U. S. Geological Survey.
Chas. D. Walcott, Director
Henry Gannett, chief Topographer.
E. M. Douglas, Topographer in charge.
Triangulation by A. H. Thompson.
Topography by W. H. Herron & J. D. Doyle.
Surveyed in 1895.

Longitude Trinidad 104° - 30'; Lat 37° - 10'

Altitudes:

Trinidad 6000
Hoehne 5705
Aguilar 5673
Tyrone 5520
Van Brunt Canon 5250
Cuming Arroya "
Purgatoire Canon - north bank 5500; bottom 5250
Barela 5738; Trinchera Station 5803
Mouth of Trinchera Creek - 5500 on bluff; 5250 bed.
Trujola creek near mouth 5500 ft
Raton Mesa - due south of Barela, 8750 ft
" " E of south of Trinidad 9250 ft

Nut trees mentioned as bearing.—P. 41

# ANNUAL REPORTS

OF THE

# Colorado State Horticultural

AND

# Forestry Association,

FOR THE

YEARS 1887–88.

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VOLUME IV.

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DR. ALEXANDER SHAW, SECRETARY.

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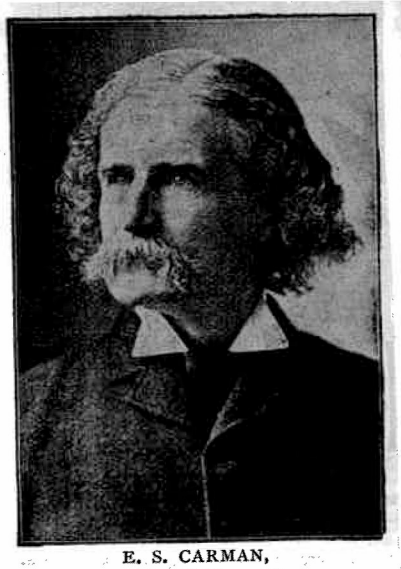
DENVER:
COLLIER & CLEAVELAND LITH. CO., STATE PRINTERS.
1888.



E. S. CARMAN,
*Editor Rural New Yorker.*

DENVER, COLORADO, May 27, 1888.

HON. JAMES RICE,

*Secretary of State:*

*Sir*—In compliance with the law, I have the honor of submitting herewith the report of the Colorado State Horticultural and Forestry Association, with supplimentary papers for 1887 and 1888.

Respectfully yours,

ALEXANDER SHAW,
*Secretary.*

## OFFICERS FOR 1888.

PRESIDENT,

A. E. GIPSON, Greeley.

VICE-PRESIDENT AT LARGE,

GEORGE H. PARSONS, Colorado Springs.

SECRETARY,

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| | | |
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| COSTILLA | COL. CHARLES JEHU | ------ |
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| CHAFFEE | ALEX. G. WATSON | Buena Vista. |
| DOUGLAS | HON. L. W. WELLS | Castle Rock. |
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| FREMONT | JOHN GRAVESTOCK | Cañon City. |

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| SUMMIT | HON. B. F. MONTGOMERY | Breckenridge. |
| SAGUACHE | J. W. TAYLOR | ------ |
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| WELD | O. H. GALLUP | Greeley. |

## STANDING COMMITTEES, 1888.

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JAMES ACKERMAN . . . . Hygiene.

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PROF. ELWOOD MEAD . . Fort Collins.
EDWARD EASLY . . . . . Golden.

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---

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David Brothers . . . . . Denver
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Wm. C. Miller . . . . . Denver
A. S. Osburn . . . . . Denver
Nelson Millet . . . . . Denver

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| Brown, H. C. | Denver |
| Bird, F. E. | Denver |
| Braun, G. J. | Denver |
| Crawford, R. T. | Colorado Springs |
| Corning, Geo. C. | Denver |
| City National Bank | Denver |
| Craig, Rev. W. B. | Denver |
| Craig, Mrs. W. B. | Denver |
| Clark, J. M. | Denver |
| DeVinney, V. | Jefferson County, P. O. Denver |
| Davis, William | Denver |
| Ellsworth, L. C. | Denver |
| Frazier, Jesse | Florence, Fremont County |
| Grimes, David S. | Denver |
| Gallup, Avery | Denver |
| Gallup, C. R. | Denver |
| Hanna, J. R. | Denver |
| Hallack, Mrs. Charles | Denver |
| James, Robert | Denver |
| Kountz, C. B. | Denver |
| Lane, John H. | Denver |
| Lee, Henry | Jefferson County, P. O. Denver |
| Lessig, W. H. | Denver |
| Londoner, Wolfe | Denver |
| Lower, John P. | Denver |
| McClure, Mrs. Kate B. | Denver |
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| Marquis, Robert | Denver |
| Moulton, Thomas | Denver |
| Newcomb, J. H. | Denver |
| Newcomb, Mrs. J. H. | Denver |

Peabody, A. L. . . . . Grand Junction, Mesa County
Peabody, Mrs. A. L. . . Grand Junction, Mesa County
Pitkin, Ex-Gov. F. W. . . . . Pueblo
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Rushmore, H. . . . . Denver
Richardson, George . . . . . Argo
Shaw, Dr. Alex. . . . . Denver
Short, Prof. S. H. . . . . Denver
Van Camp, J. M. . . . . Denver
Wolf, H. G. . . . . Denver
Wolf, Mrs. H. G. . . . . Denver
Wood, S. N. . . . . Denver
Wolcott, E. O. . . . . Denver
Wade, Samuel . . . . . Paonia
Dana, F. A. . . . . Denver

## HONORARY MEMBER.

Brackett, G. C., Sec. Kansas State Horticultural Society.

# CONSTITUTION

OF

# Colorado State Horticultural

AND

# FORESTRY ASSOCIATION,

AS AMENDED AT ANNUAL MEETING,

JANUARY 13, 1888.

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SECTION 1. This Association shall be called the COLORADO STATE HORTICULTURAL AND FORESTRY ASSOCIATION, and shall have for its objects the promotion of horticulture, pomology, arboriculture and floriculture.

SEC. 2. This association shall hold its regular annual session, beginning on the second Thursday in January of each year, at 10 o'clock a. m., at such place as the President may designate, for the purpose of electing its officers, and the transaction of such other business as may be necessary, and it shall also hold such other meetings as the interests of the Association may demand, at such time and place as the Executive Committee may designate, and seven members shall constitute a quorum for the transaction of business.

SEC. 3. The officers of the Association shall consist of a President, a Vice-President at large, a Secretary and Treasurer, who shall be elected by ballot, and a majority of the votes cast shall be necessary to an election; also, a Vice-President from each of the counties of the State interested in the promotion of the objects of the Association, who may be elected by the Association at its annual meeting, or by the Executive Committee.

SEC. 4. The President of any District or County Horticultural Society, of this State, shall be *ex officio* Vice-President of this Association, and shall have all the rights and privileges of regular members.

SEC. 5. The President, Vice-President at large, Secretary, Treasurer and three other members, to be elected at the annual meeting, shall constitute an Executive Committee, charged with the general supervision of all matters of interest to the Association during the interim of meetings, with power to act in all cases of emergency, and a majority of the committee shall constitute a quorum for the transaction of business.

SEC. 6. The Association shall contract no debts, unless by a two-thirds vote of members present at any regular or called meeting.

SEC. 7. The written acceptance of an officer elected, filed with the Secretary, shall be considered as qualifying.

SEC. 8. The Treasurer shall give bond in such sum as may be fixed and accepted by the Association at any annual meeting.

SEC. 9. The Association shall, in every proper way, encourage and assist in the organization of County and District Societies.

SEC. 10. The Association may, at each annual meeting, offer premiums for essays on such subjects as may

be determined on, such essays to be read before the next annual meeting, and immediately after reading, the premiums to be awarded by a majority of the members present.

SEC. 11. Representatives from organizations formed in the interest of horticulture, shall be admitted to all the rights and privileges of members upon certified credentials and without payment of membership fees, upon the following basis: Town Societies, one representative; County Societies, two representatives; District Societies, three representatives.

SEC. 12. The Association may adopt at any meeting such by-laws, rules and regulations as a majority of the members present may determine, not inconsistent with this Constitution.

## BY-LAWS.

SECTION 1. The officers of this Association shall hold their respective offices until their successors are elected and qualified.

SEC. 2. The first business of each meeting shall be the reading and approving of the minutes of the previous meeting.

SEC. 3. The payment of one dollar shall constitute an annual membership, which shall cease on the day preceding the first day of the annual meeting in January. Ten dollars paid at any one time shall constitute a life membership.

SEC. 4. The Secretary shall solicit from each Vice President of the several counties, such reports as have immediate connection with the condition of horticul-

ture, pomology, arboriculture and floriculture, and such other information as may pertain to the interest of the Association, and he shall report the same to the Association. The President shall appoint a standing committee on each of the following subjects, who shall make an annual report at the January meeting: Committees—Meteorology in its relations to Horticulture, Entomology, Ornithology, Geology, Forestry, Pomology, Vegetable Culture, Floriculture and Ornamental Gardening.

SEC. 5. No money shall be drawn from the treasury except upon orders signed by the President and countersigned by the Secretary.

SEC. 6. It shall be the duty of the President to preside at all meetings, sign all orders upon the Treasurer, act as *ex officio* chairman of the executive committee, and sign all approved records; and in his absence the Vice-President at Large shall perform his duties.

SEC. 7. It shall be the duty of any one of the County Vice-Presidents present to preside in the absence of the President and Vice-President at Large, and to furnish such information as may be solicited by the Secretary.

SEC. 8. It shall be the duty of the Secretary to keep a record of all proceedings of the Association, receive all moneys and pay the same to the Treasurer, and take his receipt therefor; countersign all orders upon the Treasurer, and deliver to his successor in office all books and papers in his possession belonging to the Asssociation; and he shall receive such compensation as may be allowed by the executive committee.

SEC. 9. It shall be the duty of the Treasurer to keep all moneys belonging to the Association, and to

pay out the same only upon the order of the executive committee, signed by the President and countersigned by the Secretary. And he shall make a report of the financial condition of the Association at its annual meeting, and at the expiration of his term of office deliver to his successor in office all moneys in his hands belonging to the Association.

SEC. 10. It shall be the duty of the executive committee to audit all bills, and in the interim of the meetings of the Association, to take such official action as in their judgment may promote the objects of the Association, and report their action to the next succeeding meeting; and they may call a special meeting at any point of the State desired, by giving twenty days' notice.

SEC. 11. The records of this Association shall at all times be open to inspection by any member.

SEC. 12. These By-Laws may be altered or amended at any regular meeting, by a vote of a majority of the members present.

# FOURTH ANNUAL REPORT

OF THE

# Colorado State Horticultural Society,

## FOR 1887,

CONTAINING THE PROCEEDINGS OF THE

## SEVENTH ANNUAL MEETING,

HELD AT

DENVER, COLO., JAN. 12, 13 AND 14, 1887.

---

## OFFICERS FOR 1887.

PRESIDENT,
A. E. GIPSON, Greeley.

VICE-PRESIDENT AT LARGE,
GEORGE W. WEBSTER, Hygiene.

SECRETARY,
NELSON MILLETT, Denver.

TREASURER,
WM. DAVIS, Denver.

EXECUTIVE COMMITTEE,
PROF. JAMES CASSIDAY, Fort Collins.
GEORGE H. PARSONS, Colorado Springs.
MRS. A. GALLUP, Denver.

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W. H. Davis, M. D. . . . . Denver
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Mrs. David Brothers . . Jefferson County, P. O. Denver
W. A. Helm . . . . . Cañon City
Dall Deweese . . . . . Cañon City
A. E. Gipson . . . . . Greeley
E. Millison . . . . . Denver
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Nelson Millett . . . . . Denver
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M. B. Townsend . . . . . Denver
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Mrs. W. L. Porter . . . . . Greeley
Stark Nurseries . . . . . .
Lalkeld Smith . . . . Jefferson County, P. O. Denver
Mrs. Martha A. Smith . Jefferson County, P. O. Denver
Allen Lewis . . . . . Golden
Mrs. A. L. Washburn . . . . . Loveland
John Tobias . . . . . Denver
G. W. Webster . . . . . Hygiene
P. D. Goss . . . . . Loveland
Elwood Easley . . . . . Golden
Mrs. Elwood Easley . . . . . Golden
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Mrs. T. R. Burch . . . . . Denver
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Mrs. Levi Booth . . . . . Denver
R. A. Southworth . . . . . Denver
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Mrs. O. H. Harker . . . . . Denver
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Mrs. W. H. Reynolds . Jefferson County, P. O. Denver
F. G. Wilmore . . . . Jefferson County, P. O. Denver
Platt Rogers . . . . . Denver
B. K. Walker . . . . . Highlands, Denver
Prof. James Cassidy . . . . . Fort Collins
M. Hodgson . . . . . South Pueblo
John G. Dingwall . . . Jefferson County, P. O. Denver
Ira A. Scott . . . . . Denver
J. W. Eastwood . . . . . Rocky Ford
R. J. Cory . . . . . Denver

## LIFE MEMBERS.

Berry, John . . . . . Denver
Ball, J. J. T. . . . . Denver
Brown, H. C. . . . . Denver
Bird, F. E. . . . . Denver
Braun, G. J. . . . . Denver
Crawford, R. T. . . . . Colorado Springs
Corning, George C. . . . . Denver
City National Bank . . . . . Denver
Craig, Rev. W. B. . . . . Denver
Craig, Mrs. W. B. . . . . Denver
Clark, J. M. . . . . Denver
Cornforth, J. T. . . . . Denver
De Vinney, V. . . . Jefferson County, P. O. Denver
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Ellsworth, L. C. . . . . Denver
Frazier, Jesse . . . . . Florence, Fremont County
Grimes, David S. . . . . Denver
Gallup, Avery . . . . . Denver
Gallup, C. R. . . . . Denver
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Hallack, Mrs. Charles . . . . . Denver
James, Robert . . . . . Denver

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Lane, John H. . . . . Denver
Lee, Henry . . . . Jefferson County, P. O. Denver
Lessig, W. H. . . . . Denver
Londoner, Wolfe . . . . . Denver
Lower, John P. . . . . Denver
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Moore, Rev. D. H. . . . . Denver
Marquis, Robert . . . . . Denver
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Peabody, Mrs. A. L. . Grand Junction, Mesa County
Pitkin, Ex-Gov. F. W. . . . . Pueblo
Pierce, Gen. John . . . . . Denver
Rushmore, H. . . . . Denver
Rushmore, Frank H. . . . . Denver
Richardson, George . . . . . Argo
Shaw, Dr. Alex. . . . . Denver
Short, Prof. S. H. . . . . Denver
Short, Mrs. S. H. . . . . Denver
Shiff, G. C. W. . . . . Denver
Swan, W. S. . . . . Denver
Van Camp, J. M. . . . . Denver
Wolff, H. G. . . . . Denver
Wolff, Mrs. H. G. . . . . Denver
Wood, S. N. . . . . Denver
Wolcott, E. O. . . . . Denver
Wade, Samuel . . . . . Paonia

# PROCEEDINGS

OF THE MEETING OF THE

# State Horticultural Society,

HELD AT

## DENVER, COLO.,

JANUARY 12, 13 AND 14, 1887.

