liable to die in the lower limbs, like the balsam fir. After planting, give the best of care by cultivation, fertilizing and mulching. Do not cut them into grotesque or formal shapes. Look

years ahead, and prune with reference to the future. Thinning and pruning had better be done a little each year and not a large amount once in five or ten years. Thin before the beauty of your best trees is lost by crowding. Remember that the lower limbs, especially of evergreens, will not start out again when once removed.

SHRUBS, VINES AND FLOWERS.

These will be used for the final touches of embellishment. Shrubs are valued for their bloom as well as for form and foliage. Each variety will serve some special end. As a rule, plant in irregular groups as directed for trees. At projecting points in shrub masses plant some hardy herbaceous perennials. Use vines for porches or for covering a half dead tree or stump or rubbish pile. Plant flowers mostly at the side of the house in irregular but gracefully-shaped beds, and while trees are young, about their trunks, perhaps. No special paths are needed about flower or shrub groups. Rock work is seldom satisfactory, and is only appropriate in a retired portion of your grounds. A pile of shells, rocks and scoria in the front yard is badly out of place. Heap them in some back and shady corner, and you will find great delight in transplanting from woods and meadows an assortment of hepaticas, spring beauties, blood-root, trillium, bell worts, phloxes and ferns. If you have a pond near by, introduce some water lilies, cat-tail flags, pickerel weed, arrowhead, and near by set some Wisconsin weeping willows and birches and ashes. Do not despise flower, shrub or tree because it is native and "common." As a rule, the best known is better than the imported rarity. Give thought and attention to all the details of the work of making a pleasant home. It is a worthy work. You will be surprised to find how much beauty can be obtained at little cost, and how rapidly everything hastens forward toward the completed plan in your own mind. You will have a constant comfort and a fresh hope realized every year as the trees grow, and transformation follows transformation towards the full development of your original design.

RARE AND LITTLE KNOWN TREES AND SHRUBS OF ALABAMA.

BY DR. CHARLES MOHR, OF ALABAMA.

Amongst the number of woody plants which recommend themselves to the cultivator for the adornment of pleasure ground there are particularly three, which might be called peculiar to the flora of Alabama. They are scarcely known outside the herbaria of the professional botanist. Deserving of a wider notice, they were deemed worthy to be brought on an occasion like the present to the attention of the horticulturist.

The trio embraces the *Rhus Cotinoides*, called by the settlers shittim wood or yellow wood; *Nerudia Alabamensis*, and the *Croton Alabamense*. These plants excite the interest of the botanist in representing types which,

confined to extremely narrow limits, furnish in their strange and complete isolation, further instances of the perplexities and difficulties surrounding many of the questions in relation to the geographical distribution of plants, and the consideration of which carries the mind far back to past periods in the history of our globe, before the occurrence of the glacial period, by whose influences the features of the present flora of the temperate zones in the northern hemisphere were shaped.

The two last of the above named plants have, so far, not been observed outside of the small district where they were first discovered. The *Rhus Cotinoïdes* was discovered by the botanist Nuttall in the second decade of this century in southwestern Arkansas. Since that time no trace of it could be found in that State. Prof. Buckley found it in the spring of 1842 on the mountain side, bordering upon Flint river, in Madison county. For nearly forty years this interesting tree was again lost to the botanists, until rediscovered by the writer at the same locality in the fall of 1880. There it was found growing on the ledges of limestone rock, which, at an altitude from 900 to 1000 feet above the Gulf, are found cropping out beneath the strata of coal bearing sandstones, to which it seems never to ascend. On the rocky soil of the steep flanks of the mountains it delights in open situations as well as in the shade of the larger trees of the forest, the mountain oak, hickories and elms, associated with the undergrowth of blackhaws, the Southern privet, wild plum, aromatic sumac and red cedars. It is a handsome tree, attaining the height of thirty to thirty-five feet. The trunk, ten to twelve inches in diameter, divides at a distance of from eight to ten feet above the ground, with the primary limbs erect or slightly declining, spreading out into numerous slender horizontal or ascending branches, which are covered with a dense, rich foliage of a bright green, softened by a pleasing bluish hue. Similar in its foliage and bloom to the closely related *Rhus Cotinus*, or smoke tree of Europe, it possesses claims superior to those of that old favorite of the cultivators for a place amongst the shrubbery of the garden and the park. With the early days of spring it unfolds its broad, oval leaves at the same time with the dense, elongated panicles of small, white flowers, alive with the hum of countless insects attracted by their nectar. With the fading of the flowers the panicles begin to expand, increasing rapidly in size until the beginning of the maturity of its fruit. They rise far above the dense covering of the foliage, and spread out into numerous threadlike, graceful branchlets, clothed with long, silky hairs of a reddish-purple color. There is no other object of the forest shining forth in all the freshness and loveliness of vernal beauty which surpasses this tree at the time of the highest development of its panicles, in the soft blending of the various shades of tender green appearing from a distance shrouded in the haze of a transparent, purplish cloud of smoke. With the ripening of the small, bony, kidney-shaped fruit the panicles begin to dry up, and its fragile branches soon breaking away are swept off by the wind, leaving no trace of the flowering parts of the tree

behind. From the fine yellow color of its wood, which is susceptible of the highest finish, the negro calls this tree shittem wood, under the belief that it was used in the construction of the tabernacle in Solomon's Temple. To the settlers it is generally known as yellow wood, being extensively used as a dye stuff. Judging from its native habitat this tree requires a warm, calcareous soil, well drained. It is of slow growth; full-grown specimens by their annual rings of growth were found to be from seventy-five to eighty years old. After being cut down the stump produces numerous sprouts, which grow rapidly during the first years. Seeds may be distributed by the director of the Arnold arboretum, Cambridge, where, as I am informed, they were successfully made to germinate, and a stock of young plants is now raised. The seeds are slow to sprout, and consequently the success of raising the tree from the seed is connected with some difficulty. It can easily be propagated by layers. There can be no doubt that our Alabama smoke tree or shittem wood can as easily be grown as its European relative so common in cultivation throughout Europe and this country, and that it will be found equally as hardy.

The *Nerisusia Alabamensis* is a shrub of the rosaceous order, nearly related to spiræ, from which it differs by the want of petals. Its numerous wand-like stems are from two and a half to three feet high, the white flowers appear with or soon after the leaves during the first warm days of the dawn of spring, covering the slender branches in profusion. The delicate pencils of the numerous stamens exceeding in length the lobes of the calyx fully compensate for the lack of petals. The flowers are sweetly fragrant. This pretty shrub belongs to a type unique in its characters among the plants of the United States, finding its sole representative in Japan, as has been shown by Prof. Gray. It grows on the bold sandstone cliffs which line the banks of the Black Warrior river, near Tuskalooosa. There it was first observed by some of the professors of the University, and the Rev. Dr. Nevius, who brought it to the knowledge of the botanists in sending specimens to Prof. Gray. It was found by that botanist to belong to a new genus, which he dedicated to the above-named zealous pioneer in the field of the botany of Alabama. *Nerisusia* submits with facility to cultivation. Small rooted plants received from their rocky native home, thrive well in the low and damp ground of the garden of the writer, where they have bloomed abundantly every successive season. It is easily propagated by the suckers which annually start from the roots and which are found to grow easily after being transplanted late in the fall. This shrub has, so far, not been found beyond the narrow confines of the locality where it was first observed.

Croton Alabamensis, of latest discovery was first found by Prof. E. A. Smith, in the rock-covered hillsides bordering on the bottom of the Little Cahaba river, at Pratt's Ferry, Bibb county. It came to the notice of the writer in the course of his examination of the plants collected by the geologist of the State. The specimens were quite insufficient to serve for a description of the characters of the plant. From a single female flower it was, however,

evident that it must refer to the section Eleutera, represented by many species in tropical America but heretofore not known to exist in the United States. Dr. Chapman, soon after receiving fine flowering and fruiting specimens, has described this shrub in the new supplement to his flora of the Southern United States under the name *Croton Alabamense*, finding it very closely related to a Brazilian species. It grows to a height of six feet and over, branching from the base with straggling limbs and horizontal branches, which bear toward their extremities the oblong lanceolate leaves. Like the foliage of many of the related tropical kinds, they are covered on the lower surface with a shining silvery-white tomentum, forming a strong contrast to the dark green of their upper side. The flowers appear with the first days of spring, the staminate or male flowers forming short, close terminal racemes; the pistillate or female flowers are short stalked and single, or by two or three, situated in the axils of the leaves. Plants raised from the seed by Prof. Smith bloomed profusely and ripened their fruit after the third season, when scarcely a foot in height, ripening their seeds up to the middle of May. In that stage of growth raised in pots, the plants, with their peculiar foliage and covered with their golden yellow catkins of male flowers, present a pretty sight. Like the *Neviusia*, the Alabama Croton, when grown in pots in the green house, one should think could be easily forced to bloom during mid winter, thus affording a valuable and novel addition to the cut flowers so greatly in demand at that season of the year. Both of them can be presumed to prove hardy along the Atlantic border, with but a slight protection, as far north as New York. They would require in cultivation a well drained soil with plenty of rich leave mould. The Alabama Croton seems also to be exclusively confined to the narrow limits within which it was first found, embracing a few square miles in the valley of the Little Cahaba river.

THE PEACH INTEREST IN THE CENTRAL STATES.

BY J. S. BEATTY, OF KENTUCKY.

I have not yet heard from a single point within the Central States, except the extreme southern portion, that does not give an unfavorable report for a peach crop the coming season. Then, sir, you must not find fault with me if in this paper I should see nothing but the dark side of the subject. The peach interests in the Central States have not been universally successful. There are many causes for failures that so frequently occur, to which I will call attention before I am through.

The territory that I shall speak of as the Central States lies wholly within the Mississippi valley. We refer to this particular section of the world because our homes are there, our interests, our pride, our joys or our sorrows, combine to give it that attraction which nothing else can give like home. It is the home of our Society, it is the home of almost our entire membership.

Within this, the largest, the richest, the grandest valley in the world, the territorial center as well as the center of population of the United States are found. Then why should we in this brief paper pass beyond its bounds? But while we claim it as our home and the home of our Society, we can hardly claim it to be the true home of the peach. While it succeeds in some favored sections of this great valley pretty well, we must candidly admit that ours is not the best peach producing part of the world.

The Mississippi valley is more exposed to meteorological extremes and disturbances than any other part of this continent. The torrid heat of our summers and the arctic "blizzards" of our winters embrace a range of temperature from about 120° in the shade to -40° zero. We are exposed to droughts and floods of great extremes. Then, from times when every living creature gasps for a breath of fresh air to the cyclone, that in its fury knows no bounds, tearing the very rocks from their everlasting resting places, then scooping up the mighty oaks, hurling them round and round with the apparent ease that a school boy spins his top. What is it that will hold out against these mighty forces? The trees can not long endure the compound forces of "Old Sol," nor can the fruit germs resist the intense cold of -40°, -20°, or even -10° under certain conditions. Protracted droughts are detrimental to the peach interest. No matter how you cultivate, the fruit wilts and dries as if passed through an evaporator. On the other hand, too much moisture is equally as fatal to the peach crop as it is to have too little. A season of rainstorms at the time of blooming washes away the pollen, which is equivalent to destroying the crop. Protracted rainy weather at the period of ripening often saves the trouble of gathering, the expense of shipping and commissions.

We that attempt to grow peaches have often counted our "chicks" too soon. We have often seen our fruit pass all of the tight squeezes and our highest hopes almost realized, when the beautiful blush beginning to show itself (it seemed to almost rival that upon the cheek of a lovely young girl just bursting into womanhood), when, alas! as the fond hopes of many a proud mother has been blighted by some cruel ill to which all flesh is heir, the rich blood no longer courses her veins, the glow is no longer seen to mount her brow, but fades away, each day less and less is seen, until the victim drops into an untimely grave. So it is with our little pets, they fade and drop to the ground, thus blighting our highest hopes.

In the obituary we read, in the very noonday of life, that vile destroyer (rot) lay a ruthless hand on our little beauties, and stayed not his mighty grip until the last one had yielded to the malady. What peach grower has not been made to feel almost sick, when after a violent storm of wind or sleet he sees his trees all mangled and torn, his finest specimens of fruit strewn here and there over the ground, a total loss? There is another great cause of failure in the peach interests, brought about by a rush after extra early varieties. Hale's Early was the first to advance the season earlier than Early Tillotson. Hale, from the beginning, developed a weak point in its pre-

disposition to rot. Amsden and Alexander came next, and marked another advance in maturing. Though originating in different States, they are so much alike no one but an expert can see a distinction. Evidently they came from the same parentage, and inherited the parents' disposition to rot.

Other new seedlings from widely separated districts have come into notice, each claiming to be just a little the earliest of all. By means of the indomitable energy and push of the nurseryman, and that scourge to the fruit interests, the oily tongued, itinerant tree agent with the last world's wonder in point of earliness, goodness, and every other point his fertile brain is able to hatch up, these new candidates for public favor have become disseminated and largely planted. What have been the results? The cry comes up from every nook and corner, rot! rot!! rot!!! Growers anxious to not lose all, gather and ship fruit when half ripe; the markets are overstocked with green and rotting fruit, much of it is sent to the dump, and instead of remittances on account of sales, bills for express charges are sent for the grower to foot. This is not an imaginary or overdrawn picture. We know of thousands of baskets that were purchased for packing early peaches in within the last few years, that have been returned and ordered sold, or have never yet been used.

But, some one asks, what about the older and later sorts? Well, every fellow had struck a "bonanza." With his brain bewildered with dreams of fabulous wealth from early peaches, "put all of their beans in one bag" by planting nothing but early sorts, and lost sight of the later and better kinds to an extent very damaging to the peach interest.

We have other troubles to contend with. The borer, the curculio caterpillar and a host of other ills that require prompt and determined action on the part of the grower, or all is lost. One of the greatest causes of the decline in the peach interest is, when we do succeed in raising a crop of peaches there are so many "slipshod" growers that plant and half cultivate, or do not cultivate at all, grow large quantities of poor stuff, gather it carelessly, pack all of the best so they can be seen, hide the trash in the middle, or do not pack at all, but tumble the peaches into old salt or flour barrels (matters not if one holds a bushel more than the other), load in a jolt wagon, or indeed we have seen loads upon loads put loose into the wagon bed, without springs, and hauled ten, fifteen and even thirty miles. They are sold for just what some dealer and peddler will give for them, and in many instances, if they pay the grower fifty or seventy-five cents per day for his time, gathering and hauling, and the expense of the trees, and enough over to get a jug of "rille" whisky, he blows it loud and long how well he did.

This fruit goes on the market by the side of good fruit that cost the grower largely to cultivate, gather, pack, handle carefully and deliver by the easiest mode of transportation. The one can be sold at a very small price because it cost but little; the other must be sold at a price far below its real value, or what it would have sold for had it not come in competition with the "slipshod" goods. Hence, the grower of the good fruit finds the business un-

profitable, and either falls into the "slipshod" habits or tries some other occupation.

Thus the peach interest is being slowly but surely smothered out. It has been a long and hard struggle to battle with all of the warring elements of nature on one side, consisting of polar waves in winter to sharp frosts of late spring, from cyclones that play havoc with the trees to storms that rattle down our fruit, from burning, shimmering, heated droughts to semi-Noachian floods. Then to make victory doubly sure and easy, an alliance is formed with the insect world, thus requiring the peach grower, on the other side, to employ every means and force at his command to meet these destructive agents. He finds that to meet the old and the new enemies he must enlist scientific aid, therefore forms a compact with two able and willing parties; one for offensive war, who understands insect tactics and knows their modes of attack, manner of living and where they were most likely to be found. We propose to enlist and fight under the generalship of that great man among bugs who has exhibited his great ability in a supplemental report on insects affecting the strawberry.

The other scientist was one in whom we all have had great confidence. We felt almost sure that he possessed, as near as it is possible for man to possess, the power of omniscience and omnipresence, judging by what we see and hear of the work in which he is engaged. The part that he was expected to perform was to stand on the watch-towers and sound the alarm at any time, that one arm of the mighty host with whom we had to contend showed the least sign of activity indicating an attack on our works. This man is pretty generally known, incognito, as Old Probabilities, who, with Uncle Sam to back, and he in his lookouts and forecasts, recently suffered the most complete surprise all along our lines that we have any history of, carrying everything pell-mell before it, which about settled the peach interest for the next twelve months.

Now, sir, in a summary of the foregoing, we wish to indicate the several points of interest that we should be glad to hear discussed:

1. Is peach growing within the Mississippi valley generally a successful and profitable business?

2. Is it not a fact that we must abandon the extra early sorts now in cultivation for commercial purposes and fall back to the old reliable Early Tiltonson?

3. Can not some uniform system of packing peaches be adopted?

4. Can not the depredations of the curculio be averted by jarring the trees and capturing the little Turk on sheets and disarm him?

5. Is there any practical way of protecting the peach trees by baling or thatching to prevent winter killing of both trees and fruit? Also, could not late spring frosts be rendered harmless to peaches by means of a cheap iron furnace to burn coal in, set between every four trees and fired up any time that frosts may be expected?