The Society convened for its Seventh Annual Meeting at 9:30 a. m., January 12, 1887, in the hall of the Denver Chamber of Commerce and Board of Trade, which had been kindly placed at the disposal of the Society for that purpose. Tables had been arranged upon which an extensive exhibit of fruit was displayed. This being the first fruit exhibit given by the Society at its annual meeting, it attracted a great deal of attention during the session, and was pronounced by all visitors a most creditable display, and one worthy of a much older State. It embraced about a hundred varieties of apples, besides many varieties of small fruits in jars. The meeting was called to order by the President, A. E. Gipson, of Greeley.

The first business was the reading of the Secretary's financial report, as follows:

RECEIPTS.

| | |
|---|---|
| Received of J. M. Clark, former Secretary | $ 3 75 |
| Twenty-one annual memberships @ $1.00 | 21 00 |
| Nine annual memberships (ladies) @ 50 cents | 4 50 |
| Unexpended balance of amount deposited for costs in Supreme Court | 15 00 |
| Total | $ 44 25 |

DISBURSEMENTS.

| | | |
|---|---|---|
| Paid William Davis, Treasurer | $ 15 25 | |
| Paid for postage | 4 00 | |
| Expressage on reports of our own and other State societies | 6 60 | |
| Boxing reports | 75 | |
| Drayage | 1 50 | |
| One-half ream legal cap for reports | 1 80 | |
| One thousand letter heads | 4 00 | |
| Bill of *Colorado Farmer*, printing programmes, 1886 meeting | 3 25 | |
| Incidentals | 30 | |
| Total | | $ 37 45 |
| Balance on hand | | $ 6 80 |

The report of the Treasurer then followed, as follows:

Report from January 15, 1886, to January 12, 1887:

RECEIPTS.

| | | | |
|---|---|---|---|
| January 15, 1886. | Balance on hand at last report | $ 3 05 | |
| January 26, 1886. | Cash from Secretary Millett | 15 25 | |
| Total | | | $ 18 30 |

DISBURSEMENTS.

| | | | |
|---|---|---|---|
| January 30, 1886. | To J. M. Clark on order | $ 10 00 | |
| Total | | | $ 10 00 |
| Balance on hand | | | $ 8 30 |

On motion of Dr. Shaw the foregoing reports of the Secretary and Treasurer were referred to the executive committee.

The Society then listened to the reading of the following paper:

# The Fruits of Fremont County.

W. B. FELTON, Cañon City.

Sometime last month Mr. Nelson Millett, the Secretary of this Society, informed me that he had been unable to arrange for but little from Fremont county for this meeting and, as he said, it is claimed that the Arkansas Valley has superior merit as a fruit region, he desired to have it represented in the published report of this annual meeting of the State Horticultural Society, and he

assigned me the subject I have taken for this paper. As to the assertion that we claim superior merit for Fremont county as a fruit region, I will say that while it has generally been conceded that in many portions of the northern part of the State small fruits do equally well as in our more southern latitude, it is the general opinion with us that the fruit will do better in our locality. It may be, however, that time, "the Great Evener of all things," will convince us of our error in that respect. The excellent exhibition of apples and other fruit at the Exposition in October, and the reproduction, in part, of the same display now before us, certainly demonstrates the fact that tree fruit can be successfully grown in Arapahoe, Jefferson, Boulder, Weld and Larimer counties. But as it is my purpose to speak of the fruits of Fremont county, rather than to attempt a comparison with other sections, I will proceed to the consideration of my subject.

The fruits successfully grown in Fremont county are apples, pears, plums, cherries, grapes, strawberries, raspberries, blackberries, currants and gooseberries. About all varieties of apples do well, and I know of no more uncertain variety than the crab. The idea that crab apples only could be grown in Colorado, seems to have imbued the minds of nearly everybody who set out apple trees twelve or more years ago in this State. But this idea has been exploded. The fact that the crab blooms late in March, or early in April, making it liable to be nipped by the late frosts that generally come about the middle of April, make the crab a more uncertain bearer in our locality than most any other kind of an apple tree. I believe that Jessie Frazier has about one hundred varieties of apples, all of which do well. With such a wide range of varieties doing well, it may safely be said that about all varieties will do well—that is, that the trees will live

and grow well, and bear according to their nature. Of course there are varieties more profitable than others to grow, and each fruit grower will select such varieties as his experience or his fancy may dictate.

Pears do remarkably well in Fremont county. My experience is that there is a greater loss in pear than in apple trees, in transplanting, but that after a pear tree has once got a good hold upon life after having been set out, it is as healthy and as hardy as an apple tree. The liability of the pear to bloom before the late frosts in spring, is the only uncertainty about its being as reliable for a crop as an apple tree. The plum tree is more tender than either the apple or the pear, and consequently we are confined to the more hardy varieties. Of cherries, only the hardy, sour varieties have so far been successfully grown. The sweet varieties winter-kill. Peaches and apricots have been grown, but there is too great uncertainty about their bearing to consider them in with our list of fruits. In 1878, 1879 and 1880, there was a fair crop of peaches, since when there has been but very few. There will probably be yet other years when peach trees will bear with us, but I should judge that in some other section of the State the culture of peaches would be more certain than with us. The winters are too warm, starting the buds prematurely, only to be nipped later in the season. Grapes of all varieties do well. Of what we call the native varieties, nearly all kinds do well without any winter protection. The California varieties need to be covered in winter, and being so protected, bear enormously. Of the native varieties, the Concord is most extensively grown, but the Hartford Prolific, Moore's Early, Brighton, Pocklington, Vergennese, Walter, Catawba, Prentiss, Dutchess, Lindley, Elvira, Worden, Salem, Iona, Agawam, August Giant, Early Victor, Jefferson, Niagara and other varieties are suc-

cessfully grown. Of the California varieties, the Black Hamburgh, Flaming Tokay, Golden Chlessales, Muscatel, Rose of Peru, Whitewater, Missini and other varieties grow to perfection and bear profusely with the winter protection before mentioned. Strawberries are a sure crop every year, and yield very abundantly. They do fully as well without mulching in the winter as with it. Blackcap Raspberries do well without winter protection. Red raspberries and blackberries will bear about half of the year, without being covered in winter, but to be sure of a crop it is necessary to cover them. Currants and gooseberries do well.

My first personal observation of the fruit of Fremont county was in September, 1879, while on a visit to Cañon City. I visited the orchards of W. A. Helm, Anson Rudd, W. C. Catlin and went down to Florence and saw Uncle Jesse Frazier's boss orchard of the State. I was astonished and delighted with the show of fruit, it exceeding any I had heretofore seen in any country. Frazier had about three thousand bushels of apples that year, and has not had less any year since. The past season his crop was estimated at ten thousand bushels. I was so impressed with the fruit capabilities of that section, that in the spring of 1881 I set out one thousand apple trees, three hundred pear trees, quite a number of plum, cherry and peach, about twelve hundred grape vines, and a quantity of all the small fruits. Experienced nurserymen who have annually visited orchards in most of the western states, and such experienced fruit men as Dr. Alexander Shaw, say they never saw a finer growth of trees in any orchard of its age in any State.

Up to the present time we have not been annoyed by many of the ills that fruit is heir to in most other fruit localities. The trees are all healthy and make a strong

vigorous growth. The pear blight is unknown, our plum trees have not been attacked by the curculio, there is no mildew or other disease upon our grape vines. The coddling moth, however, has made its appearance, and the apples in some localities are quite wormy. Means will have to be taken to destroy the coddling moth or the value of the apple crop will be much impaired. As to the quality of fruit; apples are good—better than in many localities where they are grown; the small fruits are all excellent, and, in my opinion, the pears and grapes are of a very superior quality. It would seem that our soil and climate is just right to produce pears and grapes in the highest degree of perfection. The grape crop is a very sure one; not that it is equally large every season, but there are no seasons when it is a failure. The pear crop is more uncertain, as the buds are sometimes started prematurely by an unseasonable warm spell, yet as that is the only drawback to the culture of pears, and the seasons when they will be a failure are only exceptional, we believe pear culture will be very largely engaged in and be among the most profitable fruits grown. Hon. Jas. A. McCandless, our present State Senator, has at Florence, four pear trees that were set out nearly twenty years ago. They never fail having a large crop, and this last season averaged about twenty-five bushels to the tree.

With the exception of Mr. Jesse Frazier, no one in Fremont county, up to the spring of 1881, had engaged in fruit as a business. Messrs. Rudd, Helm, Catlin, Rockafellow, and others, had more or less trees and patches of small fruit about their home residences, and that was all. In the spring of 1881, quite a step was taken in the way of setting out orchards and vineyards, which has been continued annually, until now a close calculation shows that there are about six hundred and

fifty acres set with fruit of all kinds in Fremont county; and should the coming season prove to be favorable many of the orchards and vineyards set in 1881 and 1882 will be in pretty full bearing.

Considering the healthfulness of the trees, vines and shrubs, the large quantity of fruit borne by them, and its excellent quality, together with the fact that good prices can always be obtained, I consider the culture of fruit in Fremont county one of the most profitable enterprises, as well as one of the most pleasant occupations one can engage in. To many of us who came to Colorado in the early days of its settlement, the achievements in fruit raising already accomplished, are astonishing, but they only forecast the possibilities of the future.

It is said that in the early days a man met a friend leaving the country. Inquiring why he was leaving, the friend replied, "he didn't want to live in a country where dried apples were a luxury." The day is not far distant when fruit—fresh, juicy, wholesome fruit, will be raised here in almost sufficient quantities to supply all the needs of the people of our prosperous Centennial State.

MR. DE VINNEY: There are several varieties of crabs which blossom as late as the standard apples, and which should be planted instead of the Transcendent, which should never be planted in Colorado. The Golden Beauty of Paradise is among the late bloomers.

MR. JOHN TOBIAS: The Hyslop also is later than the Transcendent.

MR. WM. DAVIS recommended the Whitney No. 20.

MR. DALL DEWEESE, of Cañon City, recommended the Hyslop, Lady Elgin and Whitney No. 20.

The Quaker Beauty was also recommended.

PRESIDENT GIPSON: There is as much difference in crabs as in standard apples. Some are early and some later, but none open to serious objection except the Transcendent, and that is desirable for shade owing to its vigorous growth. I would recommend the Martha, Hyslop, Whitney No. 20, Sweet Russet, Florence, Tilfa Sweet, Briar Sweet, Shields and others that are free from the objection of early blooming. I know no apple superior in flavor to the Sweet Russet. These trees being hardy, should be planted in the severest climates of our State. The fruits are valuable for many purposes, and they should not be discarded.

DR. SHAW: How many seasons have you failed of fruit in Fremont county?

MR. DEWEESE: Never in five years, although for the last three years we have not had a full crop.

MR. ELWOOD EASLY: Does the Ben Davis bear two years in succession?

MR. DEWEESE: Not as a rule, although when the fruit is thinned out it does.

MR. EASLY: When my Transcendents were about as big as peas they froze and dropped off. Soon afterward they put out new bloom and I had a crop. Has anyone had a similar experience?

MR. DAVIS: I have.

DR. SHAW: Have we not enough standard apples without growing crabs?

MR. DEWEESE: There are some uses of crabs for which they are superior to anything else—for instance, cider jelly, etc.

MR. C. S. FAUROT, of Boulder, President of the Northern Colorado Horticultural Society, then read the following paper:

# Small Fruits for Northern Colorado.

*Mr. President and Members of the Society,*

*Ladies and Gentlemen:*—When your worthy Secretary requested me to prepare a paper for this meeting, and left it for me to choose my own subject, I thought I would choose something easy, and therefore chose the subject of small fruits for Colorado. Little did I think of the magnitude of the subject or the job I had willingly tried to perform, and I hope you will bear with me and not blame me if I do not write in full on all the small fruits now in cultivation in this great State of ours, where the cultivation of the small fruits is getting to be of such magnitude as it is at the present time.

We will notice first, the strawberry, as this is the first fruit we have. First the ground should be thoroughly ploughed, the deeper the better. The strawberry is more uniformly successful in all soils than any other fruit; it appears more at home, provided plenty of manure has been applied, than any other plant we cultivate. Strawberries should be set on land that can be irrigated without much trouble, as water is a very essential part of its cultivation. After the ground has been thoroughly cultivated, so that all seeds of red and white clover and the many other grasses that are so numerous, have been destroyed, lay the ground off by running a small plough through, making the furrows three and one-half feet apart, setting the plants one foot in the rows; run the rows north and south if you can, and set the plants under the shade of the ground thrown up by the plough; this will protect the young plants from the hot afternoon sun, and they will be more apt to live thus protected. Never allow the ground to become dry after you begin to irrigate as this is sure death to the young plants. If the vines have been set in early

spring it will not be necessary to irrigate them as soon as they are set. In selecting plants be very careful to have nice yellow or young roots, for plants with an old or black root are of no account, and your time will be thrown away in setting such plants. It may not be known to some of us, that nearly all plants are bisexual. Most plants are perfect, or that is, plants that have both stamens and pistils perfect in all the flowers; the Wilson, Sharpless, James Vick and Captain Jack are of this class and are perfect flowering, while in the Manchester and Crescent the stamens are abortive or wanting, and such berries are called Pistillate. The pistils are the female part of the flower; they spring from the seeds, one from each seed, and are about half an inch long, and are found in the center of the flower. Such flowers as those of pistillate berries, like the Manchester and others, will not bear fruit unless a staminate plant, such as the Wilson, Captain Jack or Sharpless, is planted near to fertilize them. This is done by the stamens of the flowers. These stamens produce a kind of yellow dust, called pollen, and when the bees and other insects in search of honey, crawls over the flower, some of the pollen clings to the bee and is lodged on the pistils of the flower; the flower is then perfected. A portion of the pollen which still adheres to the bee is carried to those plants which are deficient in stamens, and hence, also, in pollen, when at once the same fertilization takes place as it did in the former case; so you can see if it was not for the bee and other insects and the stamen of the perfect blossoms of the staminate berries, the pistilate berries would be barren and would not produce under any circumstance. Such varieties often fail to produce fair berries for want of a sufficient number of perfect flowering varieties near them. When planted four to one, or in that ratio, the fertilization will be complete and an abundant crop of perfect berries will

be produced. The question may be asked, "why plant pistillate kinds at all?" We answer, many of the pistillate berries are the most productive and valuable varieties, and when properly fertilized, are by far the most profitable.

I will not, at this time, enter into a detailed discussion of cross-fertilization of the strawberry, as that will take up too much time, but I should like to call your attention to a few facts. In setting staminates and pistillate varieties of strawberries together, if the one is a soft berry, such as the Crescent, which is a pistillate, use a staminate, such as the Wilson, for a fertilizer, as it will have a tendency to make softer berries more firm; and in setting late varieties, such as the Manchester, use a late variety as a fertilizer, the James Vick or Captain Jack are good; but I would not advise setting the Sharpless, which is a staminate, to fertilize any variety, as it will make the berry thus fertilized soft. The strawberry wants two things in abundance, manure and water; the ground cannot be made too rich and productive; potash and phosphate, especially potash, are specific manures for strawberries, they never seem to know when they get enough of them; barnyard and stable manure contain them all, and can safely be used in any quantity; the more you use of them the more the profit will be, the last load in all cases paying better than the preceding one; the proper time for application is, when used largely, before the plants are set; when there is a scarcity of stable and barnyard manure, the various potash salts are next in value, when applied with bone-dust; the bone-dust can be sown broadcast, after setting the plants, but before is preferable; the use of potash fertilizer after setting must be in small quantity, say two or three hundred pounds per acre; by this manner of applying the potash salts, all danger of burning the plants by them will be avoided; gypsum will make the

berries of lighter color but will not affect the firmness; where a rapid growth of the berry is desired the application of two hundred pounds of nitrate of soda per acre a week or two previous to ripening, will greatly increase the size of the berry, but at the expense of the firmness; varieties that have large foliage, like the Manchester and Kentucky, will be greatly increased in foliage and will ripen poorly, while those of moderate sized leaves, like the Wilson and Jucunda, will be benefitted by it, the leaves will be increased in size that the berries will be better shaded, the nitrate of soda also is valuable in dry weather.

The question of irrigation is a very great one, and there is such a vast difference of opinion on this subject I will not stop to discuss it at this time, but will say let every man study the nature of his soil and use water as his best judgment may dictate. We all know that a heavy clay soil will not require as much water as a light sandy soil, but I do not think you can use too much water during the fruiting season, and I would recommend giving the bed a light irrigation every other day, provided the ground has a natural drainage.

I will not, at this time, take up the subject of varieties. Our country is so large, the climate so varied, and with such a diversity of soil, and the vast numbers of varieties, and the wants and tastes of the people so different, that I could not recommend a list that would suit all. I am often amused to hear berry growers who plant largely in the same vicinity, differ so widely as to the varieties grown. "When doctors differ, who shall decide?" All we can do is to try the different varieties and find out what will succeed best on our soil. No theory will be of use. Practical experiments only will decide it to the satifaction of the grower. I am growing strawberries on heavy clay, and I find for that kind of soil the

Manchester, Jucunda and Wilson are the most profitable. And I also have strawberries grown on sandy loam, and I find I can grow a good many varieties there that I cannot grow on heavy soil. The Crescent, James Vick, Captain Jack and Parry, do well on light soil.

The next fruit that we will consider on the list of small fruits, will be the currant. It is one of the oldest fruits in cultivation, as its origin dates back several hundred years, and of all our fruits it has had more ups and downs than any other. It has been kicked about from place to place, and if we have a piece of ground that is too wet for anything else, we plant currants on it; or if, on the other hand, it chances to be too dry for anything to grow on, we plant currants on it; or if there is a stone wall we want to decorate we plant currants for that purpose, and then blame it for not prodncing a good crop. What the currant wants and must have in order to be grown successfully, is a cool, moist, rich soil. Then it will bear wonderful crops and will, I think, compare favorably with any of our crops of small fruits that we grow for profit. There are many different ways of propagation—by using the green wood cutting, ripe wood cuttings, layering and dividing, but I would recommend propagation by cuttings. Cut the wood in the fall after it has become thoroughly ripe, and bury in the ground where they will be free from frost, as freezing will injure them. Plant them in the open ground in the spring and keep free from weeds, as this is very essential if you want a good growth. The varieties which have given the best general satisfaction are the old reliable Red Dutch, Red Cherrie, White Grape and White Dutch, and perhaps we might name with them the Black Naples; but the black currants are not very well known in Colorado. But I do not see why Colorado should not be just the home of the currant, as we have no currant worms nor

the borer that has played such havoc with the currants in the Eastern States, and if the currant was appreciated as it should be, and as I am in hopes it may yet be, it would be one of the best paying crops we could grow, for I consider the currant one of the most healthful fruits we have, and for making jelly it has no equal. It requires about 2,400 bushes to set an acre, and after they come into bearing they will produce in the aggregate about 10,000 boxes, which are worth eight cents per box, making $800. Deduct from this the cost of boxes and for picking, which will cost about $300, you have a net profit of $500 per acre. That is better than growing wheat or any other farm crop at the present prices. I hope the currant may receive more attention from our fruit growers.

We will look for a moment at the gooseberry, as this comes next in order. I don't know that I can say much for the gooseberry, and as we are taught that if we cannot say anything good for a person we had better not say anything, and I think that saying will hold good in this case. But I will say this in defense of the gooseberry, give it as good cultivation as you give the other fruits, and plenty of good, rich manure, and it will repay you. The gooseberry wants good, rich soil, and it must have it if you expect it to do well and produce fruit. I would recommend Downing and Houghton Seedling for profit, and the English for pleasure. Altogether I know but very little about the English varieties, and cannot say much for or against them. What we want to make the gooseberry pay is a good canning factory to work them into jams and jellies, for I know there is a good profit in growing them for this purpose. The best way to propagate them is by layering, as it does not grow very readily from cuttings. In planting set them five feet apart each way, and keep them trimmed up so you can get around them. I would rec-

ommend a huckleberry rake for gathering, as one person can gather more in this way than four or five can with their hands. If there should be leaves in, put them in a tub of water and skim off the leaves, drying the berries before shipping.

Raspberries, a delicious fruit, follows very closely after the strawberries. This fruit is not only valuable for the table, but is very nice for drying, canning and making jams and jellies, and can be grown, after the first year, as easily as corn, and a field if kept well manured, will last for a great many years. We have a new list of black raspberries that have been in use for some time, and I think them much more profitable than some of the older sorts, although my experience with black raspberries has been quite limited; but I should recommend Souhegan, Tyler and Gregg, as I think they will give much better satisfaction and will give fruit through a much longer season. Each variety is hardy, productive and bears fruit of good quality. Plant them in rows six feet apart and the vines in the rows three feet apart, this will give you room to work through them with the horse. Keep the shoots pinched back to about four feet, not allowing the tips to grow out too long, as they will attach themselves to the ground and make a mass of vines that will be almost impossible to get through; and by pinching back it will cause the canes to grow more stocky and throw out more side branches, and will be less liable to be broken by the wind. If you should want to grow new vines, wait until August or September, then put the ends of the tips in the ground three or four inches, and in a few weeks they will make a mass of fibrous roots and will be ready for planting in the early spring. The raspberry season would not be complete without a good supply of red raspberries, and I consider the Cuthburt, Turner, Hansell and Hurstein to be the best of all the

red raspberries, and with me much more profitable than the blackcap. I consider the Hansel the best shipper. Plant in rows five feet apart and the vines in the rows three feet apart, allowing the young shoots to grow in the rows until they make a matted row; pinch off the canes when they get about four feet high, as this will cause them to grow more stocky. Cut away all old wood as soon as the fruit is gone, and do not give much water after August, as this will give the wood a better chance to get ripe. Cover in the fall before the weather gets too cold. My mode of doing this is to go over the rows laying the canes all one way and putting dirt enough on to hold them down, then take the horse and a ten inch plough, ploughing around the rows, throwing the earth toward the vines. In this way the most of the work can be done with the horse and plough; what is left can be covered very easily with the shovel any time before it freezes up for the winter.

Last, but not least, on my list comes the blackberry, and I consider it one of the most profitable berries I can grow, as well as one of the most delicious for eating, when thoroughly ripe. There are a great many varieties, both new and old, and I will not stop to discuss them at this time, but will recommend those I have had the best success with, and they are the Lawton and Kittatinna, and with me there is more money in them than any other blackberry grown. I have tried the Snyder and Wilson, but do not like them. I set a plantation last spring of Ancient Britton, but do not know much about them, but think they will do well as a late berry, if they are not too late. I sometimes hear men talking about the Snyder as being iron-clad. I don't think we have such a thing as an iron-clad blackberry in Colorado. They all must be protected, and when properly cared for they will yield immense crops. In making a plantation of blackberries put the rows seven

feet apart, and the vines three feet in the rows, allowing all young shoots to grow in the rows so as to form a matted row, as the blackberry needs a good deal of shade. Pinch back the young growth to about four feet; this will cause them to throw out side branches and grow more stocky, and they will stand the wind much better. Give the blackberry plenty of manure and good clean culture and you will be surprised at the wonderful crop they will produce. I gathered at the rate of six thousand boxes to the acre. In laying them down for winter have the ground thoroughly wet, have the hands protected by a good pair of gloves, and in bending take hold of the vine and pull up as you bend it over, having first removed a fork full of dirt from in front of the vine, and in this way you can bend them over with but very little danger of breaking. Cover the blackberry the same as the raspberry, with horse and plow. In uncovering vines that have been covered through the winter, we should be very careful and have it done before the buds have started out, as they will not stand much exposure after the buds have begun to swell. A cold wind or a hot sun will blast the buds, although I have uncovered both blackberries and raspberries after the buds had begun to swell without any very serious harm being done.

MR DE VINNEY: As regards currant cuttings, I think it advisable to cut off and plant the branch whole. Am in favor of planting in the fall, as they make better plants than when planted in the spring.

MR. FAUROT: I have not had good success with fall planting.

MR. J. S. MCCLELLAND: Fall planting is all right if the plants are covered to protect them.

MR. DAVIS: My experience convinces me that blackcap raspberries succeed better when the tips are allowed to stand till spring before planting.

MR. DE VINNEY had the same experience.

MR. BROTHERS: What is needed is a better knowledge of the soil on which small fruits are grown. I prefer planting blackberries in the fall. Can plant with safety from October until the ground freezes.

MR. DEWEESE: They should be covered if planted in the fall. I have had better success with spring planting.

MR. TOBIAS: I have had good success in planting raspberries and blackberries in the fall.

MR. SMITH: Has any one had good success with Fay's Prolific currant?

MR. FAUROT: I find it no better than the Red Cherrie—inferior if anything.

MR. SMITH: For heavy clay soil the Red Dutch takes the lead.

MR. HELM, of Cañon City: I consider the Red Dutch far ahead of Fay's. The Arkansas Valley seems to be especially adapted to currants.

MR. BROTHERS advised growers to go slow in discarding old and well-tried varieties, until the newer kinds have been thoroughly tested. Considers the Red Dutch a good currant.

MR. SMITH: Fay's and Cherry seem to be very similar.

MR. FAUROT: I see no similarity between them.

PRESIDENT GIPSON: I believe Fay's to be very different from the Cherry. Think it a good currant and should not be discarded until thoroughly tested.

MR. DE VINNEY: I received from certain eastern nurseries what I supposed to be White Grape currants that proved to be something else. I think their carelessness has been an injury to the fruit interests of Colo-

rado. I consider White Dutch preferable to the White Grape. Some of the leading nurserymen claim that the Victoria is two weeks later than other varieties, while in reality they are not two days later.

MR. FAUROT: I consider White Grape superior to White Dutch. The Victoria is ten days later with me than the Red Dutch.

MR. DE VINNEY: I admit that the Victoria blooms ten days later, but it fruits within two days of the other varieties.

## AFTERNOON SESSION.

On re-assembling the Society listened to the annual address of President Gipson, as follows:

*Members of the Colorado State Horticultural Society,*

*Ladies and Gentlemen:*—We assemble at this annual meeting, under circumstances calculated to inspire us with renewed hope and courage. The past year has been especially full of encouragement to workers in the orchard and garden, and to those who have persistently advocated the possibilities of Colorado in the direction of fruit culture, the outlook is most gratifying. We have fairly passed the merely experimental or speculative period in our pomological existence, and are demonstrating by logic at once forcible and conclusive, that our State has a great future as a field for horticultural advancement.

From the first it seemed essential to determine the status of Colorado in this regard; because, without fruits, forests and flowers, or where success with these is doubtful and uncertain, the material prosperity of a country is seriously impeded. Scarcely a dozen years since people were heard to say on every hand, "a State

that cannot produce fruits and shade is hardly worth living in. I never could think of making a permanent home in such a country." The thought made them homesick, discontented and unreconciled. It must be confessed that the feeling was shared by all classes. In this respect alone, what a change a few years has wrought.

Fine fruit is truly said to be the flower of commodities. Charles Downing well says, "it is the most perfect union of the useful and beautiful that the earth knows." Hear, also, the words of Wilder, "fruits are the overflow of nature's bounty; jems from the skies which are dropped down to beautify the earth, charm the sight, gratify the taste, and minister to the enjoyment of life; and the more we realize this, the more shall we appreciate the Divine goodness to us, and the duty of providing them for others. Next to saving the soul, is the saving of health, and I know of no better means than through an abundant supply of ripe fruits."