THE GRAPE ROT.

BY PROF. WILLIAM TRELEASE, OF WISCONSIN.

Of late years the attention of grape growers has been annually called to a number of diseases of the berry, by which their vintage has been much lessened. As a rule these diseases are known as "the grape rot," and no little anxiety has been felt as to the cause and probable duration of this rot.

I shall try to bring together as briefly as possible the facts which have come under my observation, through specimens and inquiries, from various parts of Wisconsin. It is probable that there are other forms of the so-called rot which are familiar to members of this Society, and the main object of my paper is to direct their attention to the subject, with the hope of utilizing their observations in the further study of the diseases of the grape.

Some berries show a discolored spot about an evident injury on the surface, which most frequently appears as a minute puncture, suggesting at once the idea of insect work. Occasionally such berries crack open, especially in wet weather, as a result of the osmotic imbibition of water by the pulp cells near the puncture.

An examination of grapes affected with this form of the disease shows that they often contain small caterpillars. These larvæ feed on their pulp and seeds. From its resemblance to the larvæ of the codling moth, this insect (*Eudemis botrana*, Schiff.) has been called the Grape Codling, the Grape-fruit Worm and the Grape-berry Moth. When grown the larvæ deserts the fruit and, as a rule, cuts a little flap from one of the nearest leaves, which it webs over it, after the manner of the Tortricides or Leaf-rollers, to which group of insects it belongs. In this retreat it changes into a pupa, from which the small moth into which it transforms ultimately emerges. A very good account of its transformation may be found in Prof. Riley's First Report on the Insects of Missouri, pp. 133-6.

The spring brood of larvæ are said to eat the leaves of the grape. It has also been shown* that they sometimes "feed on the tender shoots of the common Iron Weed (*Vernonia noveboracensis*), which they web together for their better protection. When mature they desert these retreats and cut little flaps from the larger leaves, which, folded over and fastened at the edges, protect them during the pupa stage." The insect "has also been bred from larvæ webbing the leaves of the Tulip Tree (*Liriodendron*), and of the Lead Plant (*Amorpha*)," from which it will be seen that its food is supplied by plants of the most diverse nature.

A somewhat similar injury is caused by the Grape Curculio (*Craponius inæqualis*, Say), the larvæ of which can be readily distinguished from the Codling by being footless, while the latter has three pairs of true legs and five pairs of prop legs or abdominal legs. When mature the Curculio larvæ de-

* Miss Murtfeldt: Psyche, 1881, III., p. 276.

serts the grape, and transforms in the ground, emerging in the fall as a beetle, in which form it passes the winter.

Other grapes, more frequently seen about Madison, Wis., and received in quantity from other localities, show no sign of insect work, although, as will be seen directly, they are sometimes punctured. They are commonly more or less deformed, often flattened in places, where they are of a brown or gray color, according to the progress the disease has made. In short, their appearance is much as if they had been scorched on these places, which are usually of rounded outline.

This form of the rot is common on certain of the Rogers Hybrids, and appears to be quite similar to what is known in parts of Europe as Anthracnose. An examination with a hand lens sometimes reveals nothing but a drying of the epidermis. Often small black points are visible in the gray back-ground. Sections of the spots, passing through these points, show that they correspond to the microscopic cavities in the dried skin of the fruit, which contain numerous very small spores or reproductive bodies, characteristic of the fungus *Phoma uvicola*, B. and C., which has long been known in connection with this "dry rot" of the grape. The *Phoma* is so uniformly associated with this form of the disease in the United States, that it is held by some to be its cause. My own observations are too limited to admit of a positive assertion on this point, but, while the *Phoma* unquestionably sometimes develops on grapes which are already diseased from another cause, some specimens certainly show no injury that I have been able to make out other than that due to this species.

The genus *Phoma*, to which this fungus belongs, is one of a large number of "form genera," many species of which are known or at least suspected to be early forms of fruit of species which, in the winter, appear in other forms and have often been given other names. Like the larvæ of insects, these imperfect forms can sometimes be watched through their transformations, but the work is much more uncertain and difficult. Whether *P. uvicola* is a good species; whether it is a form of one of the many known grape fungi, or whether it belongs to a species, the perfect fruit is as yet unknown, is not certain. Such culture experiments as I have been able to make have yielded only negative evidence.

Another form of rot which is, perhaps, the most destructive of all in Wisconsin, manifests itself by the shriveling of the berries, either when they are about grown or long before. Many of these fall to the ground, while others remain attached to the plant. So numerous are those that suffer, that what were at first full, symmetrical clusters, finally become reduced to irregular bunches of scattered fruit, and entire clusters are sometimes destroyed.

Berries which shrivel in this way occasionally show one or more livid spots on their surface. In some instances these show no traces of insect injury, but ultimately bear a crop of *Phoma uvicola*. In Canada an injury of this sort is caused by the grape seed maggot, which I have not yet seen. In his first report Prof. Riley described this as the probable larvæ of some cureulionid

beetle, but it was subsequently shown to be that of a chalcid fly (*Isosoma vitis*, Saund.). The maggot feeds in the seeds of the grape, one or two of which enlarge considerably as a result of its attack.

Last fall, on the invitation of Mr. A. L. Hatch, of Ithaca, Wis., I spent several days at his home in the examination of rotting grapes. The greater number of the diseased berries in his vicinity were simply drying up and falling, with no external sign of insect attacks. These berries, when cut open, showed quite uniformly a discolored appearance before any trace of injury could be seen at the surface. As a rule, while most of the pulp remained unaffected, a zone of browned tissue could be seen running almost or quite around the fruit between the seeds and the skin. In sections of this diseased tissue I was able to make out the presence of a fungous mycelium, which is evidently that of some *Peronospora*, and possesses the small, round haustoria or suckers of the mycelium, which is found in grape leaves attacked by the American grape mildew (*Peronospora viticola*, B. & C.). Sections of grapes containing this mycelium were placed in damp air, and in the course of a few days several of them produced a small quantity of the fruit characteristic of this *Peronospora*.

It appears, therefore, that the most destructive form of the grape rot with us is a direct result of the growth in the berries, of the fungus which causes the common leaf disease of the vine. This fungus forming, when in fruit, frosty white patches on the under surface of the leaves, which are browned above in corresponding places, should be familiar to every grape grower; but it is, unfortunately, the case that many horticulturists do not distinguish it from the *Oidium* or true mildew of their upper surface.

Heretofore this *Peronospora* has been found only on the vine, fruiting abundantly on the leaves, sometimes on the shoots of the plant, and rarely on the fruit the epidermis of which, perforated by no stemata or breathing pores, usually prevents the emergence of its fruit-bearing threads. During the past season it has also been found on a near relative of the grape, the Virginia creeper (*Ampelopsis quinquefolia*), in several parts of the West, e. g., in Minnesota by Prof. Farlow, and in two localities in Wisconsin by myself and Mr. L. H. Pammel, one of my students.

From what has been said, it will be seen that what is generally known as "the grape rot" is not one disease, but that this is a generic name, including several well marked disorders. For convenience I append a key that will probably enable any careful observer to determine the cause of either of these, or if there are still others, to determine that fact:

1. Insects not found in the pulp, 2.
Insects found in the pulp, 4.
2. Minute black dots on a dried gray spot, *Phoma uvicola* (B. & C.).
Berries shriveling, not appearing scorched, 3.
3. Berry not punctured, seeds not enlarged, *Peronospora viticola* (B. & C.).
Berry punctured or discolored at one spot, one or two seeds enlarged,
containing a footless maggot, *Isosoma vitis* (Saund.).

1. Larva, footless, 5.

Larva, with 16 legs, *Eulemis batrana* (Schiff.).

5. About $\frac{1}{4}$ in. long, not hairy, *Crapmius inaequalis* (Say).

Less than $\frac{1}{2}$ in. long with fleshy hairs, rarely, *Isosoma vitis* (Saund.).

European vineyards have suffered much of late from related diseases, but authorities have differed as to the cause of some of them. Planchon has found anthracnosed berries infested by the fungus *Sphaeceloma ampelimum*, De Bary. Passerini has ascribed the injury to *Ramularia ampelophaga*, Pass.; while Cornu has traced the disease to the American *Phoma uvicola*, B. and C.; above mentioned, and still others have found its cause in one or other of the many fungi of the vine. More recently Prillieux, having examined grapes from this country, has shown that in some cases, at any rate, the *Phoma* only grows on tissues already diseased through the previous action of *Peronospora viticola*.

REMEDIES.

With respect to remedies for the *Peronospora* rot several points are suggested. In damp, hot weather the fungus spreads readily from plant to plant by means of the spores borne on the frost-like tufts everywhere abundant on diseased leaves; hence it has been proposed to kill these by dusting the affected plants with sulphur, applied by a sulphur bellows. Where the disease is local in its appearance this may prove effectual if promptly resorted to, but it should be borne in mind that the actively vegetating part of the parasite, its mycelium, lives in the interior of the diseased parts, where it is protected from all topical applications, and for this reason can not be destroyed by them like the European *Oidium*. There is consequently no means of reaching the fungus after it has once entered the plant.

The most promising time for attacking the pest is the fall or winter. On the approach of the latter season winter spores are produced in some of the leaves permeated by mycelium. These spores fall to the ground with the leaves and lie dormant until spring, when they germinate, the mycelium proceeding from them growing into any young grape leaves or shoots with which the spores may be brought in contact. Up to the present time these spores, which do not appear to be very abundantly formed in this country, have been found only in the leaves of the grape, but it is possible that they may be equally or even more abundant in the Virginia Creeper, so that any measures intended to destroy them should extend to both host plants of the fungus.

It is not only possible, but quite probable, that the careful collecting and burning of all grape and creeper leaves in the fall would so lessen the number of these spores left to germinate in the following spring, as to much simplify the problem of preventing the spread of the disease by the judicious use of sulphur. To secure any real good this treatment should be adopted by every one who owns a vineyard, and few wild plants of either the grape or *Ampelopsis* should be allowed to grow, unwatched, in the vicinity of valuable cultivated plants.

Bagging the young fruit clusters, a process thought very favorably of by some persons, especially when the vintage of a few choice varieties is to be saved, has been recommended as a preventive of the rot caused by *Phoma*. It will, however, be of little use against *Peronospora*, which usually, if not always, reaches the berry through its stalk, and not by direct surface inoculation. On the other hand, bagging may protect the fruit from its insect enemies, if properly done.

The prompt destruction of berries attacked by either the curculio or codling, and the suppression of iron weed near the vineyard, with the crushing of any pupæ found under the characteristic flaps made by the codling, will likewise tend to keep these insects in check.

Perhaps some members of the Society may be disposed to test the remedy suggested by A. B. Coleman, in the *Rural New Yorker* for November 3, 1883, viz: the removal of every vestige of vegetation for a distance of at least four feet in every direction from the diseased vine, and the scattering over of this part of the soil of enough fresh air or water-slaked lime to whiten it, repeating the dressing if it be removed by rain.

It has also been noticed that grapes which get much sunlight seldom rot badly; and there is doubtless much truth in the statement of Gen. Clay, (*Rural New Yorker*, July 23, 1883), that grapes trained against a wall are less susceptible to the rot than those trained to stakes or trellises, although some exception might be taken to his views of the dyspeptic nature of the disease.

THE NEW GRAPES.

BY GEO. W. CAMPBELL, OF OHIO.

I here offer a few observations upon some of the most prominent of the new grapes, which seem worthy of more or less consideration as they promise to be of value. While the past season has not been specially favorable to grape growing in my locality, it has been one in which the health or the liability to disease of the newer varieties, as compared with the older ones, could be profitably observed and recorded. With this brief preface, I will give you my impressions as to the promise and prospective value of some of the most notable of the new grapes.

I fruited the Pocklington upon several young vines the past season. I find it a moderate grower, not as strong as Concord, but hardy and healthy in wood and foliage. Clusters medium, or rather small; berries large. In flavor and quality rich; a little foxy in odor, but better than I had expected, and to my taste preferable to the Concord. It was fully ten days later than the Concord. Its introducers claim that the clusters increase in size as the vines grow older. Indeed I have seen upon exhibition specimens even larger than the showy fruits with which we are so familiar. This grape has a tenacious

skin, and will bear handling and shipping well. It is also the best keeper of any other of its family that I have tested. It has many of the qualities of a profitable market grape, and it should prove valuable wherever it can be successfully grown.

The Prentiss is another white grape prominently before the public. I fruited it the past season upon a grafted vine which was carefully protected during the previous winter. It bore a few handsome, medium-sized clusters, pleasant flavored and not foxy; ripening very nearly with the Concord. The growth and appearance of the vine seems much like that of the Rebecca, though of apparently stronger growth and greater productiveness. The foliage shows some disposition to mildew, and the wood did not ripen well the past season. Much of it was soft and immature, and appears as though it would not endure severe winters. Further experience in this respect is desirable, for upon this point of hardiness in winter will its value depend. If it proves to be no hardier than the Rebecca, it ought not to be recommended, though for specially favored localities or the garden of the amateur it may be useful.

Antoinette, one of the late Mr. Miner's white seedlings from the Concord, appears promising. The vine makes a remarkably vigorous and healthy growth—stronger even than the Worden or Concord, bearing abundantly large and handsome clusters of delicate yellow color, and in flavor much like the Pocklington, but ripening some days earlier. It is a little foxy in odor, but much the same as all the white Concord seedlings, which have a strong family resemblance. I have seen several notices of this grape both favorable and unfavorable, but after fruiting it for three years my impressions are in its favor as a very strong-growing, productive, hardy and healthy variety, of good market quality and certainly worthy of trial.

The Lady Washington I found later in ripening than I expected, and it suffered from rot. The season seemed unfavorable for it. It ripened a week or more after the Concord. The vine is one of the most vigorous in my whole collection and the foliage has been remarkably healthy. In quality I should class it as rather negative, neither positively bad nor very good.

Eldorado is a twin sister of the Lady Washington and pleased me much better both as to quality and time of ripening. The vine is very vigorous, and has been, up to this time, entirely healthy. It fruited for me the first time the past season. Ripens as early as the Delaware, and though not quite as large as the Lady Washington, is much better in quality. The clusters, although of medium size, are handsome; color light yellow, or amber; flavor pure and delicate, entirely free from foxiness, and very good, if not best in quality. As to productiveness and general character, in that respect, I can not say, having fruited it but once upon a young vine. I have, however, seen it very favorably noticed by our Eastern friends, who have fruited it for a longer period.

Jefferson I still regard as one of the most promising for value among the new grapes. I fruited it moderately the past unfavorable season and found

the quality excellent—to my taste, equal to the Iona, which it greatly resembles, both in the shape, size, and color of its handsome clusters. The foliage of the vine is healthy, growth vigorous, compact; wood short-jointed and firm, though not as rampant in growth as the Lady Washington. My experience with the Jefferson has been satisfactory and my impressions of it favorable. It ripens about a week after the Concord.

The Virgennes has made a good record and promises to be valuable. The vine seems to be purely native and after the Hartford Prolific type, with thick, healthy foliage and strong growth, ripening its wood perfectly. It seems hardy and productive, medium sized clusters with large berries, red in color, pulp tender, skin thin but tenacious; flavor good, somewhat like the Salem and Brighton. But, unlike the Brighton, it is a good long keeper, either upon the vine or after being gathered. It ripens a little earlier than the Concord, is not foxy, and altogether seems one of the most promising and reliable of the new grapes.

The Early Victor has stood all tests admirably. I have had it in bearing for three years and find it one of the most reliable grapes I have, either new or old. Healthy in fruit, vine and foliage; productive, pleasant-flavored, without foxiness and really good. It is black, about the size of the Clinton, and ripens early, just about the same time as Moore's Early or Hartford.

The Duchess, a handsome white grape, made a strong growth of vine the past season, and although the foliage mildewed slightly, it ripened both its wood and fruit well. Its clusters, in common with many other kinds, were rather small and somewhat imperfect, caused, as I suppose, by much cold and rain about blooming time. It ripened a week or ten days after the Concord. The fruit, when well ripened, is very pleasant and pure flavored, resembling the Croton and some of the foreign Chasselas varieties. It seems to have excellent keeping and shipping qualities. Mr. Caywood, the originator, exhibited at the meeting of the American Pomological Society, at Philadelphia, last September, very beautiful clusters of this grape, some of which were said to be over a pound in weight.

The Highland, although very late in ripening, I think will be found valuable where the Catawba can be grown successfully. In growth, healthy and vigorous; fruit very large in bunch and berry; one of the handsomest black grapes I have grown; somewhat acid until quite ripe, when it is rich, pleasant flavored and entirely free from foxiness. In size and appearance it resembles the Black Hamburg, is a good late keeper, and has shown no tendency to rot.