But aside from the very intimate connection between good health and good pomology, from a commercial standpoint also, fruits are among the leading commodities of the world, and the great fruit staples will be found to form an important item in trade and traffic. The value of the fruit yield of this country in a favorable year, is estimated at $150,000,000. From present indications, the annual product of Colorado, not many years hence, will reach up into the millions. This general statement gives an idea of the magnitude of the fruit interests, and of the importance of this great industry to Colorado. With a wide diversity of soil and climate; with a territory stretching through five degrees of latitude and eight of longitude; with mountain slopes and valleys, giving a difference of thousands of feet in altitude and exposures, the field for experiment is almost boundless. These natural variations and contrasts, give

scope and hope for many things not possible on the level prairie or in the sheltered valley. The products of last season, from different parts of the State, go to sustain this position. In the northern country we raise as fine apples, plums, pears, grapes and small fruits, as one could reasonably desire, while on the more southern and western slopes, peaches, apricots, nectarines and similar fruits, bordering on the tropical, were grown, that would stand well in comparison with the same varieties from the famous fruit belts of the world. Nut producing trees, like the black walnut, butternut, almond and chestnut are coming into bearing in a way to justify hopes, that will warrant extensive planting of these in various sections of the State. That our mountains are full of rare and valuable flora, is no longer a question. In plant life, and among vines and creepers, these elevations abound in wealth; while some of our native evergreens are contesting the palm with the most highly prized conifers, from all parts of the world. To bring out and develop these should be one of the aims of our Society. In a word, our Association has a wide and grand field for usefulness. The work before us, in point of real lasting value to the State, is second to no other, and this fact must be kept constantly before the people. I have no hesitancy in asserting that what has already been shown to exist in the horticultural economy of Colorado, is actually worth more to the State to day than any other discovery affecting its welfare within the same period of time.

Having dwelt somewhat upon the supreme importance to the State of its proper horticultural development, I wish to call up and briefly discuss means and methods of promoting the work.

First, a special effort should be made to enlist the active co-operation of friends of the cause throughout Colorado. They should become available members of

the State Society, or of local organizations with the same end in view. This would have the twofold effect of awakening a local interest, and of creating a wholesome public sentiment that would tend to influence proper legislation, and cause a just recognition of the work. The parent society should have at least one hundred active members, to do real effective service. Every fruit and vegetable grower, every florist, every cultivator of forest trees, should have a membership; and it is scarcely an exaggeration to say, that it would pay each one of these producers, on an average, from ten to one hundred times the membership fee, to have the benefits derived from public discussions and reports, upon topics in which they would be directly interested. The only way to reach many of those people is by personal solicitation. At present, this can only be done through the voluntary efforts of committees self-constituted, or appointed by our Society from its available members. If we can succeed in assuring everybody of a valuable annual report, it will be an important step toward securing needed support. I would suggest that the Vice-President from each county, make an earnest effort to secure membership from his locality, the present year.

The feasibility of establishing experimental stations in the State, should be kept constantly in view. If one main or central station could be created, others might be organized or located as auxiliary, to cover different conditions of soil, climate and surroundings. This is a matter that should be brought to the attention of our legislators this winter. It is possible, that Congressional legislation may soon be had upon this point, that will prove of National benefit. Experimental work is needed to determine, not only the things adapted to the various localities of the State, but likewise to find out the trees and plants that may flourish beyond the possible limits of irrigation. This is really a problem of con-

siderable moment to all interested in the great plains of the Rocky Mountain slope.

Individual efforts in the direction of originating new fruits should be encouraged in every possible way, and if our Society could devise ways and means for offering a liberal premium for every meritorious introduction of this kind, it would be but a just recognition of the labor and benefaction bestowed.

Another channel in which our efforts might be properly and wisely used, is in the way of school-ground ornamentation. How sadly is some system of this kind needed. I can but think that if this Society should prepare and recommend to school officials a general plan that could be modified or changed to suit particular instances, for laying out and ornamenting public school-grounds, it would be favorably received and productive of lasting good.

There is still another matter which is assuming importance, and that is the means of protection against injurious insects. These are already attacking our orchards and gardens, and have done serious mischief in certain localities. While this is an emergency that might properly be the subject of legislative action, this Society should take the initiative by recommending the best methods for guarding against and dealing with depredations of these destructive foes. It seems clear that even our superior climatic condition will not give immunity from such visitations, and we should face the inevitable in time.

Our Society should likewise be found progressive, and aim to keep abreast of the times in finding out the best of the novelties and newer productions for the benefit of planters and experimenters; the value of fruits and flowers among recent introduction that are of surpassing excellence.

Among the last public words of the lamented Wilder are these: "Think once more, my friends, of the great blessings you may confer on mankind by the multiplication of good fruits. You can do nothing better for the generations that are to follow us."

Says President Barry: "We are not of those who cry out against new varieties. On the contrary, we look upon every one of real excellence as an additional benefit to fruit growers and to society, for which they should be duly thankful. Some well-meaning persons make a great outcry against nurserymen and others whose business it is to experiment, for extending their list or noticing new varieties, and against horticultural societies for offering premiums for large collections. If such a spirit had prevailed, what would our fruits have been to-day?"

This suggestion of President Barry seems especially worthy of consideration. The important precaution to observe in regard to all new fruits is to select and plant judiciously and not at random. For example, among the new Russian fruits, particularly of the first importation, will be found many that are inferior and comparatively worthless. But the best experimenters and highest authorities on these varieties agree, without exception, in pronouncing many of them also excellent in quality and very desirable.

Says Mr. Howlett, of Wisconsin, with fifteen years' experience with Russians: "I do not wish to be understood that all the Russian apples are first-class as to quality and productiveness, but many are as good as our best—as productive and profitable—and some are as long keepers as any known.

Says Mr. Summerville, of Minnesota, (with forty-eight Russian varieties), "Last winter killed pretty nearly the last of my trees in my orchard, except my

Russians. Of them, I think I have not one that was injured. I have something over twenty varieties in bearing, and there are some that are excellent fruit and others that are far from being valuable. The majority of them I consider good cooking and good keeping apples."

Says Mr. Sias, "My opinion is that we have no better fruits nor better quality of apples in the State, than we find among the Russian varieties. Take for instance the White Transparent, I don't know whether I ever fruited anything that surpasses that in quality. The Russian Green is hard to beat. I have several other varities of fine quality." Prof. Budd states that the varieties fruiting with him, "are by far exceeding the fondest hopes of many, in size, appearance, quality and varied season."

Mr. Tuttle, of Wisconsin, who has had more experience than any man in this country with Russians, says: "It is too late in the day for a man to come out and talk about there being no Russian apples of good quality. I can mention apples among them that will rank with the best American apples. I would like to know of an early apple that will compare with the Yellow Transparent. Take the Anisettes, the Famuse, the Golden White, Longfield and others. They are good in quality." Says Dr. Hoskins, the eminent pomologist of Vermont, "The best early iron-clad for market or family planting, is no doubt Yellow Transparent." He also speaks in high terms of several other of the newer Russians. The testimony of Mr. Gibb and even of Mr. Barry and Charles Downing, could be added to the above.

Finally we should bear in mind, that from the cold regions of Russia, came some of our fruits of universal popularity, like the Oldenburg, Red Astrachan,

Tetofsky and Alexander apples, the black Tartarian cherry and other superior fruits. In a word, there seems little doubt, that the importation of these foreign fruits is destined to largely aid in the solution of the problem of fruit growing in many sections of this country.

I have given these opinions from men of large and varied experience, not as an argument in favor of Russian varieties, but to correct false impressions which seem to exist, and to help overcome unfounded prejudices. There is too much loose talk about all kinds of fruit. Let us commend nothing simply because it is American, nor condemn things on the ground that they are of foreign origin. Merit should be recognized everywhere, and if we can improve on existing things let us do so by all means.

From the suggestions made herein, it will be seen that I believe in practical work on the part of our Society, and that in proportion as we aim to make this work of real practical benefit to all sections of our State, will we receive recognition from the people as an institution worthy of public patronage and endorsement.

I cannot conclude these remarks without a mention of the recent death of that grand old man, Marshal P. Wilder, of Massachusetts. For fifty years a landmark in the progress of pomology in this country, he devoted his time, talents and resources to the upbuilding of a systematic and practical horticulture that gives us today no little distinction as a Nation. Faithful and hopeful to the last, he has left a name and a record worthy a place among the benefactors of mankind.

In retiring from the Presidency of our Society, I desire to thank the members, one and all, for the uniform kindness and courtesy extended me, and for the cheerful manner in which they responded to the work assigned

them. And I do wish especially to thank Secretary Millett for his valuable services, and for the promptness and efficiency he has shown in the discharge of the duties of his office. That the Society is destined to a large measure of usefulness and prosperity, is my firm belief, and to this end may we continue to labor with the best efforts at our command.

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On motion, a committee of three, consisting of C. S. Faurot, D. S. Grimes and W. H. Davis, was appointed to consider the subjects recommended in the President's address, and report at a subsequent session.

Mr. P. D. Goss, of Loveland, Secretary of the Northern Colorado Horticultural Society, then presented the following paper on

## How to Treat an Orchard.

Briefly, with that careful forethought and intelligent understanding that is essential to the success of any undertaking, it is an old saying that history repeats itself; but of all the various features of this fact, there probably never was a more striking illustration of it than that of your humble servant.

Nearly 6,000 years ago there were placed in the Garden of Eden our first parents, without forethought or consultation on their part. To-day your committee has placed me in an orchard (which should be a Garden of Eden) and directed me to "treat" the same, with less definite knowledge of my surroundings than what my illustrious fore-parents had of theirs, for they found fruit to eat, and in eating which they were enabled to pass away the time in a much pleasanter way than what I shall be able to do while contemplating the task before me.

The fact of their being supplied with fruit would indicate fruit trees of matured years, while your committee has not mentioned any age or condition of trees that are to be my companions during my stay with them. But here I find myself (without any fruit to eat, like most fruit growers in Colorado to-day), all alone, with my task in sight and no one to help me, and in this respect that much worse than Adam, for he had Eve to consult with. I most sincerely hope, however, that my advent among you may not prove as disastrous to mankind, and the human family generally, as was that of those illustrious dead of the Garden of Eden.

Your committee has not stated in the subject of this paper whether it is apple, peach, pear or plum, that is designed for me to consider, or all of them, and I find myself at a loss as to what point to begin at. I discover, however, that it leaves the imagination at liberty to play about and figure on the various views and features of handling the orchard, field, and possibly I may hit upon some suggestions that would be well to avoid, and others that might be rightly followed in caring for the same.

I shall assume that it is the apple orchard that is understood to be the subject of this article, as it would be altogether too extensive to embrace them all.

Silently I stand and glance around me, and as I look I try to re-read the lesson I am given to learn so that I shall be sure that I fully understand my mission in this paradise that I have been ushered into. And as the wintry winds of this midwinter day comes pouring through the leafless boughs with their piercing, doleful sound, carrying in their cold embrace the bitter, biting frosts, I bethink me, "how has the previous master of my present situation done his work, in preparing the silent witnesses of this scene, so as to be able to withstand this intense cold and peculiar climatic changes

incident thereto." If well, then shall my errand here for the present be more easily performed. If not well, then my labor is much increased, if not altogether lost. And here we muse, the trees and I, and I see in each leafless bough a language of nature, a work of love and the bloom of health, while they behold in me their new master, and in their majestic form they seem to beckon to me a welcome of delight as they say, "we will be your willing servants so long as you are ours, and we will heap into your coffers many golden crops of bright, glossy, luscious fruit, if you will but give us that intelligent watchfulness that we so justly deserve." And really, ought not a king to envy me my throne amongst the trees—this paradise on earth—a fit place for the gods.

And yet, Mr. President, how few of my fellows take pleasure in reveling in such a scene of beauty and work of love as my fancy picture portrays. What a small per cent. of farmers (and with the farmers rests the greater part of fruit culture), can stand amongst the orchard trees, sweet with the fragrance of flowers and ripe, luscious fruits, and drink in from the surroundings a full, satisfying draught of wisdom which, if judiciously acted upon, is so well calculated to make home pleasant? But we will return to the subject more directly connected with the object of this paper.

One very common way to "treat" an orchard, and I fancy it would receive the greatest number of votes, if the "noses" were counted, is to buy a bill of trees of the first chronic tree peddler that comes along extolling the grand qualities of the various fine fruits in his gaudily painted cuts of the fruits he claims to be selling, regardless of the adaptability of the same to our peculiar climatical influences, and plant them out in the field somewhere in range of the future sight of the mansion

that is to be erected when the profits of the farm will allow.

Providence must care for them largely in the matter of watering and weeding, and if He should so far do His work well (which is doubtful as to Colorado), as to let the trees get a good start the first summer, the manager of the premises seems well gratified with the outlook, as he has been placed to no trouble himself.

WHY ORCHARDS FAIL.

Of course there are no fences but the one that encloses the whole tract of land owned by the occupant, and this only composed of two barb wires poorly tightened, with posts one hundred feet apart, and no stays between. Of necessity all the stock of the neighborhood has access, indirectly, to this enclosure, and it is nearly as common to them as the roadway that is expected to furnish them pasture, unless the smart boy and his dog can overtake the Texas steer while he is forcing his way into the field and turn him back.

The result is that the old "stub-horned cow" gets in while the boy is taking his noon-day nap and makes a bee line to one of the very finest specimens of the petted orchard tree, and gets astride of it in less time than would seem possible, and scratches and rubs herself as as though there were not a barbed wire fence in the State that would answer the purpose as well, and have the tree entirely destroyed before the boy and the dog arrive on the scene to get her away. The cold winter gets away with what the cattle have not destroyed, and then, of course you cannot grow fruit in Colorado.

This, Mr. President, is not a fancy picture. Hundreds of parties that have tried growing orchards (many in a small way), in our State, and have failed, can be found to-day that owe their failure to fully as gross care-

lessness as here represented. And shall we not wonder, and almost stagger, at the thought that one of the most important efforts that should be put forth by every head of a family to make his farm home bearable, and the hours that must necessarily be spent there pleasant and home-like, should be treated with such indifferent forethought and care.

It has always been, however, one of my failings in life so far, to have something to do about the ordering and planning of anything that I was to care for or become interested in; and I would not feel disposed to be placed in the position I am before you to-day unless I assume the same liberty as in many other cases, and point out my location and begin from the real foundation stone, from which points it is necessary to start well if we meet with the best success in fruit growing.

### SUB-IRRIGATION.

Let the location be one of natures own fitting as much as possible, and at least one that is thoroughly underdrained, either by its natural location or by artificial means. On this one particular feature, I realize the success or failure of the undertaking rests in a great measure. A hog-tight, thief-tight, barb-wire fence is next in order. I prefer to have no stock of any kind in the orchard plot—more especially cattle. I would much sooner have the ground well tilled and fairly well fertilized for two or three years previous to planting it out to trees. The tillage should be deep and thorough, and the oftener the ground is handled during this time the more perfectly will this be accomplished. Lay off the ground not less than twenty-six feet apart, and thirty is better. Take your plough and turn a furrow each way, or a dead-furrow as it is often termed amongst farmers, in the direction in which you wish your irrigation to go on during the season. The amount of earth to be re-

moved where each tree is to stand, depends entirely on the space required by the roots of the trees to be planted, so that they may assume their natural position as they were before they were removed from the nursery. I think nothing of digging a great-hole, deep and wide, as recommended by so many. Let the depth the tree is placed in the ground be somewhat deeper than what it was before it was removed from the nursery.

MY CHOICE

For setting would be two-year-old trees, and I should be careful in selecting to get those of many small fibrous roots and of the varieties well adapted to our high and dry climate. The names of these varieties can be gotten from those that have been over the road before us, and need no mention here. Use such precaution as good judgment would dictate, in removing damaged roots and surplus top, and place the roots in easy position before the filling-in is done—which I should do with surface soil, pressing it firmly with hand or foot while being filled, and much care should be used not to expose the roots to the cold or hot sunlight while setting it out. Puddling is often resorted to for this purpose and is to be recommended. Have the water ready to run down the furrow as soon as all the trees are placed in one row and let it soak while planting another. Some prefer not to let the water come in contact with the tree; I have discovered no difference.

I would give the tree a mulch of straw or native hay for the first year, to maintain an evener temperature and less evaporation of moisture. Let the irrigation be more frequent than in after years, and I should prefer, if I wanted the very best results, to plant nothing in the field at all, but use clean cultivation. You can, however, grow hoed crops for a few years with but little injury to the growth of the trees, if desired.

### THE SECOND SEASON

I should take my plow and fill the furrows that were used the previous season to set the trees in and remove the mulch, using the furrows thus made to irrigate them the second season. Have the varieties of trees named by attaching a zinc label to a stake driven by the tree, and this season replace all missing trees according to kind.

Little else will be needed during the summer but now and then taking off the unnecessary shoots that may be out of keeping for the formation of a good top. It is somewhat a matter of taste as to how much stem or body you will have for your tree. Care should be taken, however, in forming the top not to allow it to prong or fork out in two equal stems as it is liable to split and ruin the trees in after years when bearing fruit. I believe it is conceded by good authority that the low branching head for the apple tree is to be preferred if fruit alone is desired. Yet higher trimming gives a better opportunity to till about the tree, and I have adopted it in my practice.

After this season, or the third summer, I should begin to feed the soil by a moderate covering of stable litter, and plow under, not too much, as it would tend to induce too rank a growth of new wood; a good healthy growth being more desirable, as it renders the tree less liable to winter-kill on account of unmatured wood.

### LOOK SHARP.

I should this season try to anticipate the growth of the tree for a series of years in the future and trim it to correspond, taking out all small shoots that would naturally be in the way in after years, and by this means avoid the removal of large limbs. Keep a sharp look-

out for injurious insects. The apple tree borer does his work on the south and south-west side of the tree always, and confines his work mostly to the body.

I should till and manure the ground each season from this time on, increasing the manure as the demands of the tree require. After the tree had got so far matured as to bear fruit well, if it were thought desirable to seed down it could be done by sowing red clover seed, occasionly plowing down and re-seeding. With me, as the trees get older they require less water, and it may be used at a greater distance from the tree. I should be inclined to defer irrigation from near August 15 to October 1, so as to allow the tree to ripen its wood for winter.

The matter of trimming has a variety of features with its different advocates, some preferring one time, some another. I never let an opportunity pass when I see a limb to be removed, but off with it then and there and do not understand that I have damaged my trees by so doing. Though if I had large limbs to remove I would defer the matter until June, and then cover the wound with paint or grafting wax at once.

The matter of wind-breaks are believed to be of value by some good orchardists, but others pay but little attention to them. I hardly think they signify any special advantage as to growth of tree, quality of fruit or prolific bearing, and the only advantage I see is the protection of fruit from being blown off the tree. The very best orchard that I know of, in every particular that goes to make a perfect orchard, has no wind-break whatever. If I were to plant a wind-break I should be slow to use the cottonwood.

The following paper was then read:

# Fruit Culture in El Paso County.

## HOW IT CAN BE MADE SUCCESSFUL.

BY WM. BUSH.

The experimental stage of fruit growing in El Paso county has almost passed, and we have entered upon an era in which practical results prove that Colorado can grow fruit.

Too much credit cannot be given those pioneers in fruit culture who had the enterprise and perseverance to meet and overcome the difficulties which hedged about the earliest efforts at fruit growing in this county. The prejudice it was necessary to meet is gradually wearing away and fruit growing is less ridiculed now, but a few years ago it was very common to hear the expression "grow fruit on such soil? it is a wast of time and money." Experiments show that all kinds of fruit will do well in El Paso county. The soil is in general a sandy loam, but near the streams a rich loam running from four to ten feet deep. The central and southern parts of the county are adapted to fruit growing, and more are engaging in it every year. Quite a number have been successful with apple growing on a large scale.

O. S. Loomis, of Fountain, has several varieties of apple trees, and raises from 200 to 300 bushels of large perfect apples of fine flavor.

D. M. Rose, south of the city, has four varieties of winter apples, one of which he does not, however, recommend as hardy, four of fall apples which are hardy, but long coming into bearing, and five summer apples, which are all good and bearing. He has forty varieties in all, twenty not yet bearing. He has eight varieties of plums, six of pears, two of peaches, three of apricots

and six of crabs. The pears and plums do exceedingly well, the pears taking a first premium at the Denver Exposition. Peaches will succeed, though subject to injury by early frost before they are fully matured. Experiments with apricots show that the hardy varieties succeed. Crab apples do well in all parts of the county and are of fine quality.

Mrs. Finley is a successful fruit grower, but we have not the results of her work, nor of others engaged in the business.

In raising fruit we have to take into consideration the question of water supply. It has seemed to me that by a judicious use of what water we have there need be no fear of losses by drouth. We want more cultivation and less water. Keep the ground well stirred and it will retain moisture for a very much longer period. Another thought for consideration is the question of too close planting. My impression is, as a general thing, that plants and trees are not allowed sufficient room. It may be taken as a settled fact, that with plenty of room we have a larger and finer growth and more perfect fruit. My rule would be to cultivate well, manure well, give plenty of room, prune vigorously, give a top dressing of manure late in the fall, and the snows of winter will carry it down to the roots, give a good wetting late as possible, let the ground freeze, then mulch well and so prevent as far as possible all early spring growth. One of the more serious things to contend with is a too early growth in spring, hurrying out fruit blossoms too soon, and so exposing them to liability to frost late in May.

What can be done on a small place may be of interest. On my lot 100x190 feet, I have apples, pears, plums, cherries, strawberries, raspberries, blackberries, grapes, red white and black currants and gooseberries, all of which have been very prolific.

I consider the best early apple to be the Red Astrachan. My trees of this variety bear very heavily, in fact break down with the weight of the fruit. They are a very showy apple, good size and flavor and very thrifty. My trees are planted eighteen feet apart, they are fourteen years old, and I am persuaded are too close, would give them two more feet if I planted again. Early Harvest is another very good apple, fine flavor and good size, tree a good grower and healthy, but not nearly so thrifty and vigorous as the Astrachan. Duchess of Oldenburg is a fine healthy grower and seems to be perfectly hardy, good bearer and of good flavor.

For winter apples, I would first plant Ben Davis. This has proved itself to be a good hardy tree, comes into bearing early, and, although the flavor is considered by good judges to be only second rate, yet its fine size and rosy appearance make it a great favorite, and my experience goes to prove that it is one of the best selling winter apples that we have.

Wealthy and Jonathan are both good apples and may be planted with safety. I would also recommend White Winter Pearmain. I do not remember seeing any mention made of this apple by any of the fruit growers of the State, and I am somewhat surprised that such should be the case. I have a tree of this variety in my garden that beats everything I ever had. For several years this tree has been bearing heavily. During the season of 1885 it had but a light crop, but during the past season it made amends for the previous year's rest. It had apples everywhere all over it. The branches were litterally covered with them. While they were yet about the size of a filbert I picked them off by hundreds, and again when half grown I picked off large quantities, and even then I had over two dozen props under the branches, and with it all had some half dozen branches break off,

one of which measuring four feet in length, contained eighty apples. It is a good sound apple, of fair size, peculiar, but of good flavor and a splendid keeper. I have kept them in my cellar until June. Yellow Transparent is a fall apple, early bearer, very prolific and hardy. Mr. Dixon, of Cheyenne ranch, has planted this variety two years, and I consider it a very promising addition to our apple pomology.

In pears I would recommend the Bartlett, Flemish Beauty, Lawrence and Keifer's Hybrid. The Bartlett is by all odds the most desirable for any one desiring but one kind. In my own garden I have raised them for several years, large, smooth and beautiful in appearance, and a most delicious flavor, equal to any that the country can produce. During the past season I had a gentleman in my garden from the eastern States, and he said my Bartletts were far ahead of any he had ever seen back east.

For crab apples I think the Transcendant and Hyslop preferable.

Plums—Lombard is a very fine bearer, of beautiful, large fruit. Blue Damson is another.

In raising small fruit be careful to select several of the well-established varieties. If you wish to experiment, and every fruit grower ought to go out of the ruts to some extent, try the later introductions in a small way until you are sure of them.

For strawberries one may depend on the old stand-by, the Wilson. Then comes the Manchester, Crescent Seedling, Jucunda and Miner's Prolific. Sharpless is a good berry for home use. Some growers claim the Jucunda to be as early as the Wilson. After growing them a number of years I have never found it to be so. My Wilsons are fully two weeks earlier than the Jucundas.

Manchester is a very fine berry, firm, good shape and beautiful in appearance, subacid flavor, and very productive; rather late.

For currants I should recommend Red Dutch, White Grape, Red Cherry and Fay's Prolific, all good bearers and fine flavor. Red Dutch is best for jellies, and by proper cultivation will attain a remarkable size. Red Cherry and Fay's Prolific are very large, magnificent fruit.

Gooseberries—the Downing and Houghton are good. For myself, I grow almost exclusively the English varieties, Whitesmith and Crown Bob. They are so very superior to the small Houghton as to make them appear ridiculous in comparison.

In transplanting any description of fruit trees or plants I would say do it well, take some little pains over it, for it will repay you. Many persons think they have only to dig a hole, dump the tree in with the roots all doubled up, and fill in earth much as they would set a fence post. This is wrong. A tree is a living thing, and when you are about planting, dig a hole sufficiently large to spread out the roots, loosen the soil well at the bottom of the hole, spread the roots out carefully, see that all broken and bruised ends are smoothly cut off, sprinkle a little fine mould over the roots first, then partly fill the hole, press down firmly with the foot, then pour in a pail full of water, let it soak in, then fill up level, do not bank up around the tree, rather let it remain hollow, so that the rain may have a tendency to flow to the tree rather than away from it, as it will do if banked up. Always be careful not to expose the roots to the sun or wind, keep well covered until you place in the ground, and be sure to plant the tree as deep as it formerly stood. I am thus particular because I have seen some parties plant trees in such a careless and slovenly manner, and

then complain either of the tree salesman, or the climate, because their trees did not grow.

If a thing is worth doing at all it is worth doing well. There have been some complaints on account of the ravages and destruction caused by the codling moth to the apple crops. To remedy this I have found the following plan to be very beneficial. Take London Purple of the proportion of two table-spoonfuls to three gallons of water, mix the powder with a little water into a paste, then stir it into the water, mix it well by drawing into a garden syringe or force pump and driving it back again into the vessel, continue this process until well mixed, then use as follows: The codling moth may be seen flying among the apple blossoms sometimes during the day, although it is claimed they do most damage at night. When the apple is in full bloom the moth lays an egg deep down in the calyx and the mischief is done. In due time the fruit is set and the egg hatches out the worm. Now, when the apple is very small they will always be found in an upright position on the branches of the tree but as they become larger and heavier they gradually hang down by their own weight. Now, while the apple is in its first stage of growth, that is, as soon as the blossom is all off, take the above mixture and spray the trees well all over; every drop that falls on the egg of the moth is sure death and means one more apple for the cellar. When the moth is left alone to do its own sweet will, the egg is, in about three weeks time, changed to a worm which works its way into the apple; when the apple is about three parts grown the worm will work out at the side and drop on the ground, and by instrinct or some other fine sense which I cannot explain, will find the trunk of the tree, up which it will climb, spin its webb, and in course of time change to a moth which will lay more eggs in future apple crops. It is a good plan to tie

bands of cloth around the trunk of the trees during the summer, and every week or two take them off and kill the worms which you will find in them. When spraying the trees always stand so that the wind will carry the spray away from the operator, as the mixture is poisonous. The amount that falls on the apple will do no harm, as the rain will wash it all away long before the apples are gathered. If the mixture is made too strong it will scorch the foliage of the tree. The proportions I have given will be found to be about right.