There are quite a number of new grapes of the Riparia type, which have originated in Missouri, mostly seedlings from the Taylor or the Elvira. They are regarded as most promising for wine making, but some of them will probably be found also good enough for table use. I have hardly had sufficient experience with them as a class to determine their prospective value. The Elvira is being largely planted upon the islands of Lake Erie for wine making, and some of its seedlings seem more promising and better than the

parent, though all have a strong family likeness. All are vigorous and healthy growers, and, so far as I have tested them, productive. Amber, Black Taylor, Faith, Groin's Golden, Missouri Riessling, Montefiore and Pearl are among the most prominent. Black Taylor is the earliest ripening, and to me the best flavored of the lot, and may prove useful both for wine making and the table. It and Montefiore, both of which were originated by Jacob Rommel, are the only *black* grapes of the Taylor and Elvira class which I have seen. Noah, another white grape of this type, which originated in Southern Illinois, has found much favor for vineyard planting in France and in some sections of this country.

The Empire State is said to be a cross between the Hartford Prolific and Clinton. Judging from the fruit, I should regard this as highly improbable, for it is a white grape of beautiful appearance and excellent quality, neither coarse nor foxy, but rich, delicate, sprightly, with a peculiar perfumed flavor suggestive of the Muscats and Frontignans, which I have never found in a pure native cross. But after growing this grape and noting its healthy growth and foliage and the early and perfect ripening of its wood, I hardly know what to say, as in habit of growth the vine appears to be a pure native American. I had no vine on my place the past season with more perfectly healthy foliage, which remained fresh and green till removed by severe winter freezing. I hope its record may be as good in the future, and that it may prove to be worth the \$1,000 its owners paid for it.

I will say a few words about the famous Niagara, which none of us are allowed to have, except under restrictions, which, to me, render it undesirable. I have personally visited but two plantations of this grape, but have taken some pains to obtain reliable information from those who have planted and fruited it in different sections the past season. The first plantation which I visited was in Western New York in the summer of 1882. I found the vines growing very unevenly, some making a good growth, others quite feeble. It is a rather coarse looking vine, somewhat like the old Isabella. I learned afterward that a large portion of this plantation was killed by the cold of the following winter. It is but fair to say, however, that a good many vines of other varieties were also winter-killed in the same neighborhood.

Another small plantation near Sandusky I visited the past summer. The same uneven habit of growth prevailed here also. Some plants had made four or five feet of growth, others not more than as many inches, and some spaces were vacant, the vines having been killed the previous winter. I had another opportunity of testing the fruit of this grape at the last meeting of the American Pomological Society, at Philadelphia, in September, but it was grown in Virginia. Some wine made from it was also exhibited. I saw nothing in it to change my former opinion. The grape is tolerably well flavored, though somewhat foxy, to my taste rather better than Concord, and I think it will be, wherever it can be successfully grown, a fairly acceptable, and perhaps profitable, market grape. It is called a white grape, but its color is a dull, light, unattractive green. All with whom I conversed who had grown

it, or seen it in bearing the past season, reported it as having rotted very badly everywhere, both North and South. The wine exhibited was very poor, but it was both new and crude. The best unprejudiced opinions which I can obtain of the Niagara are that it is not a grape of great promise, or extraordinary merit. One of the most competent and conscientious judges of fruit in this or any other country wrote me as follows, not long since:

"I am told the Niagara grapes have rotted considerably in New Jersey. I do not have much faith in it as a market grape, and for eating the quality is not good enough."

The Worden is about a week earlier in ripening than the Concord, and has usually rather larger clusters. Its growth is a little more slender, but it seems quite as productive as the Concord, and is generally considered as rather better flavored.

Moore's Early has also the general habit of the Concord, except that the berries are usually longer and the clusters rather smaller. It ripens about a week before the Worden, or two weeks before the Concord. In flavor and general character, except in the matter of earliness, scarcely distinguishable from its parent Concord.

A new white grape named Francis B. Hays has been exhibited several times by the originator of Moore's Early. It is a good and handsome grape, and has received favorable notice and commendation from the Massachusetts Horticultural Society. It is also a pure native seedling of the Concord type, of good quality, and I consider it at least worthy of trial.

GRAPE GROWING IN MISSOURI.

BY SAMUEL MILLER, OF MISSOURI.

It is now sixteen years since I came to this State, with the idea that outside of California it was the greatest country in the United States for grapes. I doubt, however, if there is a poorer one within the limits of grape growing than this very region. That we can grow some varieties to perfection is very true, but if there is any rot in the constitution of a grape, here it will show itself; and as to hardiness, it takes an ironclad that will stand mercury at 79° in the shade, and in sixty hours after be down to zero and 18° below. But in the face of all this, while my right arm can handle a hoe and pruning shears, the grape will have no rest.

One consolation we have that Cynthiana and Norton are almost infallible, and the best heavy red wines are made from them. They are excellent table grapes, and can be kept all winter with but little trouble. One difficulty about the above is, they are very hard to propagate from cuttings.

In an experiment of six different plans the past season, one plan gave me 47 per cent., others less, down to the common plan, in which it has always

been a complete failure. If equally successful another year it will be given to this Society.

Grape growing, however, can be made to succeed in spite of all the drawbacks, so far as one's own use is concerned, even if not profitable for market or on a large scale. All the hybrids, if those with half foreign blood are meant by it, will fail two years out of three in ordinary culture and treatment, while if properly cared for can be made successful. To do this, laying down and covering in the fall and putting paper sacks around the fruit bunches as soon as the berries are the size of small shot, will be necessary. All this is not too much trouble for the amateur, and he will be well rewarded for his labor. But the masses will not do it, and even we who advocate and know how will sometimes neglect.

Triumph, the finest white outdoor grape in America, and Defiance, one of the very best late black ones for this latitude and further south, if protected in winter, pruned pretty close, and as soon as in blossom pinch all the bunches off each shoot but the best one, and then protect with paper sacks as soon as the fruit is set, and one can calculate on one pound to the bunch throughout. Such grapes will bring ten to twenty cents per pound where Concord's will bring five cents, so that it might even be profitable to go to all this trouble. And Goethe can be put in for a red one. Lady Washington, Highland, Waverly, Excelsior and others by Ricketts may be grown in like manner.

Among the new ones Pocklington is perhaps the most showy of the white, and Jefferson the handsomest and best among the red ones. Pocklington has too much native aroma to suit some tastes. Its size and beauty will take with the masses. The Jefferson has not yet fruited with me, but there is not a vine among my sixty varieties that pleases me better, and as to quality (I have eaten it elsewhere), there are but few that will equal it. Good soil, proper cultivation suitably performed, and the plans herein mentioned will secure grapes for any one.

To fall back on older varieties, I may say that the Concord behaves about as bad as any other in the way of rot, and the only instances where they have been exempt here was where the vineyard was grubbed out, and some not deep enough, so that shoots came up and run on the ground among the red clover unpruned. They bore clean fruit for two years, but the fruit was inferior.

Ives is quite successful here, but the quality is too poor. Martha and Elvira are among our most successful white grapes, and when mixed make a very fair white wine. Quite a number of new varieties would have shown their fruit the past fall, but were spoiled by a late frost in the spring.

HYBRIDIZATION IN FLORICULTURE.

BY DAVID B. WOODBURY, OF MAINE.

By hybridizing, wonderful results have been obtained in many of our best plants. Every year the florists and nurserymen offer new and choice things, the result of scientific fertilizing by some lover of the art, seeking to do what can be done by aiding nature in the production of seeds, and through them of plants.

I think the plant which furnishes the pollen will exert more influence on the offspring, and if rightly used will produce many new and choice plants. It is best that both parents should be hardy and strong growers. The object in crossing is to reproduce in one all the desirable points of both parents, and may be done between any plants of the same family. If the work be rightly done, the chance of obtaining a favorable result is much better in hand than in chance fertilized seed. It is better to grow the specimens to be operated in isolated places, protect from insects, etc. By hand fertilizing new plants, crosses and hybrid crosses are produced, and from these, "sports" and "freaks of nature." Of the failures of the originator the world knows but little.

A very large part of the product of hybridization is worthless, or contains nothing superior to that we already have. Hope must be large with him who engages in a work taking so long to perfect and with the chance of so many failures. He must wait from one to five or even more years for the flowers and ripened fruit. Not until then can he know if his labors are rewarded with success.

Crosses are quite easily produced, yet the work must be rightly done to insure satisfactory results. Many are quite pure from the start, others "sport" and grow to be very unique. I have crossed and grown geraniums that have "sported," and grown four distinct kinds of foliage on as many branches. Others growing two kinds of leaves and two of flowers, each as pure as though distinct plants. These "sports" may be used as cuttings to propagate the varieties.

Hybrid crosses are between two very different kinds of the same family, as the water and musk melon. It might be possible to cross them, but is doubtful. Different varieties of the watermelon can easily be crossed together, as can the musk. "Sports" and "freaks of nature" are no doubt due to some previous cross, though they may have grown for years and shown no sign of mixture, the sport bearing no resemblance to the one that produced it. Extra cultivation helps force them, and adds much to their beauty and worth.

Nearly all our best new potatoes of the last fifteen years are the result of hybridization. Were we compelled to go back to our old varieties of twenty-five years ago and cultivate them a year, we might perhaps realize what the hybridist has done in giving us better kinds. The new varieties obtained by

crossing are quite liable to sport in the tubers and give us additional kinds, either earlier or later, and not materially different in other respects. I have originated one that has sported and gives a variegated top, clear white and green, a curiosity and quite ornamental.

To the originators in grapes our thanks are justly due. It is but a few years since a ripe grape was raised as far north as this. Now we can procure kinds that may be successfully grown in nearly all localities. Those who do not have them should try a few of the earliest hardy sorts. Acclimatization, extra cultivation and quite close pruning are very beneficial in grape culture. The hybridist has been ever ready to use his skill in all branches of pomology. Nothing will escape his notice, and to him we look for grand results in the future. He begins with an invisible dust, and after years of labor reproduces in one the delicate flavor, hardy qualities, fine form and markings of many predecessors. Few realize, when they behold all these beautiful products, the vast work it has cost the originator.

[The following most excellent paper, supplemental to the address of Prof. Forbes on Insects Injurious to Strawberries, published in Volume I. of our Transactions, should have appeared in its proper place in this report, but for the fact that the Prof. could not furnish the cuts, so handsomely illustrating it, in time for the publishers. Hence its appearance here.

SECRETARY.]

SUPPLEMENTARY REPORT ON INSECTS AFFECTING THE STRAWBERRY.

BY S. A. FORBES, OF NORMAL, ILLINOIS.

In my paper on Insects Affecting the Strawberry, published in the last volume of the Transactions of the Society, I gave a more or less complete account of twenty-two species, all known to be injurious to that plant, and I now propose to submit a supplementary report upon a number of other species, some of which were then overlooked, while others have been but lately recognized as enemies of the strawberry.

Forty species of insects are now known to attack this plant in America, east of the Rocky Mountains, with more or less injurious effect, besides one millipede and one mite not properly to be classed as insects. All the seven insect orders are represented by them except the Diptera, the Neuroptera, and to the latter very few insects injurious to man belong. Four of the forty are Hymenoptera (a mason bee, an ant and two saw flies); thirteen are larvae of Lepidoptera, all belonging to four families of moths, and fourteen are Coleoptera, representing the five families Scarabaeidae, Elateridae, Chrysomelidae, Curculionidae and Otiiorhynchidae. The two Orthoptera are both grasshoppers, and the eight Hemiptera include a scale insect, three plant lice, and four Heteroptera.

Ten of these species devour the root and crown of the plant, all Coleoptera but one, which is the larva of a moth. The leaf and its petiole are attacked by two of the Hymenoptera, by all the Lepidoptera except two, by eight of the Coleoptera, by both of the Orthoptera, by five of the Hemiptera, and by the red mite. The flower and fruit are damaged by the ant, the stalk-borer, one of the leaf-rollers, by a snout beetle, by two plant bugs, and by the myriapod.

Less than a fourth of the known enemies of the strawberry really seriously injure it in a way to demand earnest effort for their suppression, the remainder being too few in number or too local in their occasional outbreaks, to do more than threaten the crop with possible future mischief. Of these enemies of the strawberry of the first class, but two devour the leaf—the strawberry slug and the leaf-roller; four attack the roots—the white grubs and the three root-worms: one bores the crown—the crown-borer; and two injure the fruit—the tarnished and the dusky plant bugs.

THE ROSE SLUG (*Scandria rosa*, Harris).

Order HYMENOPTERA. Family TENTHREDINIDÆ.

This species is mentioned here only to call attention to the fact that it has been reported by Mr. Townend Glover,* formerly United States Entomologist, to attack the strawberry when its ordinary food fails.

THE BROWN STRAWBERRY SPAN-WORM (*Cynatophora pampiniaria*, Pack.)

Order LEPIDOPTERA. Family PHALENIDÆ.

This species was found by me in midsummer so frequently, feeding upon the leaves of the strawberry in Southern Illinois, as to make it worthy of brief mention here. It is a slender, looping caterpillar, brown in general color, about an inch in length, and gives origin to a gray moth which expands from three fourths of an inch to an inch, the wings being variously lined and clouded with black. Specimens obtained August 1st, pupated on the 11th of that month, and emerged on the 22d. Half-grown larvae collected on the 6th of September, probably represented a second brood.

The full-grown larva measured one inch in length, and was of a pale yellowish green color, with a broad reddish brown stripe edged with black on the back, and on each side of the fifth ring was a small black spot. September 4th, after spinning a few threads over itself, it became a pupa, and was transformed to a moth November 14th.

FLEA BEETLES (*Halticidæ*.)

It is not known that these insects have ever been severely injurious to the strawberry; but, as they are often very common upon these plants, and as some of them are exceedingly destructive to other vegetation, it seems worth while to notice them here. They are easily distinguished by their swollen

*Prairie Farmer, October 5, 1867, Vol. XX, p. 212.

hind thighs, which give some of them a power of leaping scarcely exceeded by the flea itself.

Three species, all minute, are known to infest the strawberry: the notorious cabbage flea beetle (*Phyllotreta vittata*), and two others not heretofore reported as injurious to this fruit, *Crepidodera fuscata* and *Systema blanda*.

The first may be distinguished by its smooth and shining surface, black, with two broad, irregular, yellow stripes on the wing covers.

Crepidodera fuscata is of about the same size as the cabbage flea beetle, but shorter and thicker. It is black throughout, except the antennæ and tarsi, which are red: and the elytra are covered with a conspicuous coat of gray pubescence. The thorax is coarsely punctured, and marked with a transverse impression before the basal margin.

Systema blanda, already known as injurious to corn, was especially abundant on the leaves of the strawberry near Anna, in Southern Illinois, where it was certainly feeding upon that plant, as I have demonstrated by dissection. It may be easily distinguished from the other flea beetles by its elongate form, and by its ochre-yellow color, with a broad pale stripe on the middle of each wing-cover. The punctures on the latter are irregularly distributed, instead of being arranged in rows, as in the other species.

Although *Phyllotreta vittata* was abundant on cabbages in Southern Illinois in the spring of 1883, I did not notice it on strawberries adjacent, and I doubt if it is likely to require the especial attention of the strawberry grower.

THE STRAWBERRY LEAF BEETLES.

(*Paria aterrima*, Hald.: *Scelodonta nebulosus*, Lec.: *Colaspis brunnea*, Fab.: *Colaspis tristis*, Oliv.)

The three species first mentioned are the adult beetles of the root-worms of the strawberry, and will be fully described and figured on another page. They are mentioned here to call attention to the fact that they all feed—at least for a time after emerging from the earth—upon the leaves of the strawberry plant, one of them (*Paria aterrima*) occasionally doing conspicuous mischief. As this last species has the longest adult life of any of the root-worms, it is the most likely to do harm as a leaf beetle, and is, in fact, the only one the injuries of which have attracted attention hitherto. If these beetles should become abundant enough to require remedial measures, poisoning with Paris green and other suitable substances, as recommended in the discussion of these insects given under the head of strawberry root-worms, will be the most suitable remedy.

THE OBLIQUE-BANDED LEAF-ROLLER (*Cucullia rosaceana*, Harris).

Order LEPIDOPTERA. Family TORTRICIDÆ.

This leaf roller of the apple has been several times reported to transfer its attentions, at least occasionally, to the strawberry. In his "Guide to the Study of Insects," Dr. Packard says of this species: "We found, on the 23d of June, the fully grown larva on the leaves of the strawberry, doubling them up and binding them together by a few silken threads.

"The worm is pale livid, greenish above and paler beneath, with a conspicuous black dot on each side of the hinder edge of the prothorax. The head is very pale honey-yellow, with two black spots, one near the insertion of the mandibles and the other on the side, near the base of the head. The posterior half of each segment is transversely wrinkled a few times. The body is scattered over with a few minute tubercles, each giving rise to a fine hair. It is .80 of an inch long.

"One specimen spun its slight cocoon on June 26th, the pupa appearing June 30th. It is sometimes attacked by ichneumons.

"The pupa is pointed on the vertex of the head, and on the back of each abdominal ring are two rows of spines. On the abdominal tip of the brown cocoon are three pairs of minute hooks, the two outer pairs supported on a pedicel, by which the chrysalis is retained in place in the cocoon. The moth usually appears the last of June. There is a second brood in August."

It will be seen that this is a much larger species than the true strawberry leaf-roller, and it may also be distinguished by the different manner of its injury to the plant, as it folds the leaf more loosely than the other.

The periods of this species are such as to render it susceptible to the same treatment as that already found effective for the strawberry leaf-roller proper.

THE PLAIN STRAWBERRY LEAF-ROLLER (*Cacocia obsoletana*, Clem.)

Order LEPIDOPTERA. Family TORTRICIDÆ.

Another leaf-roller extremely similar in general appearance to the above, but not hitherto known as injurious to horticulture, was discovered by us in Southern Illinois this year. From the oblique-banded leaf-roller it differed especially in the form of the wings, which had scarcely a trace of the characteristic sinuosity of the front and outer margins of the latter species, and in the obsolete character of the oblique band of the front wings, here reduced to two brown spots, one on the costal, and the other on the internal margin of the wing.

The larva is a plump, smooth, green caterpillar, about an inch long, concolorous except the head, the first thoracic segment, and the legs. The head is yellowish, with the anterior margin and the mouth parts brown. The ocelli are four in number, arranged in a semicircle at the side of the head the two anterior being much larger than the others. There are two or more long hairs on the vertex, and a number of others collected about the ocelli.

The first thoracic segment is brown and leathery above, but with a few long hairs which are not set on tubercles. At each end of this dorsal leathery plate is a white spot set in a dark blotch. The two remaining thoracic segments have each a single transverse row of six pale piliferous tubercles, the row being double at the ends; but all the other segments except the penultimate have two rows. These tubercles are much the largest on the posterior segments, and the rows extend entirely around the fourth, fifth, tenth, eleventh and twelfth,—those which are destitute of prolegs.

These larvae appear upon the leaves of the plant in July and August, and may be easily exterminated by the methods advised for 'the common strawberry leaf-roller.

STRAWBERRY LEAF-STEM GALL.

Concerning this species, all the information which I have is contained in the following extract from Saunders' "Insects Injurious to Fruit":

"This is an elongated gall, an inch or more in length, found on the stalk of the leaf of the strawberry near its base, produced by an undetermined species of gall fly. Its surface is irregular and its color red, while the internal structure is spongy. If these galls are opened about the middle of July, there will be found in each, about the center, a small, milk-white, footless grub, semi-transparent, with a smooth, glossy skin, a wrinkled surface, and a few fine short hairs. Its jaws are pale brown, and its length at this period is about one sixteenth of an inch, the body tapering a little towards each extremity. This insect doubtless changes to a chrysalis within the gall, from which the flies escape later in the season, or early the following spring.

THE MAPLE BARK-LOUSE (*Pulvinaria innumerabilis*, Rathvon).

Order HEMIPTERA. Family COCCIDÆ.

As a matter of interest, but of little apparent significance, I may mention the fact that the common soft maple bark-louse has been frequently found abundant upon leaves of strawberries growing in the vicinity of maple trees, under conditions to show that the louse can live and develop upon the strawberry.

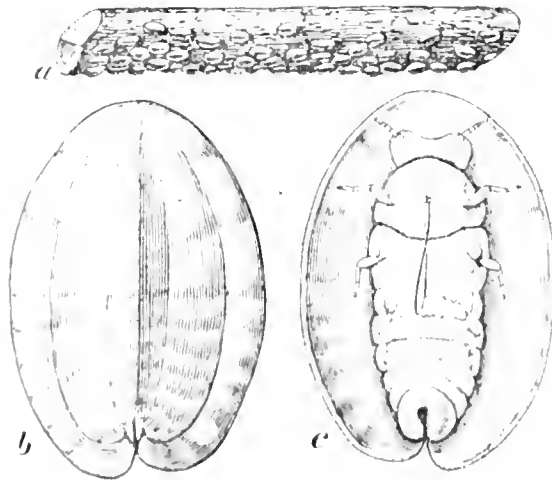


FIG. 1. THE MAPLE BARK-LOUSE (*Pulvinaria innumerabilis*, Rathvon) female in autumn condition. *a*, specimen attached to twig; *b*, dorsal view, magnified; *c*, ventral view.

Another scale insect of the maple, belonging to the genus *Aleurodes*, but of a species probably undescribed, I have likewise seen, less commonly, upon strawberry leaves. In England an *Aleurodes* is reported as often extremely abundant upon this plant, frequently almost covering the under sides of the leaves.

THE STRAWBERRY PLANT LICE.

Order HEMIPTERA. Family APHIDIDE.

In addition to the species *Siphonophora frag-triv*, mentioned in the last volume of the Transactions as a strawberry plant louse, I have now to report two others infesting the strawberry—one a minute green or yellowish green form, occurring upon the leaves and leaf and flower stems throughout the summer, and the other observed as yet only upon the crown of the plant. The former is described in my Report for 1883 as State Entomologist of Illinois under the name *Siphonophora minor*, and the latter is an *Aphis* as yet undetermined, no winged individuals having been observed. The figure in my former paper represents this *Aphis*.

THE RED SPIDER (*Tetranychus telarius*, L.)

Class ARACHNIDA. Order ACARINA. Family ACARIDE.

This abundant and everywhere well-known pest, although not an insect, belonging, instead, to the mite family of the class Arachnida, may be mentioned here merely to call attention to the fact that it is reported as sometimes injuring the strawberry. Its method of attack is too well known to gardeners to need special description. It may be sought where the leaves of the strawberry turn gray or yellow without any cause observable on ordinary inspection. If present, the mites will be revealed to close scrutiny as numerous moving greenish or reddish points (each usually with a black blotch on either side), which under a glass are seen to have eight legs, and to be without distinction of thorax and abdomen.

Spraying with soap-suds or dusting with flour of sulphur are the usual remedies for this pest.

THE SMALL YELLOW ANT (*Solenopsis fugax*, Latr.)

Order HYMENOPTERA. Family FORMICIDE.

This is a minute yellow ant, very abundant everywhere, and commonly nesting under stones, which was discovered last spring and summer to be the author of considerable mischief in the corn field, and also to eat holes in ripe strawberries.

It belongs to the sub-family Myrmicina, which is characterized especially by the fact that the peduncle of the abdomen is composed of two nodes instead of one, as in the larger and more abundant sub-family, Formicina.

In the strawberry field its work was but rarely seen. Here, selecting the largest and ripest berries, a little group of the ants would soon almost bury themselves in a cavity gnawed out of the fleshy fruit.

THE STRAWBERRY WEEVIL (*Anthonomus musculus*, Say.)

Order COLEOPTERA. Family CURCULIONIDE.

Under the above caption, Professor A. J. Cook, of the State Agricultural College of Michigan, announces in the Report of the Michigan Horticultural Society for 1883 the appearance in that State of a "new strawberry pest,"

which was said by a fruit-grower to be ruining his entire strawberry crop in July, by puncturing the fruit. *Anthrenus musculus* and a number of related species occur also in Illinois, and we are therefore liable to the same injuries which have attracted attention in Michigan. In the absence of any further information concerning this matter, I quote from the article of Professor Cook: "This strawberry weevil, of which I can find no mention anywhere as a strawberry pest, proves to be *Anthrenus musculus*, and was described by Thomas Say many years ago. His description is as follows: Dull rufous; scutel and elytral spotted bands whitish. Inhabits United States. Body more or less dull rufous, or piceous, punctured. Head piceous; rostrum with elevated lines; antennæ rufous; club dusky; thorax piceous, very much crowded with punctures; small recurved, distant whitish hairs; scutel oval white; elytra with oval impressed striae of large punctures; rufous with the edge piceous; two or three undulated macular whitish bands of short hairs; beneath piceous; feet rufous. Length, including rostrum, .1 of an inch. Variety an obscure piceous, almost black; bands obvious. This varies considerably in its depth of coloring."

REMEDIES.

In this matter I can only suggest. I should try the pyrethrum and kerosene, as described above, and if they were of no avail, I should hope to study out its natural history in hopes that that would furnish suggestions that would lead to an effectual cure."

THE TARNISHED PLANT BUG (*Lygus lincolaris*, Beauv.)

Order HEMIPTERA. Family CAPSIDÆ.

The tarnished plant bug is one of the true bugs, and is consequently destitute of jaws and provided with a suetorial beak. The adult or winged form is about a fifth of an inch in length by half that in width, oval, yellow or greenish yellow, more or less striped or mottled with dusky. It is extremely variable, but the most constant marks are five longitudinal white lines on the thorax (often reduced to spots, which then occupy the anterior margin), a white *y*-shaped mark on the scutellum, which is sometimes broken into three white points arranged in a triangle, and a white blotch tipped with black near the end of the wing covers.

The young are much less variegated than the adult, and more distinctly green. There are four stages between the egg and the mature insect, corresponding to as many different moults. In all except the first stage, the young may be distinguished by the presence of five black dots upon the back arranged in a pentagonal form.

The old bugs winter under rubbish upon the ground, emerge early in spring, cluster upon the unfolding buds of fruit trees, the fresh foliage of strawberries and other early vegetation, and there lay their eggs, old and young together draining the sap of these succulent growing parts. The effect is to arrest the development of the leaves, and even to kill them, and in

the case of the strawberry to interfere with the growth of the fruit, sometimes, at least, causing what is known as the "buttoning" of the berry. Later in the season the buds and leaves of flowering plants and vegetables, especially the cabbage and potato, are attacked.

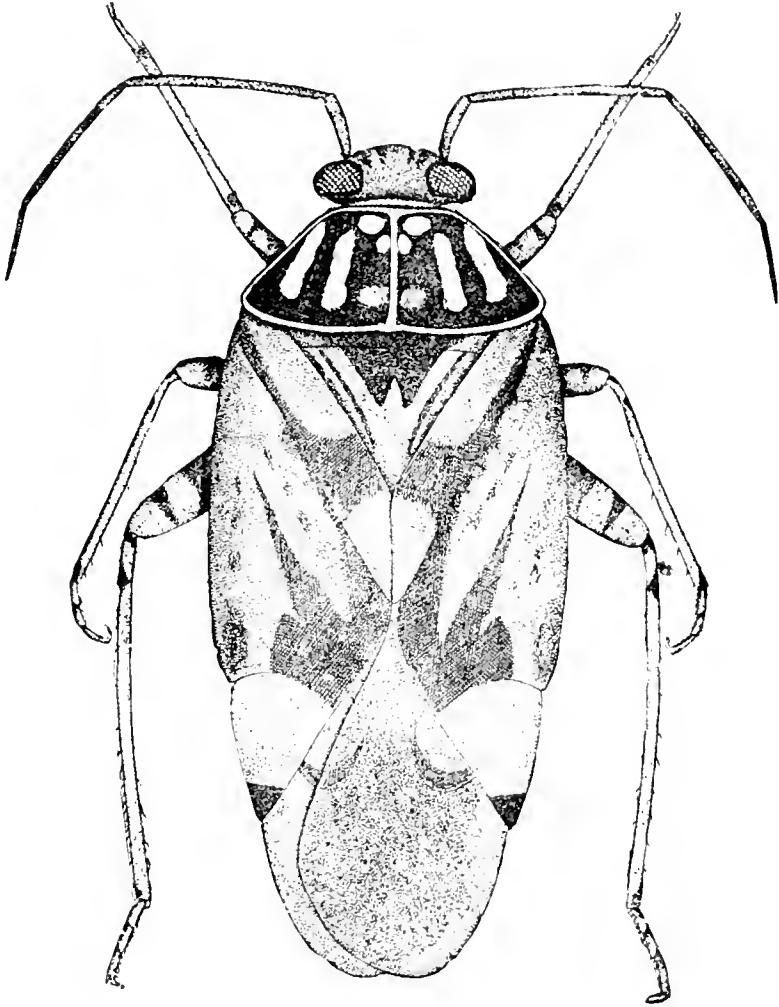


Fig. 2. THE TARNISHED PLANT BUG (*Lygus lineolaris*, Beauv.): Adult, magnified fifteen diameters.

There are at least two broods in a year, one maturing in May and June, and the other in July and August, and it is possible that there is still another intermediate.

Although a very few of these insects are devoured by birds, no natural enemies are known to have any positive effect upon their numbers. There is some evidence, however, that wet seasons are injurious to them.

The general distribution of these plant bugs at all seasons of the year makes it impossible to exterminate them or seriously to diminish their numbers by artificial means, unless the clearing up and burning of rubbish late in autumn

might have that effect. The attention of the orchardist and gardener whose fruits and vegetables are threatened by this insect, should rather be directed to measures for defending directly the crops endangered. The insects may be caught easily in cool mornings by beating with an insect net the tips of

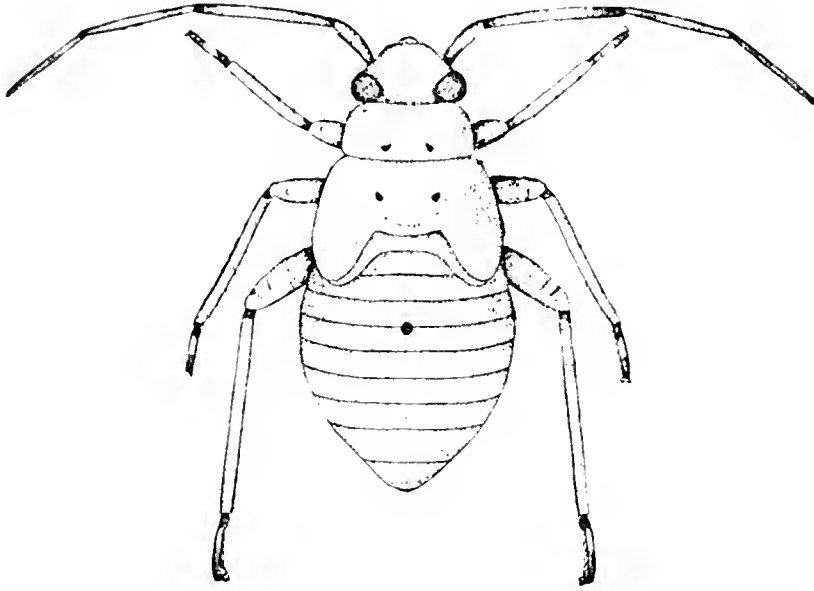


Fig. 3. THE TARNISHED PLANT BUG (*Lygus lineolaris*, Beauv.): Third stage, magnified fifteen diameters.

the twigs and leaves of the plants in which they usually lie concealed at that time, and may then be readily killed by shaking them out into a bucket containing a little kerosene, or a film of kerosene on water. They may also be destroyed by sprinkling or dusting the foliage with pyrethrum, or spraying it with diluted kerosene emulsion. Any and even all these measures of defense may be used with great profit whenever the insects are numerous enough to threaten any serious damage.

THE DUSKY PLANT BUG (*Deraocoris rapidus*, Say).

Order HEMIPTERA. Family CAPSIDÆ.

This insect has not hitherto been suspected of any injury to cultivated vegetation, as far as I can learn, nor has it even been mentioned in the literature of economic entomology. Its occurrence everywhere in strawberry fields last spring, with the mischievous tarnished plant bug already treated, both in the same ages, stages and situations, and both found only on the fruit, left no room for doubt that this species was in part responsible for the mischief apparent.