In presenting these few crude remarks for publication, I wish to be understood that I do not pretend to be giving information that is infallible; they are some simple facts that have come under my observation. Others may have had a different experience, may have formed a different opinion. We are living in an age of progress, and we in Colorado are but just finding out what can be accomplished by perseverance in well doing. Two years ago I exhibited and took premiums on fruit at the State Horticultural Show. While in attendance there I was approached by a gentleman who asked me where the fruit I exhibited was raised. I replied at Colorado Springs. Said he, "I have been raising fruit for the last fourteen years in the State of New York, but I never saw anything to equal that exhibit. If you, sir, can raise fruit like that at Colorado Springs, you have a glorious future before you as a fruit producing State."

We, who in the past have kept steadily on, in spite of the opposition and wise sayings of many of our friends, who have invariably called us enthusiasts, firmly convinced that time and perseverance would produce favorable results, can rejoice in the thought that we have been humble instruments in the hands of a Divine Providence in doing our share towards making Colorado what she will undoubtedly be in the near future, one of the best fruit producing States in the Union.

The next on the programme was "Storing Winter Fruits," by David Brothers.

MR. BROTHERS remarked that apples were not keeping as well this year as usual. The season was two weeks earlier.

DR. SHAW stated that he had put up for exhibition about a hundred varieties, and he would recommend that they be kept dry and dark, and excluded from the air. Barrels should not have holes in them nor the staves broken.

WM. DAVIS had tried both plans and those not excluded from the air had kept better.

MR. BAILEY: I have had much experience east in keeping apples and find a dry cellar best for the purpose. Put shelves seven or eight inches deep at the side of the cellar, and fill them as full as possible, and keep the cellar almost at freezing point.

MR. BROTHERS: Colorado differs widely from Michigan. If I could have a stream of water running through my cellar I would have it. One of my neighbors put his apples on shelves and found they withered, so he took them from the shelves and put them in bulk. Mr. Everett, one of our oldest fruit men, put his apples in bins and threw on twenty or thirty buckets of water to the same number of barrels of apple, and they kept fresh and firm. I have never tried keeping in pits in the ground.

DR. SHAW recommended that the members take home at the close of the meeting, some of the fruit on exhibition, which was somewhat withered, and experiment by putting them in pits to restore them.

## EVENING SESSION.

Wednesday evening was devoted to a concert in the main hall of the Chamber of Commerce, at which the following programme was successfully carried out:

ANDANTE, with variations for two pianos . . . . . SCHUMANN
*Messrs. Pfefferkorn and Hall.*

ADDRESS OF WELCOME:
GEN. R. W. WOODBURY, President Chamber of Commerce.

RESPONSE:
A. E. GIPSON, President State Horticultural Society.

VOCAL DUET, "Excelsior," . . . . . BALFE
*Messrs. N. E. Skinner and I. E. Blake.*

ADDRESS . . . . . *Governor Alva Adams*

CONTRALTO SOLO . . . . . *Mrs. Milo B. Smith*

ADDRESS . . . . . *Dean Hart*

READING, "Planting of the Apple Tree," . . . . . BRYANT
*Miss Lizzie Field.*

SOLO, "Village Blacksmith," . . . . . *Mr. John Hamlet*

ADDRESS . . . . . *Rev. Thomas J. Van Ness*

BRILLIANT FANTASIA, {"Der Freichutz," for two pianos} WEBER—ALBERTI
*Miss Julia Large and Mr. Walter E. Hall.*

REMARKS:
NELSON MILLETT, Secretary State Horticultural Society.

CONCERT QUARTETTE {*Messrs. John H. Blood, John Hamlet, George A. Brown and Archie J. Davis.*}

## THURSDAY MORNING.

The Society met at 9:30 a. m., with President Gipson in the chair.

The first subject for the morning was "Intensive Horticulture," by John Tobias. Mr. Tobias had prepared no formal paper, but made some general remarks upon the subject, and was followed by several of the members, the general verdict being in favor of the intensive rather than the extensive methods. High cultivation of small

tracts was generally advocated, rather than a slipshod cultivation of large areas. Most of the speakers believed in the old adage, that the manure heap is the garden's profit.

The next subject discussed was "Colorado Conifers," led by H. G. Wolff.

MR. WOLFF stated that the pines and conifers were about all the timber we have, and they were being so rapidly destroyed as to diminish the water supply. The railroads are to blame for much of the destruction of the forests on the Government land. Some legislation is necessary to prevent. There are about forty varieties of evergreens in the mountains.

MR. BROTHERS: I have heard that young timber is starting up in the mountains, and if something could be done to preserve this young growth we should have it to fall back upon.

MR. GRIMES: No subject is more interesting than the flora of the Rocky Mountains. The blue spruce is one of the most beautiful trees, and is to be found in no other part of the world.

MR. PARSONS, President of the State Forestry Association, said: "We need laws that can be enforced. The difficulty is in enforcing the laws. There have been many destructive forest fires the past year, due to carelessness. We must choose County Commissioners who will have a care of the forests. The timbered lands at the head-waters of the streams, belong to the General Government, and are hard to control. We are hoping to have them turned over to the State Government, withdrawn from sale and preserved. It is not so much the saw mills that injure, as they consume only the larger timber, but the tie cutters, who take the smaller trees as well. The most destructive agencies, however, are the forest fires."

DR. SHAW moved that a committee of three be appointed to draw resolutions upon this subject and report the following day. The chair appointed Messrs. Shaw, Grimes and Wolff.

The following paper was then read:

# How to Buy Trees.

BY D. S. GRIMES.

We know of no subject connected with pomology, more important in fruit culture, than that pertaining to individual intelligence shown in the purchase of trees. Nine-tenths of the failures, unsatisfactory results and alleged "tree swindling" by agents, have their origin in the fact of the purchaser not knowing "how to buy trees."

Horticultural productions, for ornament or usefulness, in some way touch the interests of all classes of mankind, and yet horticultural literature is about the scarcest thing found in the house of the average tree planting sinner. A chapter of some wonderful fruit, read from the blank volume of a non-resident, non-producing, non-taxpaying, non-responsible, non-truthful, non-sensible and unknown tree agents "circulating liebrary," is sufficient. He gives his order for the "latest thing out," never thinking of its value. It is useless to refer to the American pomological societies, horticultural societies, or any scientific or experimental channel for information regarding varieties of trees adapted to different climates, localities or conditions. The tree agent will be accepted authority as long as blank-book horticulture prevails among the masses.

When the people and the public press cease to abuse traveling tree salesmen and turn their attention to a per-

sonal education on the subject, then, and not before, will tree planters learn "how to buy trees." Trees, fruits and fragrant flowers were God's birthday gifts to the human race. It is every man's duty, first to his family and personal interests, then to his country, to reproduce, as far as his means and ability will permit, an Eden of trees around his home.

### AGE AND SIZE OF TREES TO BUY.

Practical nurserymen and tree planters, without exception, recommend young trees as the best to transplant. Fruit trees two years old are better than those four years old. The scale of value decreases as age increases. In taking up a tree two years of age, nearly all the fibrous roots through which the tree draws its food from the soil, are retained, and these provide abundant support to sustain and start into active and healthy growth, both body and top, such a tree in growth quickly surpassing the slow and sickly growth of large transplanted trees. After fruit trees have passed three years in the nursery, Eastern proprietors consider their market value declining, and all remaining unsold at five years of age, are dug up and thrown on the brush-heap. Transplanting fruit trees even at four years of age, is attended with the loss of most of the fibrous roots, leaving the tree almost powerless to draw support sufficient to sustain life in a trunk and top, being out of proportion to the amount of roots remaining. Should such trees live at all, their start and after-growth must necessarily be slow and week from the lack of nourishment sufficient to develop a healthy growth. Such trees soon become the feeding ground for insects and eventually go into tree consumption and die. With shade trees the scale of age for transplanting runs some higher, and yet the rule of selecting large trees with the view to speedy growth, is

a fatal mistake that tree planters often make, especially in the city. As with the fruit tree so with the shade tree, the roots are vital organs, the motive power that runs the system of vegetable growth. If we want a shade tree to make a quick, healthy and systematic growth, we should not select sizes greater than one or two inches in diameter of stem, and then cultivate a growth rather than let the tree take care of itself.

### SHAPE OF BODY AND TOP.

When buying trees look well to their forms with a view especially to mature growth. Do not select a forked tree, or one with the top all on one side. Different varieties of fruit trees have different habits in growth. Do not look for the rigorous, upright form of the Ben Davis apple tree in the weak growing Jonathan, or crooked and scragly habits of the Transcendent crab. For street trees, those having a high top, straight trunk, or nearly so, are the best. But for the lawn or park, all straight trees are not admissible. They are too stiff and formal, and lack that natural, graceful and easy aspect desired in grouping trees. Crooked trees in a particular situation gives variety and beauty to the landscape, throwing off that stiff reserve observed when all straight trees are used. Never buy trees of a man who will insure them further than against his own faults. Reliable parties will guarantee their trees to be true to name and in good, healthy condition when delivered, but will not insure them to live under all circumstances after leaving their care and control. This unlimited tree insurance scheme, usually demanded by western buyers, and promised by agents for the sake of a sale, from a legitimate business standpoint is unreasonable and bears the evidence of fraud upon its face. If you have ordered trees, and when delivered they do not fill the contract in quality, don't take them; the law will protect you in

the refusal. But, on the other hand, no matter how high the price you agree to pay, if the trees are as was represented, take them and promptly pay the bill; that is business. If you have had no experience in planting treas or growing fruit, do not buy the highest priced novelties to learn on, but reasonable priced varieties that have been tried and found worthy. Buying trees and plants is a transaction peculiar in itself. It requires the utmost confidence in the veracity of the seller, because both the quality of the fruit and the beauty of the flower are hidden from the sight of the purchaser in a mysterious, dormant bud, not to be revealed until perhaps years of valuable time have passed.

## EVERGREENS.

In landscape decoration the evergreen is the most conspicuous. In selecting them the greatest care should be taken in regard to the form of the top and the condition of the roots. A perfect evergreen in form is a perfect cone of even and closely set branches, tapering from the ground to the apex. This extreme point or "leader" should be straight with but one center stem if a spruce, and at least four limbs branching out at right angles in regular order from its base. Any irregular fast-growing branches should be shortened-in when the tree is planted, and continued in after-growth. The tree should be stocky rather than tall or slim. The roots of all coniferous trees are the most sensitive to exposure of the sun and air of any other class of trees. They should never be left for a moment unprotected. When buying evergreens, examine the roots carefully. If fine particles of resin-like dewdrops appear adhering to the roots it is undisputable evidence that they have been fatally injured by exposure. No power on earth can again dilute this sap and start it again into circulation. The tree may remain green for months, but eventually must die.

BUYING TREES IN GENERAL.

Integrity, responsibility, price, quality and risk being equal, buy trees from home growers, rather than send money out of the State to build up localities in which you have no interest, and remember that one line of concentrated truth from a practical home grower is worth more to you and your country than a volume of silly gas from imported apple tree "borers." Trees are in some respects like genuine and oleomargarine butter, you cannot always tell whether they are home-made or imported frauds. Unless you have seen them dug from the ground, you don't know in whose company they were raised. So it is with the butter found upon our markets,—unless you have seen the cow milked and the cream churned, you cannot tell whether the butter was made from a cow or a steer.

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This paper was followed by a general discussion in which the tree agent was handled without gloves.

G. W. WEBSTER, of Hygiene, then read the following paper, entitled

## New Fruits.

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The Good Book teaches us that whoever produces two blades of grass instead of one is a benefactor to his fellow man. Then why is not the man or woman who plants the seeds of good fruits and watches over and cares for the tender plants and young trees through all the years of their infancy until they arrive at the years of maturity? And then in return they give to mankind their delicious fruits. I think the one who does all this is a greater benefactor than the producer of grass. But now in regard to propagating these new fruits. The seeds do not produce the same variety as the parent

fruit, but sometimes it resembles it very much. My past experience has taught me that the climate, soil, altitude, water and sun, have a wonderful effect on the tree in its growing. It requires years to make a tree adapted to the climate in which the seed was planted, and the man who plants a thousand seeds, and out of that number produces ten good varieties of new fruits that are better than the old ones, is a greater benefactor to the State of Colorado and to those who come after him. Now in regard to new fruits at the present time. There is a great deal being said all over the United States about the Russian varieties; they may be the coming apple for some parts of this dominion, but there are certainly some things against them, and one thing is this: We know that they must go through a climatic change when brought here, which must either be for or against them.

Now, there is a vast difference in the climate of Russia and that of Colorado. It is not the cold winters that hurt the trees, so much as the light, dry atmosphere which we have here in our State. And most assuredly the trees that are a native of Colorado, have the inside track. That is my opinion of this matter, and when we get fairly under headway in raising these new fruits from seeds planted in our Centennial State, then Russia will be calling on Colorado for trees raised of these new varieties and propagated here in our own nurseries. Now, if we were an ignorant class of people, it might be wise for us to send to Russia for our new fruits, but when we find men and women endowed with the intelligence that the people of Colorado are possessed with, then I think it a piece of folly to send our money to a foreign land for these new fruits, when we have and can produce better ones on our own home soil in this State.

For one moment allow me to call your attention to California. Since her gold excitement passed away,

what has given her her great name? It is her industry in fruit raising. Her name goes out before the world as raising the finest fruits of any part of America. But we will admit that the climate is more mild, and she can raise more of the tender fruits than we can, but when it comes to the apple, the standard of all fruits, then Colorado comes to the front and produces a much finer shaped, smoother, and finer flavored apple in every respect, than California. I have seen apples raised in Colorado, that were as perfect as the moulding of brass was at the building of King Solomon's Temple. What is the reason of all this? We have a soil and a climate that the apple is perfectly at home in. Now, when we have all of these advantages, why are there so many standing idle in this glorious work, when it is so little labor, and the price of good trees are so low that one can get at least a few choice kinds and set them out, and in the short space of two or three years can have all the fruit that the family can use.

My experience has taught me that there is a great deal of science in this industry of producing new fruits from the seeds, to know when you have a tree that will produce good or poor fruit before it is old enough to come into fruiting. This has been my observation in the last sixteen years in this work here in Colorado. I think I have accomplished some good work in this line of industry that is an honor to myself, and will prove a great benefit to the State in years to come.