The adult is narrowly oval in outline, about one-fourth of an inch (7 mm.) in length, and eleven hundredths of an inch wide. The general color is dusky, tinged with yellow, except the head and thorax, which are orange brown. The eyes are red or black; the antennae very long, reaching the tip

of the abdomen, black at the base and banded with white upon the second and fourth joints. The prothorax is yellow, the anterior fourth being orange brown, the same color as the head. On the posterior third is a transverse black band, usually constricted in the middle, and often divided into two

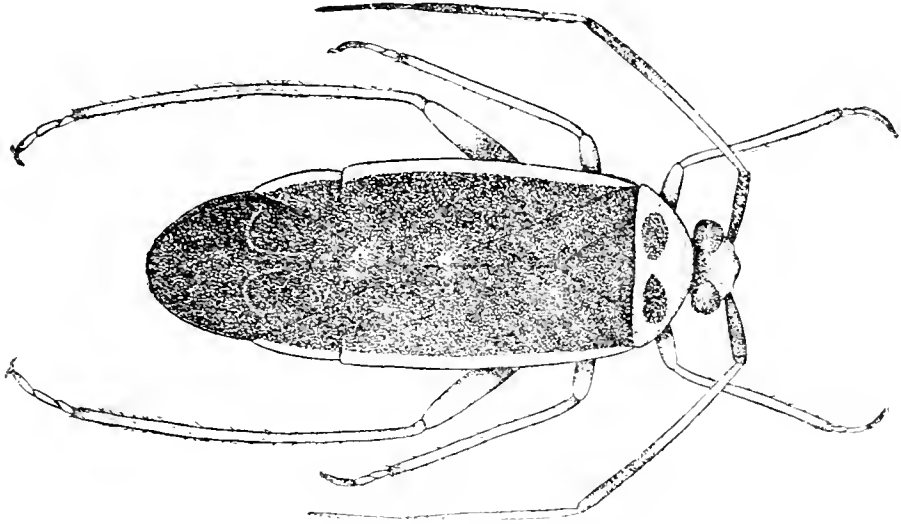


Fig. 4. THE DUSKY PLANT BUG (*Dierocoris rapitus*, Say): Adult, magnified nine diameters.

oblong black blotches. The wing-covers are black, tinged with yellowish, and more or less reddened at the tip of the leathery portion, which is there sometimes almost carmine. The membrane is uniform dusky and the veins black. The abdomen is black, with a red stripe upon either side: the

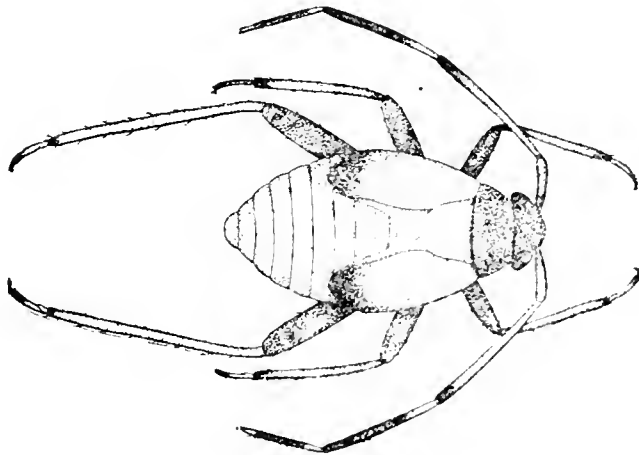


Fig. 5. THE DUSKY PLANT BUG (*Dierocoris rapitus*, Say): Pupa, magnified nine diameters.

last segment of the abdomen is wholly red. The young are similar in form to those of the tarnished plant bug, but are distinguished by their dark green and deep red colors, and by the snow-white tip and basal ring to the last joint of the antennae, the remainder of the joint being red.

THE STRAWBERRY MILLIPEDE (*Cambala annulata*, Say).

Class MYRIAPODA. Order DIPLOPODA.

In May, 1883, I received from Mr. C. W. Butler, of Anna, Illinois, a single slender, cylindrical millipede (thousand legs), said to have been taken from the interior of a ripe strawberry. It was about an inch and a half in length, and had entered the berry by a small hole about one sixteenth of an inch in diameter. When found it was coiled within the berry, entirely concealed in a cavity about the size of a Lima bean. Later in the season considerable numbers of these myriapods were found in the largest and ripest berries.

A European species of Iulidae has long been known to burrow the fruit of the strawberry in a manner precisely similar to that here reported. In his "Entomologie Horticole," Boisduval says that this European strawberry millipede, *Blaniulus guttulatus*, "is usually found under the straw in strawberry beds; it introduces itself into the fruit at the time of maturity, devours the pulp, and remains coiled up in the interior like a small snake. The hole by which it penetrates is not always very large; thus it often happens that strawberries are picked which undoubtedly contain Iuli. We only know it when eating them by their cracking between our teeth. This small myriapod prefers the larger species of strawberry, but the small ones which grow on *Fragaria vesca* are not exempt."

The Iulidae are chiefly nocturnal animals, remaining concealed by day and wandering freely about at night. The only mode of destroying them which has hitherto proved useful is that of entrapping them by slices of potato turnip, apple, or masses of other attractive food scattered through the field and covered with pieces of board, under which the myriapods will collect during the night in considerable numbers. If these lures are then visited late in the evening and very early in the morning, before the worms have scattered to their hiding places, they may often be captured by scores and hundreds, and killed in hot water or kerosene.

Dr. Sturtevant trapped them successfully in a garden where they were injuring Sweet Williams, by exposing small lumps of mingled flour and molasses, taking as many as thirty-five worms at a time, under a lump the size of a silver dollar; but attempts to poison them with Paris green were total failures, this substance having no apparent injurious effect on them.

WIRE WORMS (*Elatrida*)

Fig. 6. WIRE WORM.

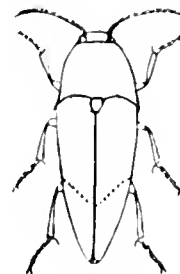


Fig. 7. CLICK BEETLE (imago of wire worm.)

The strawberry is among the plants subject to injury by these formidable insects, the roots being eaten and the crowns pierced from side to side. The wire worms are most likely to be injurious where strawberries are planted upon ground recently broken up from sod.

THE FIG EATER (*Allorhina nitida*, L.)

Order COLEOPTERA Family SCARABÆIDÆ.

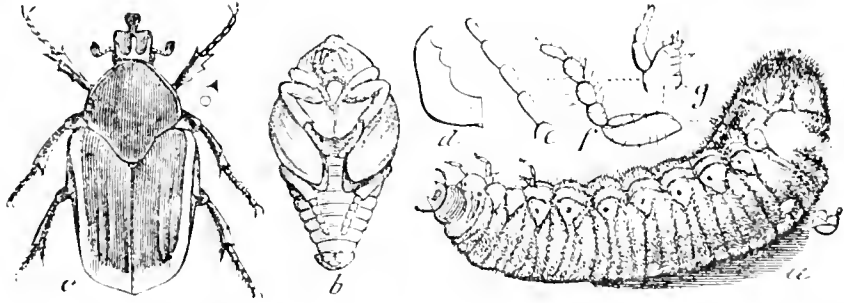


Fig. 8. THE FIG EATER (*Allorhina nitida*, L.): a, grub or larva; b, pupa; c, imago; d, mandible of larva; e, antennæ; f, leg; g, maxilla.

This species is included among insects injurious to the strawberry, upon the strength of a statement made by Professor Riley, in the first volume of the *American Entomologist* (p. 246.) Speaking of the adult beetle, he says:

“In the larval state they feed on the roots of plants, and are sometimes quite injurious to the strawberry.”

This beetle may be readily distinguished from the other large leaf beetles by the fact that the scutellum is invisible, being concealed by a backward projecting process of the prothorax. The head is quadrate, with an obovate extension in front; upper surface with a transverse ridge on each margin and one in the middle. Elytra with rounded shoulders, and slightly narrowing posteriorly, with two slight longitudinal ridges on each. General color a beautiful velvety green, with a broad margin of orange yellow around the elytra. Length, three quarters of an inch; width of elytra across the shoulders, about one half the length. The antennæ have a club at the end similar to that of the previous genera: all the claws of the feet are simple and equal, neither split nor unequal in size; the anterior coxæ conical and prominent.

From the common white grub, the larva may be distinguished when living, by the fact that when placed upon a smooth surface it turns upon its back and progresses in that position, whereas the common white grub crawls awkwardly upon its legs. The larva of *Allorhina* is further distinguished by the fact that all the segments are densely hairy, while in that of *Lachnosterna* the three thoracic segments, and the three abdominal segments preceding the last, are destitute of pubescence, and furnished with only a few long, slender hairs.

The life history of this species and its habits in general are so strictly similar, as far as known, to those of the white grub, that the remarks concerning remedies against that species will apply also to this.

THE STRAWBERRY ROOT-WORM (*Colaspis brunnea*, Fab. *Parietoterricola*, Oliv.
Scolobanta nebulosus, Lec.)

ORDER COLEOPTERA. Family CHRYSOMELIDÆ.

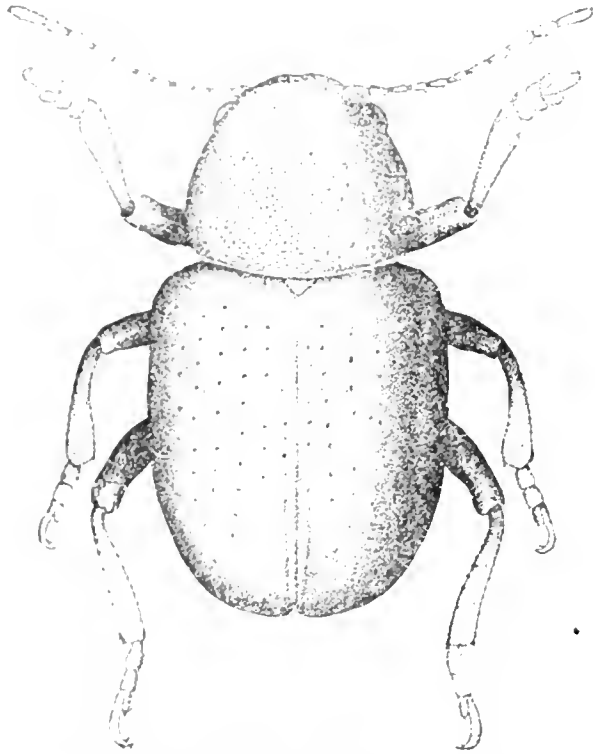


Fig. 9. *Scolobanta nebulosus*, Lec. magnified six-
teen times.

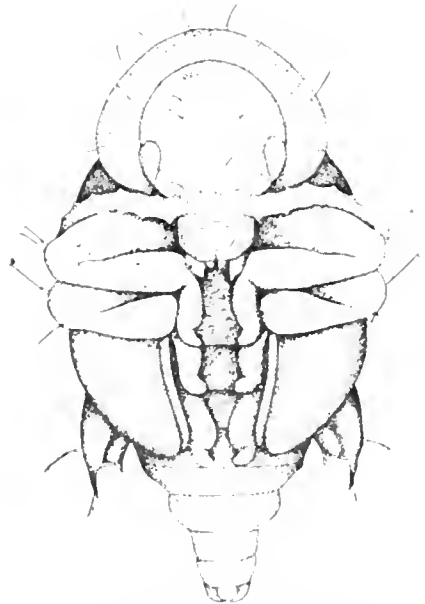


Fig. 10. *Scolobanta nebulosus*, Lec. Pupa.



Fig. 11. *Colaspis brunnea*, Fab., Larva.

The so-called root worm of the strawberry proves, on careful study, to represent not merely one, but three species of closely allied beetles, all belonging to the great family of plant feeders (Chrysomelidæ), to the same tribe of that family (Lamolinæ) but to different genera and species.

COMMON CHARACTERS.

Larva. These root-worms may be known from the crown-borer, to which they bear a strong superficial resemblance, by the absence of jointed legs in the latter; and from small white grubs, with which they are often associated in the ground, both feeding alike upon the roots of the strawberry, by their relatively shorter and thicker bodies, by the greatly inferior development of the abdomen, and by the fact that they are not nearly as much arched from before backwards as the grubs. In the root-worms the length is only about twice the breadth, while in white grubs of that size, it is four or five times as great. In the former the abdomen is but little longer than the head and thorax taken together, while in small white grubs it is at least twice as long. The latter insects have also the posterior half of the abdomen somewhat swollen, round and smooth, while in the root-worms the terminal segments are smaller than the preceding ones, and are at least equally wrinkled and tuberculate.

The root-worms here treated are all of nearly the same size, .12 to .16 of an inch long by half as wide, and all are white except the head and first segment, which are pale yellowish brown. The segments are twelve in number behind the head, with a rudimentary thirteenth one in which the vent is situated. The first segment, the one bearing the first pair of legs, is of a firmer consistence than the others, leathery and smooth above, and as long as the two following together, and each of the remaining eleven is marked on the back by about three transverse dorsal folds, and by a single fold beneath.

There is little peculiar in the external structure of the segments, and it differs but slightly from that of a great number of soft-bodied subterranean larvae. The legs are about as long as their corresponding segments, and are white with the exception of their claws, which are dark brown at the tips. They are provided with a few slender white hairs, which become shorter and more spine-like towards the end of the leg. The head is smooth, somewhat flattened in front, with a few slender, scattered hairs. The clypeus is trapezoidal, narrowing forward, and the labrum is rounded in front. The mandibles are dark brown, with black tips.

Pupa. The pupae are .14 inch long by .1 inch wide. They are white except the eyes and mandibles, which, when the pupae are mature, show through the outer envelope, red or black. The head is bent against the breast, and the legs folded against the body beneath, the posterior pair being applied against the sides of the abdomen, and the thighs of the anterior pair projecting at right angles. The front of the head is set with a few long spines with inflated bases, and three transverse rows of similar spines appear upon the thorax, one near the anterior border, one near the posterior, and the third intermediate. Six similar hairs appear upon the scutellum, and a row of about six or eight borders each one of the abdominal segments above. The last three segments are variously armed with spines, differing in shape and direction according to the genus, and the knees of the last pair of legs

are furnished with hooks and long, slender hairs with inflated bases. The sheaths of the antennae are set externally with conical tubercles.

Adults. The group to which these beetles belong is thus defined by Leconte and Horn:

"Body long, convex, rarely rounded or oval, usually metallic, sometimes testaceous or spotted. Head moderate, deflexed, front wide, eyes more or less emarginate: antennae filiform, or slightly thicker externally, usually long: widely separated at base. Prothorax with distinct lateral margin, which is, however, rarely effaced. Pygidium covered by the elytra, which are rounded at tip. Front coxae separated by the prosternum, globose, cavities closed behind. Legs moderate, the front ones sometimes elongated: tarsi broad, the third joint deeply bilobed, claws appendiculate or bifid in our genera."

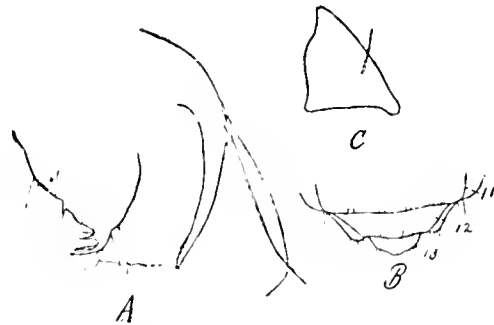


Fig. 12. Larval and pupal characters of *Sectodonta nebulosus*, Lec.: A, tip of abdomen of pupa, side view, with anal hook more highly magnified; B, terminal segments of abdomen of larva, viewed from beneath; C, mandible of larva.

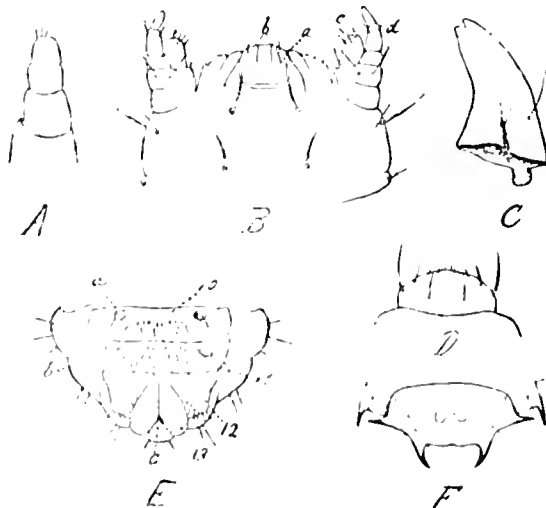


Fig. 1. Larval and pupal structures of *Colaspis brunnea*, Fab.: A, antenna of larva; B, labium and maxilla of larva; a, labium; b, labial palpi; c, maxillary lobe; d, maxillary palpi; C, mandible of larva; D, labrum of larva; E, terminal abdominal segments of larva, viewed from beneath; a, b, ventral tubercles; c, vent (10, 11, 12, 13, indicate the corresponding segment); F, spines upon the terminal abdominal segments of pupa, viewed from beneath.

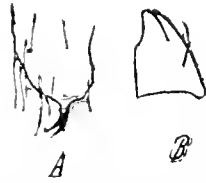


Fig. 14. Larval and pupal structures of *Paria aterrima*, Oliv.: A, tip of abdomen of pupa, side view; B, mandible of larva.

DIFFERENTIAL CHARACTERS.

As may be inferred from the fact that these root-worms all belong to the same tribe, the characters which distinguish them in their immature stages are few and trivial. The adult beetles may be described without difficulty, but the larvæ of *Scelodonta* and *Paria* are almost indistinguishable.

Hoping to avoid the necessity for long and minute descriptions, I have drawn up the following tables for the determination of larvæ and pupæ :

SYNOPSIS OF LARVÆ.

1. Mandibles bifid at tip.
 - a. Inner edge of mandibles excavated before tip, anal segments shorter than preceding, ventral tubercles not prominent. *Paria.*
 - b. Inner edge of mandibles not excavated, anal segment more developed than preceding, ventral tubercles prominent, with long hairs. *Colaspis.*
2. Mandibles entire at tip, inner edge excavated, anal segment short, ventral tubercles not prominent. *Scelodonta.*

SYNOPSIS OF PUPÆ.

1. Anal hooks simple, incurved. *Colaspis.*
2. Anal hooks recurved.
 - a. Hooks short and stout with strong erect tooth at upper side of base, and two long hairs on posterior margin. *Scelodonta.*
 - b. Hooks slighter, simple, or with slender hairs at upper side of base, no hairs on margin. *Paria.*

The beetles may be very easily distinguished, the *Colaspis* being usually of a pale clay-yellow, ranging to a yellowish brown, smooth but not shining, concolorous throughout, or occasionally with the head and thorax green; while *Paria* is shining black above, varying to brown with four black blotches upon the wing covers, but always with pale legs; and *Scelodonta* is purple or green, with a bronzed metallic lustre, and covered with a gray pubescence, of which both the other species are destitute.

The life histories of these insects, as far as known, are curiously different in respect to the times and periods of development. The larvæ of *Colaspis*

appears early in the season, and does its mischief principally in the months of April and May, the beetles appearing in June and July. That the eggs are laid by this beetle in the preceding year, is rendered highly probable, in which case the species hibernates in the egg. *Paria*, on the other hand, certainly passes the winter as an adult, doubtless laying its eggs in the spring, and making its chief attack upon the plants in July, the beetles emerging in the latter part of July and early in August. *Scelodonta*, again, hibernates in the larval condition, (the root-worms having gained their growth the previous autumn), pupates in the spring and emerges in June. The eggs are probably laid in July, and the larvae make their attack on the plant in August and September, continuing it possibly through October as well. Certainly by November they have gained their growth, and formed cells in the ground for their hibernation. The beetles of all these species live in part upon the leaves of the strawberry, especially at first, but scatter afterwards elsewhere, feeding upon various kinds of vegetation: *Colaspis* especially upon the grape, *Paria* upon the juniper and crab apple, and *Scelodonta* upon the evening primrose, and probably upon heads of grass.

In their larval stage, all, as far as known, depend strictly upon the roots of strawberries for food, devouring especially the smaller fibrous roots, but also penetrating and perforating the crowns. An attack in force is extremely destructive, and rapidly kills the plants affected. Often as many as fifteen or twenty larvae occur in or about the infested stool. This injury is maintained throughout the season, the species attacking the plant successively—*Colaspis* first, *Paria* next, and *Scelodonta* last.

Finally, in the absence of conclusive experiments on the artificial destruction of these pests it will be worth while only to say that Paris green or London purple applied to the leaves from June to August, will take effect upon the mature beetles as they emerge from the earth, and will thus unquestionably limit the increase of the larvae: while it is probable that applications of crude carbolic acid, bi-sulphide of carbon, or similar substances destructive to larval life, may be profitably made in the earth of infested fields, with the view to killing the larvae in the ground. It is especially likely that this last, or some similar measure, will prove worth while (if used in time) for the destruction of the larvae when they first make their appearance, in isolated patches in the field.

Laboratory experiments with both the above mentioned substances, made by punching holes in earth containing the larvae, pouring in a little of the insecticide, and then filling the holes with earth, demonstrated the susceptibility of these root-worms to the vapors of both carbolic acid and bi-sulphide of carbon. No opportunity has offered for field experiment.

If it be desired to destroy the root-worms by plowing up the plants, the time for this must evidently depend upon the species by which the field is occupied: since this measure will be ineffective unless taken when either the eggs or the young larvae are exposed to it. To kill *Colaspis*, the plants must be destroyed immediately after the fruit is picked; *Paria* may be reached in July, and *Scelodonta* in August.

To obtain plants free from insects for the establishment of new plantations, it is best that they should be taken up early in spring; but there is a strong probability that even at that time they will contain the eggs of *Colaspis*. For absolute security against a transfer of these root-worms, the plants first set out should be dug up and destroyed as soon as the runners have struck root in sufficient number to leave a fair setting of these new stools.

BLACK FRUIT-WEEVIL (*Otiobrychius sulcatus*, Boh.)

ORDER COLEOPTERA. Family OTIORHYNCHIDÆ.

This is a European insect, well and unfavorably known to the gardeners of England and the Continent, and destructive, both in the larval and matured conditions, to a variety of horticultural products. It is in the former state that it attacks the strawberry, devouring the roots and penetrating the crown somewhat after the methods of the root-worms previously treated.

Although it has not yet been observed in strawberry fields in America, and has not in fact been reported as an injurious species in this country, still it has been for some time established in the Eastern States, having been imported from the old world many years ago. It is proper, therefore, that such brief mention of it be made here as may serve to warn the fruit grower against it, since it has proven in its native home to be one of the most unmanageable of the insect enemies of horticulture.

The larva is footless, like the crown-borer, and is described as yellowish white, with a brown head, and provided with brownish hairs. It is known to feed upon the roots of raspberries, strawberries, and various garden plants, from midsummer until autumn. It hibernates in the larval stage and transforms in the following spring, emerging as a beetle in April or May.

The adult is oblong, brown black, sub-opaque, the surface sparsely and coarsely punctured, and sparsely hairy. The thorax is sub-cylindrical, widest in front of the middle, not longer than wide, covered with rounded, shining tubercles, each bearing a short hair. The elytra are broadly striated, and the striae coarsely punctured, the intervals each with a row of shining, rounded tubercles, rather closely placed, and with small patches of short yellowish hair irregularly distributed. The body beneath is black and shining, and very sparsely hairy. The length is thirty-four hundredths of an inch. As the adult is wingless like the beetle of the crown-borer, its invasion of a field may be easily guarded against by proper precautions in transplanting.

SUMMARY OF LIFE HISTORIES.

I gave in my Report upon Strawberry Insects, published in the Transactions for 1883, a brief calendar of a few species there treated, and I insert here a revised calendar, including all the strawberry insects of importance mentioned in both that paper and in this. By consulting this table one may see at a glance the periods of the transformations, and the stages in which each species occurs at any time. Running along the horizontal lines of the table, one has a brief epitome of the life history of each species; and following the vertical column, one may learn in what stage and situation each will be found at any given period.

CALENDAR OF STRAWBERRY INSECTS.

	WINTER.			SPRING.			SUMMER.			AUTUMN.		
	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
Mason Bee.....	La	La	La	La	La Pa If	If Ec Ld	Ld Pa If	If Ec Ld	La	La	La	La
Strawberry Typha-Worm.....								Ld	Ld Pd If			
Brown Strawberry Spider-Worm.....							Ld Pd	Ld Pd If	If			
Reddish Strawberry Spider-Worm.....							Ld Pd If	Ld Pd If	If			
Green Strawberry Spider-Worm.....							Ld Pd If	Ld Pd If	If			
Smoothed Dagger.....	Pd	If Pa?	If Pa?	Pd	If Lf E?	Lf	Lf If	Lf Pa	If Lf	Ld Pd	Ld Pd	Pd
Army-Worm.....	If Pa?	If Pa?	If Pa?	If	If Lf E?	Lf	Lf If	Lf Pa	If Lf	Ld Pd	Ld Pd	If Lf Pa?
Stalk-Borer.....	If	If	If	If	If	If	L	L	L	L	L	L
Cut-worms.....	La	La	La	Ld	Ld	Ld	Ld Pa	Ld Pa	If	Ec	Ld	La
Common Strawberry Leaf-Roller.....	Ld Pd	Ld Pd	Ld Pd	Ld If	Pd If	Ld	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd
The Strawberry Flower-Worm.....							Ldg	Ldg	Pd If			
Plain Strawberry Leaf-Roller.....							Ldg	Ldg	Ld If			
Oblique-banded Leaf-Roller.....							Ld Pd Pd If	If Ld	If			
Peach-tree Leaf-Roller.....							Ld Pd Pd If	If Ld	If			
Crown-Miner.....	Lc	Lc	Lc	Lc	Lc	Lc	Lc Pd	If	If	Lc	Lc	Lc
White Grubs (Anthonomus).....	La	La	La	La	La Pa Ld	La Pa If	La If	La Pa	La	La	La	La
White Grubs (Cotinus).....	La	La	La	La	La Pa	La Pa If	La Pa If	La If Pa	La If Pa	If La	La	La
White Grubs (Allorhina).....	La	La	La	La	La	La	La If	La If	La If	La	La	La
Colorado Root-Worm.....	Th	Th	Th	Ld	La	La Pa Ld	La Pa Ld	La Pa Ld	If	Ld	Ld	Ld
Paria Root-Worm.....	La	La	La	La	La	La Pa	La Pa	La Pa	La Pa	Ld	Ld	Ld
Scedionia Root-Worm.....	La	La	La	La	La Pa	La Pa	La Pa Ld	Ld	La Ld	La	La	La
Cabbage Flea Beetle.....	If	If	If	Ld	Ld	Ld La	La	Ld	Ld	Ld	Ld	If
Yellow-striped Flea Beetle.....							Ld	Ld	Ld	Ld	Ld	Ld
Downy Flea Beetle.....	Th	Th	Th	Ld	Ld	Ld	Ld	Ld	Ld	Ld	Ld	Ld
Crown Borer.....	Th	Th	Th	Ld	Ld	Ld	Ld	Ld	Ld	Ld	Ld	Ld
Strawberry Weevil.....	Th Ph	Th Ph	Th Ph	If	If	If	If Lf	If Lf	If Lf Pd	If Pd	If Pd	Th Ph
False Chinch Bug.....	Th	Th	Th	Th	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd
Tarnished Plant Bug.....	Th	Th	Th	Th	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd
Dusky Plant Bug.....	Th	Th	Th	Th	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd	Ld Pd
Flea Negro Bug.....	Th	Th	Th	Th	Ld	Ld	Ld	Ld	Ld	Ld	Ld	Ld

NOTE. E, eggs; L, larva; P, pupa; I, imago, or perfect insect.

A, on ground; b, on vines; c, in petiole; d, on leaves; e, in crown or main root; f, free; g, on flowers; h, on ground; i, on crown; j, on fruit.

For the purpose of summarizing the most essential facts relating to insect injuries to the strawberry, and to remedies against such injuries, I have prepared the following

CLASSIFICATION OF INSECT INJURIES TO THE STRAWBERRY, WITH SUGGESTIONS OF REMEDIES FOR THEM.

I have given first a synopsis of insect injuries to this plant, arranged in the form of an ordinary key for the determination of species in natural history, but containing no unnecessary references to the insects themselves; and have added indications of the proper remedies, in the form of figures and letters referring to the classification of remedies on a following page. In taking up subsequently for description and discussion the separate species of insects known to attack the strawberry, I have arranged these also on the same plan, grouping together under each subdivision of the classification of insect injuries, all the species now known to produce that especial form of injury.

As an illustration of the use of the "key" given below, let us suppose that the strawberry grower notices, after the fruit is harvested, that many of the leaves of his plants are folded or rolled together; and that on opening these he discovers a caterpillar in the fold, which has evidently been eating away the surface of the leaf. This injury comes under "Injuries to the Leaf and Leaf Stem" (A). Looking at the next line below this in the table, he places it at once in the class of injuries (1) done by eating away the tissue of the leaf. Following the key still further, he finally decides that it is not done by an exposed insect (b*), but by an insect rolled in the leaf (b**). Against this group he finds the reference 3c, 4a, by the first of which he is cited to the discussion of the method of destroying insects of feeble locomotive power, in midsummer, after the fruit is picked, by mowing and burning over the field; and by the second, to the use of arsenical poisons.

A. Injuries to the Leaf and Leaf Stem.

1. The tissue of the leaf eaten away.
 - a. When the plant is in fruit.
 - * By an exposed insect, 4c, 3a.
 - ** By an insect concealed in a rolled or folded leaf, 3a.
 - b. When not in fruit.
 - * By an exposed insect, 4a.
 - ** By a concealed insect, 3c, 4a.
2. The tissue not eaten, but pierced, and drained of sap.
 - a. A gall on the stem, 3a.
 - b. Not making gall, 4ede.

B. To the Flower and Flower Stem.

1. By an exposed insect, 3b, 4c.
2. By an insect concealed in a cluster of webbed leaves and blossoms, 3a.

C. To the Fruit, Ripe or Unripe.

1. The substance eaten away.
 - a.* By a small yellow ant. (No remedy needed.)
 - b.* By a brown caterpillar, striped with white, 3g.
 - c.* By a snout beetle. (No remedy known.)
 - d.* By a cylindrical, brown, thousand-legged worm, 3f.
2. The berry shrunken and knotty, the seeds on the shriveled parts well developed, with plump kernel, numerous greenish bugs occurring on the fruit, 3b, 4e.

D. To the Crown and Main Root.

1. The interior bored out.
 - a.* By a small reddish caterpillar, with sixteen legs, 1c.
 - b.* By a small, white, footless grub, with brown head, 1cd, 2bc.
2. The substance gnawed and perforated.
 - a.* By a hard, straight, slender, cylindrical larva (wire-worm).
 - b.* By white grubs four or five times as long as wide, with abdomen at least twice as long as head and thorax, and with tip of body swollen, rounded, and smooth, 1ab, 3e.
 - c.* By small white grubs not more than one fifth of an inch in length, about twice as long as wide, with abdomen but little longer than head and thorax, and with tip of body not swollen or smooth, 1af, 1ede.

E. To the Fibrous Roots.

1. By a hard, cylindrical, straight larva. (See above, D, 2a.)
2. By a large white grub. (See D, 2b.)
3. By a small white grub. (See D, 2c.)

CLASSIFICATION OF REMEDIAL MEASURES.

Preventive and remedial measures against insect attacks may be conveniently arranged under five general heads :

1. Methods of culture, including the preparation of the soil.
2. Barriers to progress.
3. Capture and direct destruction.
 1. Topical applications.
 2. Protection, or artificial multiplication, of natural enemies.
4. Under methods of culture we include all measures like rotation of crops, selection of time of planting, and the like, which are intended to take advantage of the insect through some fact in its structure, habits, or life history.
5. Barriers to progress may be opposed to the spread of the injurious species from place to place, or directed to preventing the individual insect from gaining access to its food or place of oviposition.
6. The capture of insects may be accomplished either directly, by hand, or indirectly, by lures and traps; and their destruction when captured may, of course, be effected in a great variety of ways, differing according to circumstances and convenience.

4. Topical applications may be either destructive or repellant, intended to kill the insect or drive it away. The destructive agencies are either in the nature of internal or external poisons,—killing by contact or by their action after being taken into the alimentary canal. The internal poisons can rarely be used except for the orders provided with masticatory mouths, which therefore bite and chew their food before swallowing it; and they are not usually available against such insects as take their food by suction through a beak or proboscis.

Under the above system of classification of remedial and preventive measures, we may now arrange, for convenient reference, the modes of resistance to the attacks of strawberry insects which have thus far been devised.

1. MODES OF CULTURE.

1a. Grass lands should sometimes be cultivated for two or three years in some hoed crop, to expel the root-eating insects which devour not only the roots of grass, but also those of strawberries. This measure is especially recommended against the various white grubs.

1b. In the vicinity of towns where gas is manufactured, the lime used in purifying the gas becomes saturated with sulphur, and accumulates as a waste product, known as gas lime. In a fresh state this is destructive to both vegetable and animal life, but on exposure to the air it is eventually converted chiefly into the carbonate and sulphate of lime, both valuable fertilizers for many soils.

The facts suggest the following procedure to free the soil from noxious insects, preparatory to a change of crops. First treat the surface to a dressing of fresh gas lime late in summer or early in autumn, and plow this under at once, and then apply a second dressing of the lime to the plowed surface. As the rain washes this into the soil, it will destroy the earth-inhabiting insects both in that part of the soil turned over and for some distance beneath. The details of this procedure are still subjects for experiment, and neither the amount to be used, nor the length of time it is necessary to leave the fresh lime in the ground before planting, have as yet been definitely ascertained. The value of this application as a fertilizer will also vary according to the character and history of the soil.

1c. Notwithstanding the utmost care against the invasions of noxious insects, occasional rotation of crops will probably be necessary, in which case the ground should ordinarily be plowed in mid-summer, after the picking of the fruit.

1d. In establishing a new plantation, it is best that the new plants should be removed from the old field as early in spring as possible, as a safeguard against the deposit of eggs upon them by noxious insects which may be hibernating in the field and awaiting the opening spring for oviposition. Occasionally it becomes necessary to take additional precautions against the transfer of the eggs of injurious species from old fields to new. For this purpose the

young plants should be set in the new field and allowed to remain until the runners have started and taken root, after which the plants first set should be dug up and destroyed. In this way the field is finally stocked with plants which have not been previously in contact with those seriously infested.

1c. As a security against the transfer of eggs of insects laid upon or about the roots of strawberry plants, it is sometimes advisable to wash these thoroughly after removal from the earth.

2. BARRIERS TO PROGRESS.

2a. To prevent the entrance of hordes of injurious insects like the army worm, the practice of plowing a furrow around the field (afterwards deepened, if necessary, with a spade) has been found efficient. The insects accumulating in the furrow may be destroyed by dragging a log of wood along it, or by digging holes at intervals in the bottom of the furrow, in which the insects will accumulate, where they may be easily crushed *en masse*.

2b. To prevent the spread of insects which are destitute of wings, and have but feeble locomotive power (like the crown-borer), it is recommended that newly established fields be separated from old by an interval of a few rods in width devoted to some other crop.

2c. As a still greater security against such invasion from without, the practice of establishing new fields at a considerable distance from the old has been found especially useful.

3. CAPTURE AND DIRECT DESTRUCTION.

3a. For some insects infesting the strawberry field, no cheaper or no more satisfactory method can be used than that of capture and destruction by hand.