What I have here on my own grounds to show are fifteen good varieties of apples, three of raspberries, one of gooseberries, one of fine strawberries, and have some very promising pear trees. Mrs. Webster has some fine young grapes growing from the seeds of the Delaware and Iona grapes. In two years more we shall have about seventy-five new varieties of different kinds of fruit. This fall I have taken enough new wood from

the finest apple trees to make about two thousand young trees if they all do well. I have secured six more new kinds from two of my neighbors, who have raised apples from the seeds grown in Colorado, that are of a superior quality, and I shall get all of the wood for propagating them, and in two years shall have a fine lot of young trees from these new kinds ready for sale.

I will now give you the names of some of these apples and their seasons. The St. Vraines ripens July 20. It is a seedling from the Rambo, but is larger and a little more tart, and is the color and shape of its parent tree, very hardy and a good bearer.

The Colorado Favorite is a large, yellow apple, ripens in September, flavor subacid, one of the best for cooking. The tree is a good bearer and is iron-clad.

The George Webster apple is very large, red-striped, somewhat of a greenish background; flavor subacid. As a cooking or baking apple it has no equal. It is a seedling from the Plum Cider. The apples are very uniform in size, tree hardy and a good bearer; season, December and January.

Hygiene is a very fine, smooth, red apple; is a seedling from the Snow apple, but is more tart than its parent; is a heavy bearer; tree upright grower, and is iron-clad; season, November to January.

Longmont is a very dark red, medium size; is a seedling from the Spitzenburg, but think it a better apple and of finer flavor; is a good keeper; tree very hardy and a good bearer.

Montgomery is sweet; is a large yellow apple, sweet as honey; very fine tree; iron-clad; good bearer; season, September.

The Colorado Golden Pipin is a very large yellow, fine flavored, subacid apple. It will always recommend itself in any market.

Now, I will not give any further description of these fruits, for they will all pass muster in the best of style.

Now, in conclusion, go with me to the grounds of Peter M. Gideon, the great experimenter of the State of Minnesota, who propagated the wonderful Wealthy apple, that has saved that State alone, one million dollars with the production of fruit in one year. Now the same thing can be done in Colorado. Mr. Gideon had the State of Minnesota, through the acts of their Legislature, make a law to give him the use of one hundred and sixty acres of land, and $1,000 in money per year, for the propagating and producing new fruits for that State. So far, in Colorado the horticultural industry has had to paddle its own canoe, if it was paddled at all. Now, if so much has been done for the saving of money in the State of Minnesota, why cannot our Legislative body do a little to the aid of this industry? I know that our members of that body are composed of just as brilliant and far-seeing men as in any other State in the Union, and I do think that this term of our law makers will give us some respect in this good and noble cause.

DR. SHAW: What are the marks of difference between the Snow Apple and the Webster Seedling?

MR. WEBSTER: The Snow Apple is a fine eating apple but loses its flavor when cooked. The Webster Seedling is more tart, but I think grafting will overcome that. It is good both for cooking and eating.

MR. MILLISON: Could you tell them if they were mixed with the others?

MR. WEBSTER: Yes, sir.

## AFTERNOON SESSION.

The first business of the afternoon session, was the election of officers for the ensuing year, as follows:

President, A. E. Gipson, of Greeley; Vice-President at Large, George W. Webster, of Hygiene; Secretary, Nelson Millett, of Denver; Treasurer, Wm. Davis, of Denver; Executive Committee, Prof. James Cassidy, of Fort Collins; George H. Parsons, of Colorado Springs, and Mrs. A. Gallup, of Denver.

PROF. JAMES CASSIDY, of the State Agricultural College, then read the following paper, entitled

## Injurious Insects.

Although the progress of agriculture and its branches is but little impeded in Colorado by the presence of injurious insects, which, in the older states, harrass, and well nigh set at naught the best efforts of the husbandmen, still their presence with us, and increasingly large numbers, hinges the development of our agricultural and horticultural resources, and especially upon the extent and permanancy of specialties in field and garden.

Already we hear of their presence wherever field and garden culture obtains, and as the number of food plants are each year increased, and both large and small fruits are to be found on every farm, then may we expect to have to fight for the products of the soil, so seriously handicapped by their insect enemies.

In this State we hardly realize the situation as yet, because we have not felt the danger, but when it is upon us, we shall be successful only by the most united effort

on the part of every one who raises farm or garden products. Fortunately as the year rolls on, and as emergencies become more and more exacting, economical entomology successfully comes to our aid, with new and efficient remedies for many of our worst insect enemies. Many valuable insecticides are now before the people, and yearly, new and more economical methods and appliances, are eagerly sought for and obtained, to insure the better application of these remedies.

### THE GOOD THEY DO.

Insects play a very important part in the economy of nature, their presence affording us the enjoyment of many luxuries and necessities, of which honey, silks, dyes, wax and inks are among the most important. In fact, it may be said that we are in a great measure dependent upon them for our existence. They are indispensible in the destruction of all decaying organic matter, and as pollenizers of the flowers of plants they fill a very important position in the economy of nature. Insect life, too, exercises a most lordly sway over the earth and its inhabitants, for nothing in nature that possesses life or has possessed life, either animal or vegetable, is safe from their attacks.

### CANNOT DODGE THEM.

The air does not protect its denizens, nor the water its animal life, and the world of plant growth entertains a mighty host of them. The gardener suffers more loss from this source than the farmer, because of the greater variety of plants grown by him.

As specialties are practiced in agriculture, we find as a natural consequence the rapid increase of particular forms of insect life whose favorite food plants they are, and if these plants are cut off many insects exhibit a

very plastic adaptation to their changed conditions. Thus there is but the most limited bar to their rapid increase.

### OLD TIMES.

The very early history of agriculture in this country found the soil rich in plant food, and owing to the very natural conditions prevailing at that time we had a harmonized fauna and flora. So long as nature was operating alone, and man had not interfered, plants and insects and the parasites of the latter, seemed to be about equally balanced, no one infringing to any serious extent upon the other. But with the growth of population, and the increased volume and variety of man's wants, that law, which we may denominate the "Balance of Nature," was overthrown. Nature seems to have been generously disposed toward all created things, and to recognize everywhere the law of competition, and to give every possible chance to live and beget its kind to every organism in her realm. Among inferior organs of creation, supreme selfishness is the rule; the strong are ever ready to devour the weak.

### THE POTATO BUG.

When these plains were first settled, the potato beetle was found here "to the manor born," seemingly satisfied to exist on the native allies of the potato, but settlement brought with it the cultivated plants of our time, and among them the potato, and this latter plant proved to be so much better suited to its tastes, and owing to the universality of its culture, the *Doryphora* soon covered this continent between the two oceans.

### PARASITES DO NOT COME.

The settlement of the United States, too, has brought to our shores the most persistent and aggressive elements in plant and insect life of an older civilization,

and these are constantly being added to, and, in the case of insects, it is but rarely that we get with them the parasites that so hedge them in their native haunts so as to keep them within reasonable limits. The introduced foreigners in plant and insect life are most to be dreaded, because of this perfect freedom from the checks that held them down in their old home not being present in the new. Thus relieved they increased in numbers with extraordinary vigor.

Darwin, the great naturalist, was the first to notice the fact that the introduced species of all animals are more vigorous and prosperous than are closely related native species. The dreaded cabbage butterfly is a case in point. The currant saw fly (*nematus ventricorus*) is another of these pests from over the sea. So, also, are the codling moth, wheat midge, grain weevil, and many others. The codling moth, cabbage butterfly and currant saw fly, will continue to devastate wide areas of country. Others, again, will be confined to more limited areas, so that it may be said that each State will have its own pecular forms of insect life, and which will be none the less destructive because of their limited field of operations. There are millions of insects operating at all times on growing crops that are scarcely, if at all, noticed because not visible to the naked eye. Economic entomology has made most rapid progress within the past few years, which is seen in the invaluable original work done by Riley, Cook, and others, in determining the life, habits and history of our worst insects, and the careful consideration given the various remedies proposed for their extermination.

### SOME FIGURES.

Prof. Lentner notes one hundred and seventy-six species that are known to feed on the apple, and Prof. Cook added three more last season. It has been estimated

that the damage done by insect life to agriculture in this country would reach $200,000,000 annually. This estimate is based on the census reports of the General Government. Prof. Cook says that the chinch bug has destroyed $75,000,000 worth of corn in a single season in Illinois. The same authority says that the Hessian fly often destroys $20,000,000 worth of wheat in one year in a single State, and that it has been estimated that each species of plant serves six species of insect life as food. From these statements it will be seen that this subject is one of no mean economic importance. From all this it is reasonable, too, to infer that agriculture and its branches can never be successfully practiced anywhere without an accurate, scientific, practical knowledge of all our insect enemies.

VALUE OF SCIENCE.

The value of this science, too, as an educator of youth, is now readily acknowledged by all modern writers on natural history. Its study cultivates the qualities of accurate discrimination, ready perception of resemblances among diversities, and of the latter among resemblances. The ability to see things quickly, and to be able to interprit readily what they teach us, is a most admirable quality or gift in practical life, all of which this science is fitted to develop, and chiefly for the reason that its objects are things of life which are ever a source of interest to the young, and are gifted with instincts so marvelous as to challenge and hold the attention of the student eager for knowledge, that would be certain to be of value to him in after life.

ALL INSECT LIFE

May be said to have four stages of existence: the egg, the larva, the pupa and the imago, and three of those states are more or less abruptly marked by metamorphose. With the first stage we are all familiar in a

general way. In the second stage the larva resembles worms, the word signifying a mask. Linne, the naturalist, considered the true insect as being masked under this form. It is in this stage that insects are most destructive, feeding voraciously; they cast their skins several times and when, having attained their full growth, cease eating and fix themselves in a secure hiding place. Linne gave to this stage the term pupa, because of their resembling somewhat a child swathed in swaddling clothes, a practice once common among ancient, and even modern people. In this stage insects eat no food, are incapable of locomotion, and, if opened, seem filled with a watery fluid. After remaining a longer or shorter period in this stage, as the case may be, some species only remaining a few hours, others months, and still others years, the inclosed insect, when matured, bursts its bonds and enters the fourth stage. It is now a perfect insect, endowed with all the peculiarities of its kind, and to which state Linne gave the name *imago*, because, having laid aside its mask, it is now a typical representative or image of its species.

## EXTERMINATORS.

From these preliminary considerations we will proceed to consider the principal remedies at present in use for their extermination. There are two general classes of remedies now in use, those which kill and those which repel.

The best repellant is to keep plants in a healthy, growing condition, and this implies liberal culture and fertilization of the soil. Other measures of this nature are rotation of crops, and a judicious selection of seed. When plants become stunted in their growth, they at once are especially susceptible to the ravages of rapacious insects. Under this head, too, may be classed such repellant measures as the washing of trunks of

trees with soft soap or lye, to prevent the apple or other borers from depositing their eggs. Whale-oil soap for the *aphis* and red spider, soot, lime, ashes and fine dust, are at times valuable agents in protecting plants from the egg deposits of insects.

### HOW THEY WORK.

The remedial measures, however, transcend all these in value and importance: they are arsenical compounds, hellebore, petroleum, pyrethrum. The first and second poisons the food plant, and hence acts through the stomach. They must not, however, be applied too strong, or plants will either be killed outright or deprived of all or part of their foliage, and which would, of course, defeat the purpose in view. The second and third destroy life by contact, and so are equally effective against insects that eat the struction of plants and those that suck its substance. The arsenical compounds are arsenic, Paris green and London purple. The first mentioned has been recommended by Prof. Budd and others.

### THE WOOLLY APHIS, OR AMERICAN BLIGHT.

I received this insect last winter of Mr. Webster, of Longmont. It is a small insect, covered with a white, woolly substance, which conceals its body. They infest the apple tree, especially working on the trunk and branches, and under the surface of the ground on the roots, producing small warts by their punctures. The wind carries them long distances by means of the woolly substance with which they are enveloped.

The remedy noted in the last case will prove to be effective. The trunk at all times should be kept smooth that no rough bark shall afford a lodgment for insects and prevent the application of effective washes.

### THE PEAR SLUG.

This is a destructive insect to the foliage of the plum, leaving only the bare net-work of the veins. Any of the arseuical compounds, or the kerosene emulsion, will destroy them.

### LEAF ROLLERS.

In May and June these insects may be found on the leaves of fruit trees. They form for themselves a sort of cocoon out of the leaf, and hence, are hard to kill. The remedy in this case would be to apply some poison to the foliage. In the case of very small trees, the leaves may be picked off in order to prevent their increase.

### SCALE INSECTS

Of many kinds attack fruit trees. They attach themselves to the bark. They are found usually in the greatest number on trees that are stunted in their growth. The best time to kill them is in June, when they are young, as at other times they are hard and able to resist ordinary remedies.

### THE CURRANT WORM

Feeds on the leaves of the currant and gooseberry, in June. The remedy is to dust its leaves with powdered hellebore. We have also used dry, fresh slacked lime successfully.

We will now briefly notice some of the most injurious insects of this region, and their remedies:

### THE LEAF-HOPPER.

Two species of *Erythronemia* were, as you are aware, destructive the past year to the apple tree and grape vine. The species on the apple seemed to be confined to that plant and did not attack the grape growing in close proximity.

They are generally, but erroneously, known as thrips. The larvæ have no wings, but jump with alacrity, and are as destructive as the perfect insect. The two species were pronounced distinct from any other known species of this genus that occur elsewhere by Dr. Riley, the eminent entomologist. We are inclined to think that the leaf-hoppers hibernate as a perfect insect, as Mr. Faurot tells me that they may still be found among the fallen grape leaves in his vineyard.

The grape-hopper seemed to attack the thin-leaved varieties of the grape first, and those with thick pubescent foliage afterwards. The same remark is true of the species on the apple. In the mountains and on the plains, the grape-hopper feeds on the *Ampelopsis*, and is said to feed, also, on the native and cultivated hop. For the destruction of this insect we commenced with *pyrethrum*, but found it much less effective than the kerosene emulsion of Dr. Riley.