3b. Sweeping back and forth along the row with an ordinary insect net is a ready means of capture available for such exposed insects as do not cling closely to the plants. It may be used to advantage for those attacking the flower and fruit at a time when less laborious measures are not allowable.

3c. For species of feeble locomotive power, which infest the leaves in summer, after the fruit has been gathered, it is a common and very useful practice to mow the field in dry weather, burning it over in a brisk wind after it is thoroughly dry.

3d. Some of the worst insects which infest the strawberry appear in the adult stage in swarms during a comparatively short period, and may then be entrapped by attracting them by lights exposed in the fields, and so arranged that the insects approaching the lights shall be caught in vessels of water. A glass lantern so suspended over a tub of water that beetles flying against the glass will drop into the water beneath, is a simple and effective device which may be depended upon to capture the May beetles and other adults of the various white grubs. If the water be covered with a film of kerosene, the insects falling into it will be speedily killed. The especial object of this

method of warfare is to destroy the adults as they emerge, or as they resort to the field to lay their eggs.

3e. As a general measure of protection, it is sometimes expedient to rake and burn the mulch and rubbish late in autumn, after insects have resorted to their winter quarters.

3f. For thousand-legs in the strawberry field, the plan of scattering slices of potatoes or other vegetables between the rows, and killing by hand late at night and early in the morning the myriapods attracted to them, has been recommended by good authority.

3g. Thick-stemmed weeds in and about the field should be destroyed if the stalk-borer is likely to be injurious.

4. TOPICAL APPLICATIONS.

4a. For all leaf-eating species occurring in summer *after the fruit is picked*, except, possibly, those which feed concealed within the rolled and curled leaves, sprinkling or spraying with Paris green or London purple in powder or suspended in water, is a feasible remedy. It must be remembered, however, that this method is of no avail against insects which do not gnaw or bite the tissues of the plant. It is recommended to destroy the leaf-eating beetles, whose young are the strawberry root-worms. For this purpose the poison should be applied during July and August. It is, of course, important that it should be used no more freely than is absolutely necessary to accomplish the end desired.

4b. Powdered hellebore is used, like the arsenical poisons mentioned in the preceding section, for the strawberry false-worm, *Emphytus maculatus*.

4c. For those species appearing exposed while the fruit is upon the plants, as well as for all those which are not provided with biting mouths, powdered pyrethrum is one of the most useful applications. This may be either dusted upon the plants, due care being taken that it shall reach both the under and the upper surfaces of the leaves, or it may be thrown in a spray of water from a hand force pump.

4d. The kerosene emulsion may be applied for the same purpose as the pyrethrum mentioned above, except that it is not available during the fruiting season.

4e. Applications of sulphur to the leaves, as well as a spray of strong soap-suds, are useful for some purposes.

4f. For subterranean larvae appearing locally, bi-sulphide of carbon or carbolic acid may be poured into small holes made in the ground, as recommended on another page under the discussion of remedies for the strawberry root-worms.

The attention of the practical fruit grower is properly concentrated on the relatively small number of insects known as positively destructive, the other species infesting his crops being regarded rather as suspicious characters

than as actual criminals. If we seek to extract the essential substance of the preceding discussion of the strawberry insects, we shall find that the really important practical measures can be briefly summarized in a few sentences.

Recollecting what was said on a preceding page, of the strawberry enemies of the first class, and analyzing the recommendations of remedies found effective against them, we shall see that the capital measures of defense are about five in number. If we apply pyrethrum, or use the hand net, or some mechanical device of similar action, for the tarnished plant bug and its allies, which attack the plant before its fruit is picked; if we poison the foliage in midsummer to kill the beetles of the root-worms, or use carbolic acid or bisulphide of carbon or its compounds, in the ground, to destroy these insects on their first appearance in the field; if we mow and burn the field in midsummer after the fruit is picked, to exterminate the leaf-rollers and other leaf-eating insects; if we change the crop occasionally, when noxious species multiply inordinately; and if proper pains be taken to prevent the transfer of the crown-borer from old to new plantations, we shall have done about all that the economic entomologist can advise against the worst enemies of the strawberry. While it is not to be supposed that the strawberry insects can be completely cleared out of an infested field, and altogether kept out afterwards, it is certain that where noxious insects are numerous and destructive, the above measures of defense will be found highly profitable, considered merely as an investment of time, labor and money.

APPENDIX.

AN INTERNATIONAL EXHIBITION
OF
HORTICULTURAL PRODUCTS.

BY THE SECRETARY.

Since the public-spirited management of the World's Industrial and Cotton Centennial Exposition, to be held in New Orleans during the winter and spring of 1884-'85, have placed the entire control and care of the Department of Horticulture in charge of the Mississippi Valley Horticultural Society and its officers, and in view of the unprecedented liberality and prominence shown this department, the Secretary deems it but just and proper that a somewhat extended notice of the exhibition be given a place here.

This seems doubly appropriate since it is due to the untiring and indefatigable energy of our honored president, Hon. Parker Earle, of Cobden, Ills., that we are indebted for the liberal recognition here shown the horticultural interests. As preliminary to this notice, I first republish the following extract from an advance circular prepared and published by Mr. Earle in December last, and which was submitted to the Society at its late meeting, where his action was fully approved. After the introductory, and proper explanations of facts, which led to the adoption of the liberal schedule of premiums to be awarded in the Department of Horticulture, Mr. Earle adds:

The Exposition Managers will erect a building especially adapted to the display of plants and fruits. This Horticultural Building will be about six hundred feet long by one hundred feet wide, and will be a handsome and convenient structure, which, with the landscape embellishments adjacent, will cost \$100,000. They will, at an early day, issue a list of premiums for fruits, in medals and money, which will aggregate from \$12,000 to \$15,000.* We expect to secure an exhibit of all such fruits as will be in season at any part of the period of six months during

* The Premium List, as already published, aggregates \$25,000 in money and medal values.

which the Exposition will continue, or as can be held over by the most efficient system of cold storage. We expect these exhibits from every State and Territory of the United States; from the Provinces of British North America; from Mexico and the Central American States; and from all the important Nations of the World. The same classes of fruits from all the temperate climates of the globe, will be placed side by side for comparison. The Citrus fruits, and others of great commercial value, will be gathered from the Gulf States, from California, from the Mediterranean countries, from South America, from India, China, and the Islands of the Sea.

This exhibition will be continuous for the whole term of the Exposition, showing every fruit in its season, and continuing many kinds beyond their season by the help of cold storage. The most ample and complete cold storage facilities to be found on the Continent have been placed in control of the management by the New Orleans Refrigeration Company.

Thus it will be seen that an Industrial Fair Association has at last been found, able and willing to recognize the importance of Horticulture and the great fruit interests of this country and the world; and to provide for their exhibition in the most liberal spirit as one of the most important and attractive departments of a World's Exposition. I can not be mistaken in my belief that these generous invitations, which are wholly without precedent in the history of Fairs and Expositions, will be responded to by the fruit growers and the Agricultural and Pomological Societies of this and other countries; and that we shall see in New Orleans next winter such a varied and profuse exhibition of the pomological wealth of all nations as the most enthusiastic horticulturist has not dreamed of beholding; and which will be of incalculable benefit to the vast interests represented.

Premium lists will be issued at an early day for distribution to all interested. All inquiries and applications for space should be addressed to the undersigned, at Cobden, Illinois, U. S. A.

PARKER EARLE,

President Mississippi Valley Horticultural Society, and Chief of Department of Horticulture, World's Exposition, New Orleans.

At this date, June 1st, 1881, the Great Building for the accommodation of the Horticultural Department is rapidly approaching completion, and already applications for exhibition space are in from most of the States and from many foreign countries.

DEPARTMENT OF HORTICULTURE.

Chief of Department.....PARKER EARLE, Cobden, Ill.
Commissioner of Foreign Exhibits.....P. J. BERCKMANS, Augusta, Ga.
Superintendent of the Division of Pomology.....W. H. RAGAN, Lafayette, Ind.
Superintendent of the Division of Plants and Trees.....S. M. TRACY, Columbia, Mo.

The Premium List in the Department of Horticulture is headed by the following.

GENERAL ANNOUNCEMENT.

The Board of Management of the World's Industrial and Cotton Centennial Exposition, to be held in New Orleans during the winter and spring of 1884-'85,

hereby announce to all persons interested in Horticulture and Pomology throughout the world, that they have organized a DEPARTMENT OF HORTICULTURE, for the purpose of making the most comprehensive possible exhibition of the valuable fruits and plants of all nations.

The organization of this exhibition has been placed in the hands of a committee appointed by the Mississippi Valley Horticultural Society, consisting of Mr. Parker Earle, of Illinois; Mr. P. J. Berckmans, of Georgia; and Mr. Chas. W. Garfield, of Michigan. The schedule of premiums herewith offered has been prepared by this committee. The complete organization and management of this department will be under the control of the officers named above.

The management expect to secure an International Exhibition of Fruits and Plants, which will be of the greatest value to all of the vast interests connected with Horticulture. To provide proper facilities for so important an exhibition, they are now erecting a large and beautiful Horticultural Building, or Conservatory, the walls and a large portion of the roof of which will be covered with glass, and specially adapted to the exhibition of both fruits and plants. This building will be six hundred feet in length, and with an average width of one hundred and fourteen feet. It will furnish table room for twenty-five thousand plates of fruit, and forty thousand feet of space for the exhibition of plants. Apartments with suitable heating arrangements for the care of green-house and stove-plants will be provided.

Extensive space has also been assigned to this Department in the beautiful grounds adjacent to the Horticultural Building, for the planting of large exhibits of trees and plants. The Government of Mexico will fill five acres or more of this space; the States of Central America, the State of Florida, and it is hoped, many other States and Nations will here occupy liberal grounds in the exhibition of their sylvan and floral wealth.

The management submit herewith a varied and liberal schedule of premiums for Fruits and Plants, and tender their assurance to exhibitors from every State and Nation, that this exhibition will be managed throughout in the most liberal spirit, and with the earnest desire of securing an unprecedented opportunity for the exhibition, the study, and the comparison of a wider range and a greater wealth of horticultural products than have hitherto been gathered together.

All communications and enquiries should be addressed to the Chief of this Department, or to his assistants, as announced above. The exhibition will open December 1, 1884, and continue not exceeding six months.

E. A. BURKE, *Director General.*

This General Announcement is followed by specific rules and regulations governing the exhibitions in the Divisions of Pomology and Plants and Trees, closing with the accompanying:

SUGGESTIONS TO EXHIBITORS.

All apples, pears, and similar fruits intended for this exhibition, should be gathered as soon as fully grown and fairly colored, and while yet as firm as possible. They should be gathered with great care and laid in cushioned baskets with some soft bit of blanket between the layers. They should not be chafed or pressed in

the least degree. Each specimen should be wrapped in three or four successive sheets of soft paper. Great care should be used to prevent the breakage of stems. All the specimens of a variety should then be placed in a tough paper sack, with sufficient packing about specimens to fill out the sack and prevent the possibility of bruising. Mark the sack plainly with the name of the variety in ink; then pack the sacks containing the varieties belonging to a given exhibit together in a box or barrel, which should be well ventilated. Keep the more perishable kinds together in same packages, as far as possible. Then attach to both heads of the barrel, or both ends of the box and to the top, gummed labels, which will be furnished by the Chief of this Department upon application, and fill out the blanks thereon with the name and residence of the exhibitor, the kind of fruit and the number of varieties, and the names of varieties so far as possible, contained in the package.

If intended for cold storage in New Orleans, ship immediately to the Director General, prepaying freight or express through to New Orleans. Arrangements will hereafter be perfected for reduced rates of freight to exhibitors, of which due information will be given.

Exhibitors should immediately advise the Chief of the Department of what shipments have been made, when made, and how made, and of the numbers of the premiums to be entered for. Exhibitors should, when practicable, attend the exhibition, and open and arrange their own fruits; but when this can not be done, the Chief of the Department should be advised, and he will have the exhibits properly placed. No charge will be made to exhibitors for cold storage in New Orleans.

The New Orleans Refrigeration Company have placed apartments at the command of this Department, where an even temperature of about 35°, and a dry air, will hold fruit well without much change; but it will decay soon when taken out, and it is not desirable to place varieties which will keep well at home in this storage. The time for special displays of particular fruits, if any be decided upon, will be hereafter announced.

Believing that the reader will be interested in a detailed description of the great Horticultural Hall, we republish from the *New Orleans Times-Democrat* of a late date, the following:

A CRYSTAL PALACE THAT IS THE LARGEST STRUCTURE DEVOTED TO HORTICULTURE IN AMERICA.

As was announced in the *Times-Democrat* two or three days ago, the building committee from the Board of Management of the World's Industrial and Cotton Centennial Exposition selected the design for the Horticultural Hall submitted by Mr. Arthur E. Rendle of New York. Under the provisions of the ordinance passed by the city council, granting the use of the Upper City Park for the exposition, this building is to be permanent in its structure; so the committee, in making the selection from the plans submitted, had to satisfy an element—that of durability—not considered in the designs for the main building. The plan chosen seems to embrace all the necessary conditions—adaptability, beauty and durability—and the building, when completed, will be a striking and long-needed ornament to the city.

Mr. Rendle has entered into a contract with the Board of Management for the construction of the hall, and will use his system of glazing without putty, a system that has met with the greatest favor in England, where Mr. Rendle's brothers are owners of the patent.

The Horticultural Hall of the Exposition will be a most magnificent structure. It is to be situated about 600 feet directly south of the main building, and almost between that building and the levee. The center of the central hall will be just over the large reservoir, or cistern, that has been in the park for a number of years, and will be on the highest ground in the enclosure. In addition to being on an eminence it is finely situated in regard to the avenues and clumps of trees in the immediate vicinity, as one long avenue leads up to the central hall. Standing at the entrance to this avenue the vista ended by this hall will be highly picturesque.

The entire building will be 600 feet long and 100 wide, except at the central hall, which is made by a widening out of the building to 194 feet for a length of 100 feet. Rising above this central hall is a tower which will be nearly ninety feet high, and which, built of glass, will be the crowning glory to the structure. On each side the construction is as follows: There is a wall of eleven feet almost full of windows and ventilators; then there is a glass roof, which rises in a long slant, sixteen feet; then a perpendicular line of ventilators six feet high, and a second glass roof slanting at the same angle as the first, to a height of fourteen feet. The top of this roof forms the apex to the entire building, except at the center, where the tower rises about forty feet higher. This construction will, therefore, present to the eye a vast expanse of shining glass, which, glistening in the sunlight, will produce a gorgeous effect. Indeed, in appearance the hall will not be unlike the famous Crystal Palace at Sydenham, England, though, of course, it will not be so large. It will, however, be the largest horticultural building on this continent, and, with the extensive exhibit already in preparation for it, will make one of the most attractive structures in America.

The central hall is to be devoted to a display of rare plants and flowers, and here will vie with one another in iridescent competition the flora of Florida, Mexico, Central American countries and Louisiana. Besides the central hall one section of the building, occupying a space 250 feet long by twenty-five feet, will be used as a tropical hot-house, in which the most delicate flowers of the far South can blossom in their brilliant perfection. The space near the outer walls to a width of twenty-five feet around the entire building will be devoted to plants and flowers, while the center space will be used for the fruit display (except in the central hall as above described), and will contain room for 20,000 plates of fruit. Thus there will be no partition across the building, and the eye can traverse its entire length without interruption.

There are four chief entrances to the building, two large ones at the sides of the central hall, and two at the ends of the structure. Those at the sides are twenty-five feet in width, and are made up of double doors and ornamented woodwork, crowned with a Gothic portico. The ventilators and windows will be on the Weatherell's simultaneous opening gear process, by which fifty feet of ventilators can be opened together by simply turning a wheel. All the heating and water apparatus will be on the most modern and scientific plans; everything will be adapted

to the proper preservation and display of the plants. On the top of the roof, running from one end of the building to the other, will be an iron cresting three feet high, and appropriately ornamented, which will give a highly finished appearance to the hall.

Mr. Rendle's contract with the Board of Management calls for the completion of the building by the 15th of September, so he will begin work about the first of March, and push the construction vigorously. He is very enthusiastic over his work, and said to a reporter of this paper that in all his experience he had never seen such a perfect site for a horticultural hall, and that he intended giving the citizens of New Orleans one of which they could have every reason to feel proud. In case the city finds, after the Exposition is over, that the building is too large the building is so constructed that both its wings can be taken down and the central hall left standing, it of course being necessary to close up the gaps thus made. As all the perishable materials to be used in the work will be completely covered by the glass the system of glazing may fairly be described as indestructible.

The selection of Messrs. Parker Earle, P. J. Berekmans, W. H. Ragan and Prof. Tracy to have charge of the horticultural display has inspired horticulturists and pomologists all over the country to make active preparations for the Exposition, and it is safe to say that this department alone will attract thousands of visitors to New Orleans during the winter of 1884-5.

There are seven hundred and nine premiums offered on fruits, aggregating in value \$18,000, and two hundred and seventy-four in the division of Plants and Trees, amounting to \$7,000; a sum total heretofore unknown in the history of horticultural exhibitions.

From the Transactions of Indiana Horticultural Society for 1883.]

REPORT OF THE FOURTH ANNUAL MEETING
OF THE
MISSISSIPPI VALLEY HORTICULTURAL SOCIETY.

BY W. H. RAGAN.

[The following paper is republished here at the suggestion of members of the Society and because of the absence in Vol. I. of any notice of the exceedingly pleasant and interesting "afterpiece" to the fourth annual meeting.

SECRETARY.]

This meeting was held in the city of New Orleans, February 21, 22, 23 and 24, 1883. The importance of the meeting, saying nothing of its pleasures will not be lightly considered, when it is remembered that this was the first assemblage of its kind ever held so far South; that it embraced leading horticulturists from more than twenty States and the Dominion of Canada; that it not only included horticulturists proper, but dealers in fruits and horticultural products in many of the leading cities of our country, together with representatives of transportation companies, having the care of our fruits in transit; and that the meeting was held in a region from which we are to expect much in the way of future development in the line of horticulture.

These causes lead me to make the bold assertion, that, in point of importance, no similar assemblage on this continent has ever equaled that held in New Orleans last February.

The Society was the guest of "The Gulf States Fruit Growers' Association," an association of some years standing and of much importance to Southern horticulture, the representatives of which had made ample preparation for

the meeting, in the procuring and fitting up in handsome style, of Grunwald Hall for the occasion. This association had also arranged with the St. James Hotel for the entertainment of delegates at reduced rates. Owing to a very low rate of fare arranged for by the Illinois Central R. R. and connecting lines, most of the delegates from the North and Northwest assembled at Cairo on the morning of the 20th, where a special train of Pullman cars awaited in readiness to convey them to their destination. Six cars were thus loaded, arriving at New Orleans at 10 A. M. of the 21st. The Indiana, Ohio and part of the Kentucky délegation found it most convenient, however, to go via the Louisville and Nashville R. R. through Montgomery, Mobile, and thence to New Orleans, skirting the Gulf coast through Southern Alabama, Mississippi and Louisiana, crossing the Rigolett and entering the city from below. I shall have something to say of this interesting trip further on.

THE MEETING.

I find the incidents and scenes of this pleasant trip so full of interest to myself, and I believe they will be also to you, that I shall devote but a brief space to the meeting itself and reserve more for a glimpse at Southern scenery and Southern horticulture.

On the evening of the first day, Judge E. M. Hudson, of New Orleans, an officer, and the chosen representative of the "Gulf States Fruit-Growers Association," welcomed the Society to their city and to their hospitalities, which was responded to briefly by Hon. Parker Earle, of Cobden, Illinois, President of the Society, who then proceeded to read his *annual address*, a paper of unusual interest and embodying many valuable suggestions. Following this was a paper on the "Origin and Importance of the Mississippi Valley Horticultural Society," by Maj. S. H. Nowlin, of Arkansas. Discussions and resolutions followed, the evening session closing with the acceptance of an invitation, on the part of citizens, to take a boat excursion on the Father of Waters, the next morning.

A BOAT EXCURSION.

In obedience to this kind invitation, the Society, numbering over two hundred delegates, many of them ladies, and with few exceptions, just from the regions of icy winter, assembled on board the elegant steamer Jesse K. Bell, together with a large number of ladies and gentlemen, citizens of New Orleans, for an excursion to the orange orchards and truck farms of Maj. A. W. Rountree, situated some ten miles up the river and on the right bank. The Bell first steamed down the river entirely below the city and to a point nearly opposite the celebrated Jackson Battle Field, thence upward to her destination. The day was delightful and spring-like, and the view of the city, whose fourteen miles of river front was thus presented in panoramic view, was grand beyond description. Her busy wharves were lined with the commerce of nations, drawn hither by the rich resources of the greatest valley on earth, which here, borne on this throbbing commercial artery, meets the outer world.

Maj. Rountree's plantation consists of one hundred and seventy-five acres, seventy-five of which are cultivated in oranges and consisting of about eight thousand bearing trees. The product of these immense orchards finds its way northward. He also cultivates early vegetables very largely. We were shown forty acres of cabbage and cucumbers, tomatoes, etc., until we were bewildered, the product of which finds a market along with the oranges, where they contribute largely to the health and happiness of a people but recently strangers to such mid-winter luxuries. After a long stroll through these interesting grounds, we were called together under the grateful shade of orange trees, the fragrant bloom of which was just appearing and *lunched* after a fashion long since noted in the hospitable South, followed by toasts, etc., too tedious for mention, interrupted only by the whistle of the steamer, who impatiently awaited our reassembling, to bear us to the city and to more important work.

On the second afternoon papers were read by Hon. J. M. Smith, of Green Bay, President of the Wisconsin Horticultural Society, on "Strawberries for the North, and How to Grow Them," and by Dr. H. E. McKay, of Madison, President of the Mississippi Horticultural Society, on "Strawberry Culture in the South," followed by the appointment of committees, resolutions and a lengthy discussion on topics suggested in the papers, participated in by members from many remote sections of our country.

President O. B. Galusha, of the Illinois State Horticultural Society, entertained the meeting on the evening of the second day with an able discussion of the subject, "Is there a Better Market Berry than the Wilson?" deciding beyond doubt (in his estimation), but not to the satisfaction of all present, that there was. This paper was followed by Prof. S. A. Forbes, State Entomologist of Illinois, in an able treatise on "Insects Affecting the Strawberry," and this in turn, by that father of strawberry culture, and of strawberries (the Longfellow, Warren and others) in Southern Kentucky, A. D. Webb, in a paper entitled "The Best Strawberries for Home Use and Market."

The forenoon of the third day was taken up by the reading of letters from absent friends, many of whom were, to their great regret, prevented from being with us by the swollen conditions of all Northern streams, rendering railroad travel in many instances absolutely impossible and everywhere hazardous; in the election of officers, which resulted in the re-election of Mr. Earle President, Maj. S. H. Nowlin, of Arkansas, First Vice President, W. H. Ragan, of Indiana, Secretary, and Maj. J. C. Evans, of Missouri, re-elected Treasurer; in the reading of an able paper by Hon. F. P. Baker, U. S. Commissioner of Forestry, of Topeka, Kan., on "Irrigation in Horticulture;" by reports of standing committees, and by the reading of a paper on "Small Fruits in the South," by E. P. Roe, of New York.

The afternoon of the third day was very appropriately occupied by Pres. P. J. Berekmans, of Georgia, in a paper on "The Newer Peaches and New Fruits for the Cotton States," and by W. H. Cassell, of Mississippi, on "Pears and Pear Culture in the South," with discussions and reports of committees,

and the evening session by T. V. Munson, of Texas, on "Systematic Horticultural Progress," Pres. T. T. Lyon, of Michigan, on "Horticulture vs. Ruts," Ex-Gov. R. W. Furnas, of Nebraska, on "Forestry on the Plains," and by the presentation, without reading, of the last paper from the pen of the lamented Dr. Warder, on the "Influence of Forests on Health."

The forenoon of the fourth day the Society was engaged in receiving and discussing reports of important committees; in hearing an interesting paper by Capt. E. Hollister, of Illinois, on "Markets and Marketing," and in discussing at length the important topics presented in this practical paper. No subject presented to the meeting more fully engaged the earnest attention of members of the Society than that of transportation and marketing fruits. In this particular this meeting, in its results, gives hope of a much needed reform, as it brought together, in a true fraternal spirit, the fruit-growers, the transportation agents and the commission men, whose interests are mutual.

In the afternoon of the fourth day, Mrs. H. M. Lewis, of Wisconsin, read a very interesting paper on "Birds in Horticulture," which was followed by one equally fascinating by Mrs. D. Huntley, of the same State, on "Adorning Rural Homes." "Can we Master the Insect Enemies of the Orchard," was next treated briefly by the writer, after which an able paper by Prof. Burrill, of Illinois, on "An Orchard Scourge," was presented without reading, the author being absent.

The last session of the meeting, on the evening of the fourth day, was devoted to the reading of a paper by the treasurer, J. C. Evans, of Missouri, on "Raspberry Management and the New Raspberries;" one by D. B. Weir, of Arkansas, on the "Persimmon in Arkansas," and one by Wm. M. Samuels, of Kentucky, on the "New Apples of Value for Market," and in the reports of committees, resolutions, etc.

I have now touched briefly upon the important features of this interesting meeting, which formally adjourned on the evening of the fourth day, though in reality did not disperse for a period of as many more days, which were spent in sight seeing and observations in the South.

NEW ORLEANS.

After the close of the meeting, two days were spent in the city of New Orleans, in local excursions to points of interest. The writer's duties as Secretary of the Society prevented him from participating in some of these pleasant jaunts, though, being represented by his faithful "better-half" in most of them, he will endeavor, through his own as well as her observations, to present a faithful summary of "things seen."

The first place visited was Carrolton, a suburb of the city, noted for its gardens and conservatories. This suburb is above the city and under the levee, where the great Father of Waters begins the crescent swoop that includes the city and gives rise to her pleasant sobriquet. An attractive garden and pleasure grounds, situated near the terminus of the street railway that bore us to Carrolton, which contained many trees and plants that were

strangers to Northern visitors, was the first and principal point of attraction. Here we found growing in the open air magnolias, pittosporums, figs, oranges, yuccas, crape myrtles, agaves, cape jasmines, with many other rare plants, shrubs and trees, in luxuriant beauty, while in the conservatories were orchids and other species still more strange and interesting to us. Some of the finest residences in the city are in this vicinity, and, oddly constructed as they seemed to us, with their light airy appearance, surrounded by verandas at each story, and with that ever present accompaniment, a two or three-story cistern, the trees, shrubs and plants that adorned their surroundings were of still greater interest. The beautiful live oaks and magnolias that lined the streets and boulevards, with great agaves and yuccas crowned with gorgeous flowers, all conspired to make us feel that we were really strangers in a strange and fairy land.

The West End and Spanish fort, pleasure resorts, situated on Lake Ponchartrain, were next visited. These are some seven miles back of the city, and are reached by railways and dummy engines. These routes take us past the

CITY CEMETERIES,

Where we were again made to realize that we were truly in a strange land. Their interments are all intermural. This is a matter of necessity, just as they are forced to build cisterns and cellars above ground, for the ground is all below the level of the water in the river, so that a grave or cellar would fill with water as soon as opened. The vaults are in many instances very handsome and expensive, being built of granite or marble, and the drives, and walks and trees, and shrubbery are most attractive and beautiful. In the rear of the city and meandering along the line of cemeteries that seem to almost surround it, is a sluggish artificial stream or canal that is really the only outlet for the city sewage. The gutters in the city all lead from the river, which is the highest point, and are conducted into this canal, where the sewage slowly finds its way into Lake Ponchartrain.

Mrs. Richardson's Greenhouses, the French Market, the United States Mint, St. Louis Cathedral, Jackson Square, the Custom House, and many other points of interest, in turn, occupied our attention, but the greatest excursion of all was our return to

MOBILE AND HOMEWARD.

Prior to the adjournment of the Society, an invitation at the hands of Col. R. W. Gillespie, General Passenger Agent of the Mobile and Ohio Railroad, and in behalf of his road and the Louisville and Nashville Road, was extended to the whole Society to become the guests of the two roads in an excursion to Mobile and return, a distance of one hundred and forty miles. This generous offer was accepted, when a special train of six cars was placed at the service of the Society. At 8 A. M., on the morning of February 27th, this train, accompanied by the railroad officials and many citizens, left New Orleans for Mobile. The day was clear and bright and cool enough to make

winter wraps seem pleasant. The route skirts the Gulf coast for many miles, at times being built on piling over shallow sloughs and broad inlets, then rushing through tall reeds and swamp-grass, or, perchance, whisking through a dense forest of semi-tropical trees, whose boughs were pendant with Spanish or funeral moss and mistletoe, then gliding past a pine forest of tall and slender stems and whitened trunks, showing that the turpentine gatherer had been among them, compelling them to pay tribute to his commercial greed, now giving us a glimpse of an orange orchard, a vineyard of Scuppernong grapes, or a view of the Gulf, with her white-winged commerce.

The flora of this region was all strange and new to us. There were acres and acres covered with a dwarf palm, or palmetto, as the citizens call it, with its broad and fan-shaped foliage, contrasting beautifully with the slender needles of the long-leaved pine.

There are a few nice villages and pleasure resorts along this line, but a large proportion of the route is through dark and impenetrable swamps scarcely elevated above tide water.

As we approach Mobile we leave the coast with its salt marshes and strange vegetation and strike out through the turpentine orchards, live oaks and magnolias, with here and there a village or farm house, with its inevitable surroundings of Scuppernong grapes, orange and fig trees, broad spreading live oaks and magnolias.

AT MOBILE

A retinue of carriages await our arrival, provided by the railroads, to drive us through and around the city. We were driven for miles over shell roads, and through truck gardens of vast extent, where hundreds if not thousands of acres of cabbage and other early vegetables stood ready for the harvest and for the hungry thousands far away to the northward. This business of truck farming, as it is here denominated, is new in this region. But a few years ago cotton was supposed to be king. *King Cabbage* now holds the scepter; and, just here lies the secret of the great interest the railroads of the South are taking in a visit of Northern horticulturists. I see by a recent report, that the "garden truck," shipped northward from Mobile county growers during the last year, returned the handsome profit of \$270,000.

Some three miles back of the city our party was very pleasantly entertained, at the residence of Mrs. Augusta J. Wilson, *nee* Augusta J. Evans, the justly esteemed Southern authoress. After spending a half hour in rambling through the grounds of this beautiful Southern home, in the shade of wide spreading live oaks and majestic magnolias, and admiring the gorgeous array of roses, hibiscus, and camelias, which here thrive in the open air and grow to the proportions of respectable trees, we were invited by Mr. and Mrs. Wilson to the house, which is built after the true Southern style of architecture, large and roomy, with wide verandas and a hall extending through the middle. Here Mr. and Mrs. Wilson were personally introduced to the members of our party, and with that ease and grace for which the South has ever been noted, had a pleasant word and a smile for each.

From Mrs. Wilson's we were driven through bewildering fields of cabbage and "truck," with here and there a time-worn relic of mortal strife in the shape of earth-works and military defenses, to the cemetery, where, by the aid of the landscape gardener and the artisan's chisel, much has been done to beautify and adorn the inevitable place of "rest."

The forenoon of the second day of our stay in Mobile was spent in a railroad excursion to the company's shops, situated some ten miles from the city, where we were escorted through all the departments by Col. Gillespie. On our return to the city the train stopped at Mr. Pritchard's place, noted for its stud of fine horses and its race course. Several of the animals were brought out and we were entertained by racing on the well prepared mile track, after which we were *lunched*.

Here the Society indulged in some toasts and a series of resolutions of thanks to the L. & N. and M. & O. Railroads, whose guests we had been for days and who still had much in store for us. The afternoon was spent in a boat excursion on Mobile Bay, which, taken all together, was perhaps the most pleasant feature of the whole. At midnight of the 28th, the Indiana delegation took leave of the party, and of many pleasant associations in the South, for their Northern homes, via. the Louisville and Nashville Railroad, while the larger portion of the party remained the guests of the Mobile and Ohio road to Cairo.

I might with propriety here close this paper, already too long, but can not forbear a brief reference to a few points of interest on the line of the Louisville and Nashville Railroad.

Birmingham, Alabama, is, just now, one of the most prosperous cities in the South. Her chief industry is iron and iron manufacture. Some fourteen years ago Northern enterprise discovered rich deposits of iron; coal and limestone in close proximity, in this vicinity. A busy city of ten thousand inhabitants has since sprung into existence.

Southern Tennessee and Northern Alabama have many attractions for the fruit-grower. The climate is delightful and the soil is much better than I had expected to find. The great lack here, as it is in many other places in this world, is with the people. Their system of agriculture is poor, and as for horticulture, that should be the leading interest in a region so bounteously blessed in many respects, there is but little to be seen. A few neglected apple and peach orchards, however, appear, as an index, both to nature's kindness and man's neglect. The hill regions of Northern Tennessee and Kentucky were passed in the night, which fact will, of course, prevent an intelligent mention here. The vicinity of Bowling Green, Ky., is growing into notoriety as a small fruit region. Some intelligent, practical fruit-growers are located here.

THE EFFECTS of this trip South, aside from its pleasant reminiscence, can not be other than good. Perhaps no single incident since the war has been productive of more real good in soothing the harsh feelings of sectional strife, and planting more deeply the true olive branch of peace, than has this

most unostentatious visit of Northern horticulturists, and they were most graciously met in their true peace mission by the people whom they visited. Everything that it was possible for them to do to make us realize that we are, in reality, one people, with one destiny and with but one great commercial interest, was done. They directed our attention to their genial climate, to their rich resources yet undeveloped and to the fact that they recognized in the people of the North that enterprise and genius that they so much needed and which they urgently solicited to seek investment in the Sunny South.

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