### THE CODLIN MOTH

Is an important insect. It abounds wherever the apple and the pear are cultivated. Its ravages and that of the scale insect are such as to threaten seriously the very existence of large fruit culture in Colorado. The moth appears early in the spring and lays its eggs in the eye, or calyx of the apple. The egg hatches and becomes a worm which at first feeds on the fleshy portion of the fruit, but as it becomes older and stronger it attacks the pips, or more vital part of the apple, after which the latter soon falls to the ground. Usually before this occurs the worm vacates the fruit during the night-time and at once secures a hiding place in the bark of the trunk. The worm attains its full growth in about three weeks, and escapes through a hole which it makes in the side of the apple.

In northern climates the moth is single-brooded, in the middle States double-brooded, and in California three-brooded.

REMEDIES.

This insect is now very readily held in check by an application of the wet mixture of the arsenites. We cannot, however, recommend its use in this climate without first making many chemical analyses of the calyxes of the fruit with a view to detect the presence of arsenic.

Other remedies are: first, to keep clean the stems of trees by scraping and destroying the cocoons wherever they may occur, whether on the trunk or in apple barrels; and, secondly, to place bands of paper or cloth around the trunk early in June, to trap the worms as they leave the fruit. The bands should be examined every two weeks and the cocoons destroyed. The moth is a very beautiful insect, but although common enough it is strange to say that it is but rarely seen, and hence but few fruit-growers, even in the older States, have ever seen it.

APHIS, OR PLANT-LOUSE.

There is hardly a species of plant that grows but what has some member of this family feeding upon it. They are found upon all parts of plants. Some species which are wingless are found on the roots of plants, as the *Phylloxera* on the grape, others again roll up the leave, or form gall-like swellings on them as in the case of the poplars and the willow; and one species sucks the sap of the kernell of small grain. Ants are extremely fond of the sweet excretions of these insects, and often herd them like cattle in their nests.

The elm, plum, poplar and willows are especially infested by them in this State. They multiply with extraordiary rapidity, and were it not for their numer-

ous enemies and that they are easily killed, they would prove to be an obstacle almost insuperable in the propagation and culture of plants of nearly all kinds. The kerosene emulsion will destroy them effectually.

KEROSENE EMULSION.

Dr. Riley's formula for the safe application of this insecticide, is as follows: Kerosene, two gallons; common soap, half pound; water, one gallon. The mixture of water and soap is heated to the boiling point and added to the kerosene. The mixture is then churned by means of a force-pump for five or ten minutes, or until a cream is formed which thickens on cooling and adhers without oiliness to the surface of the glass. It is then diluted with cold water before using, according to the insect and plant to be dealt with.

Usually, twelve parts of the water to one of the emulsion will be found effective if applied as a fine spray. Pyrethrum is the powdered flower-heads of *Pyrethrum roseum* and other allied species. It is especially effective against soft bodied insects, as the cabbage worm, and kills only by contact. The insecticide resides in a volatile oil. It is not so effective in the open air as in a green-house or in a dwelling-room. It may be used pure as a dry powder or slightly diluted or as a wet mixture, using one table-spoonful of the powder to two gallons of water. Its value, however, is altogether dependent on its being fresh, which is too often very hard to obtain. In the culture of plants grown for their leaves, an important preventive is to keep them in the most vigorous and thrifty condition during their season of growth. Insectivorous birds too should be encouraged to build their nests, by planting trees and shrubs. Our black-birds, although destructive to ripening corn and wheat, are, nevertheless, an invaluable ally in the destruction of injurious insects.

### LIQUID INSECTICIDES

Are applied by means of a fountain pump with a nozzle attached to throw a fine spray and fastened to a barrel containing the mixture to be used. Insecticides to be used in the dry form, are best applied by means of a "Woodason bellows," taking care to work to the windward, as inhaling the arsenites might prove dangerous. The much dreaded Phylloxera is now met by the use of the bi-sulphide of carbon. It is conveyed into the ground by means of injections or other complicated machinery. The French Government, last year, voted $200,000 to promote investigation with a view to the destruction of this insect. For work on a large scale, the liquid application of insecticides has been found to be most effective, and to this end much thought has been given by Dr. Riley to the perfecting of a spray nozzle that would regulate the effective and economical application of insecticides.

### RILEY'S FORMULA

For this, is one pound of arsenic and one pound of sal-soda boiled in one gallon of water till the arsenic is dissolved, and it is then diluted at the rate of one quart to forty gallons of water. The objections to its use are its color, which is white, making it liable to be mistaken for some harmless substitute, and its liability to hurt the foliage if applied too strong. Its merits are that it is cheap and perfectly soluble, not so likely to clog the nozzle of the spraying apparatus as Paris green or London purple. Paris green we have found effective in the proportion of one table-spoonful to a tobacco pail of water. As a dry mixture it is used with such dilutents as ashes, flour or plaster at the rate of from one part of the poison to twenty-five or even one hundred parts of the adulterant. London purple is used in much the same proportions, and was first used by Dr. Riley in

this country. Generally it is not so effective as Paris green, but it is much cheaper, costing about five cents as against sixty cents per pound. It is also more soluble, and less dangerous because not so poisonous, and is of very decided color, so that when intelligently used it is preferable in some cases.

I do not recommend its use in this arid region to the leaves or fruit of plants soon to be eaten as food. Insects that are suctorial in their habits and do not eat the leaves are not to be destroyed in this way. They are destroyed only by the direct contact of the remedies applied; the most effective of which is obtained from that form of petroleum known as kerosene, producing death by suffocation or by its corrosive action. The value of kerosene as an insecticide, has long been recognized, but the great risk of injury to plants because of the difficulty of properly mixing or diluting it, has prevented its more general use.

The species noted are but a few of the number destructive to useful vegetation the past season. Time will only permit me to note, only in the briefest manner, the corn worm, which was injurious to sweet corn in a greater degree than common. Various species of *Haltica*, or leaf-eating beetles, ravaged the beet, the foliage of apple trees and seedling cabbage plants. The latter and allied plants were also eaten largely by the zebra caterpillar and the cabbage *flusia*. Of our shade trees the cottonwoods are seriously threatened by the streaked cottonwood beetle and the forest tent caterpillar.

America has been called a land of insects. They thrive here apace; the conditions are favorable. Our country is vast in area and extremely wealthy and varied in its flora. Much is expected, nay demanded, of economic entomology that we may be properly

equipped to meet the exigencies of every season's developments. To satisfy this demand careful experimentation, founded on a scientific knowledge of the structure and habits of insects, is needed to fully equip the experimenter for useful work in field and garden. For this purpose the bill now before Congress to create experimental stations has much to recommend it. We need such stations in every State where competent men may carry out careful and painstaking experiments. But we need them more particularly in our own State, where conditions obtain, as you know, not paralleled in any other portion of the United States. There can be no doubt that money judiciously expended in this way would amply repay the investment by giving method and permanency to the labors of the pioneer horticulturist.

MR. WOLFF: What is the nature of the insects that prey upon the Box Elder? What becomes of the green worm and what is the remedy?

PROF. CASSIDY: All these worms that eat the foliage may be successfully met by the kerosene emulsion. This worm is known as the moth. It spins a web and can be met in this way. Pyretherum is not so successful, but it is very valuable in killing all soft bodied insects.

DR. SHAW: What is your remedy for the root aphis in the apple?

PROF. CASSIDY: The only remedy is to burn all the rubbish or use hot water around the root of the tree. They work upon the roots the same way that they do upon the foliage. This is a California insect and was introduced into the State by being brought in nursery stock. It is common in the East and in Great Britain. It has never been decided whether it is a foreign insect or not.

DR. SHAW: Have you ever been troubled by the root aphis?

PROF. CASSIDY: No, sir; I never have.

MRS. WASHBURN: Do those that work upon the Cottonwood ever take any other form?

PROF. CASSIDY: There are two species: One produces a gall upon the trunk and the other works upon the leaves. A number of this family work upon the inside of the leaf.

MRS. WASHBURN: What peculiar form do they take after they are worms?

PROF. CASSIDY: That may be gotten rid of by these remedies before mentioned. Paris green is applied to the cabbage in the East early in the season to kill the cabbage worm. These latter take no other form. They deposit eggs and live over in that way. There is a *Phylloxera* that lives on the grape that deposits eggs in the ground in the winter.

*Question:* Is there a remedy for the green corn worm?

PROF. CASSIDY: I don't know any. It is more plentiful than I expected to find it here. The green corn worm lives on such a variety of foliage plants that no remedy can be prescribed that will reach it. It is easy for it to perpetuate its existence. I do not recommend the arsenites to be used upon the foliage, yet I have seen it used to kill some kinds of worms. After a careful analysis of the plant in the fall no arsenic can be found upon plants upon which it was used early in the season. The reason why arsenic is more liable to do injury in Colorado, is the lack of rains to wash it off the plant at the proper season. Dr. Kelly, of the Massachusetts Agricultural College, analyzed several specimens and found present considerable arsenic. The arse-

nic must be applied while the apple is pointing upward on the tree. White arsenic occasionally destroys the foliage of the plant and is objectionable. It is recommended by Prof. Budd, of Iowa.

MR. GIPSON: I heard this question discussed by eminent experimenters, and the general opinion is that arsenic is a very good remedy for the codlin moth.

PROF. CASSIDY: I intend to try these remedies.

MR. BROTHERS: When are we to begin to look for these things?

PROF. CASSIDY: About the time the standard apple tree is in bloom—the first week in June. The moth flies mostly by night, and hence is not often seen. It is a very small and beautiful insect. It is a native of Great Britain.

MR. BROTHERS: What are these millers that appear so numerously in May about the candle light? Have they anything to do with the codlin moth?

PROF. CASSIDY: They are beneficial. We often destroy our best friends in the orchard through ignorance, or in attempting to destroy pests.

MR. WOLFF: We want this in such a form that we may know how to attack them. Can Prof. Cassidy give it to us in a good form? We want to give it to our friends so that it will be of incalculable benefit to them.

(Some one suggested that they be printed.)

MR. WOLFF: I move that Prof. Cassidy be requested to furnish the receipt for the use of white hellebore and the kerosene emulsion. I will foot the bill to put them where they will do the most good and be of use to everybody. I will have one thousand copies printed at my own expense.

MRS. WASHBURN: Let him do it if he wants to.

MR. J. T. CORNFORTH, a leading fruit dealer of Denver, then followed with an exhaustive discussion under the head of "A Commercial Review of the Colorado Fruit Market," filled with valuable suggestions, the result of a long experience in the fruit business. His remarks were extemporaneous, and it is to be regretted that they could not be preserved.

MR. CORNFORTH was plied with questions and replied as follows: We admit that the comparative value of the Colorado climate for keeping fruits is very high. Some years ago we bought a large quantity of Spanish grapes in New York and shipped them to Denver, because they were cheap. We could not market them. We had too many. We sold them on the start at $16 for sixty pounds, but had to reduce the price very much to sell them at all. A short time thereafter I had occasion to go to New York, and asked there what they sold grapes for. The price asked was $1.50 a pound. In Denver we sold them for $2.50. I went a little further down the street and asked the price again, and they said $2.50 a pound. I asked the reason of the price and they said they could not keep them. I then went to the first store and asked them if they would not like to buy some of that kind of grapes. They said "Yes, if they are sound." We then shipped them some to New York, paying 12½ cents a pound expressage. We emptied a barrel and found them all sound, selling five barrels at $40 a piece. They thought we were playing a game on them, so we emptied another barrel, and finding these sound also, sold more of them at $43 a barrel. And the rest we sold at prices that I am ashamed to tell. Colorado is the best fruit keeping district in the world. We have examined a great many barrels of carefully packed Colorado apples and have not found one rotten apple to the barrel.

*Question:* Can we get rid of our surplus fruit?

*Answer:* Located as we are in Colorado it would be impossible in the next twenty years to plant enough apple trees to flood the market.

*Q.* Can you give us any idea of the number of car loads of apples that you use in a month?

*A.* Our freight on apples was over $8,000.00 in one month.

*Q.* How many car loads?

*A.* Thirty, forty and fifty car loads. We have paid not less than $25,000 for freight in two months.

*Q.* What apples can you make the most money out of?

*A.* If I were to cultivate apples in Colorado, I should expect to have them sold all over the United States. My choice would be the Ben Davis.

*Q.* Do you engage all the fruit you can of our home growers before going out of the State?

*A.* We can't afford to pay one dollar for an article for which we only receive ninety cents. It requires more intelligence in gathering, packing and marketing in order to get the full value out of it. Our apples can be sold in the future across the British line and as far south as South America. I believe we shall have railways extending to South America, and in 25 years can dispose of our entire crop through these agencies. I am acquainted with a man who has 450 acres of apple orchard the product of which would not last Cornforth & Co. a month. I recognize the fruit of the apple as the fruit of the world.

MR. MILLETT: I saw it stated by a fruit grower that he was absolutely compelled to ship his fruit to the mountains because he could not sell it in Denver. Is it

true that he simply desired a larger price for his apples, or is there some other cause?

*Answer.* That is the same question over again. The intelligence of gathering and packing is the only reason. I know the eating qualities of an apple as soon as I look at them. Apples are often improperly packed and soon spoil. It would pay a man engaging in the fruit business to go to California and learn how to pack and care for his fruit. Farmers have been broken up simply because they do not know how to pack and care for their fruit. The Colorado apple growers neither pack their apples nor sort them. A single bad apple in a barrel, will have a bad effect on the remainder. Apples should be put in heaps and covered with straw; afterwards sorted and put into barrels; the good in one barrel and the poor in another. The apple I like the best is the Jonathan. The Bell Flower comes next. The Jonathan has no commercial value as a shipping apple. A friend of mine was in the grain business and sent a car load of wheat south. Six months afterward a letter came from some place in South America to know where the wheat came from, as they wanted more of it. And so it will be with our fruit. I believe in time our market will extend beyond the Isthmus of Panama.

The following paper was then read:

## Floral Fashions

BY MRS. AVERY GALLUP.

In the wintry days when the sun, with a whole army of dogs at his heels, can hardly raise the mercury above zero, we look with content at the few modest blooms on our library table, making the room more cheery within, in contrast with the snow without. Floral styles are far

from our thoughts; but let wintry breezes waft the news of an elegant reception. What dress shall be worn is the ladies first thought, and how to decorate it, for an elegant costume is not complete without at least a corsage, and many wish elaborate dress trimmings as well as a hand bouquet. In selecting these, the color and style of dress must be consulted, as well as complexion and style of wearer, making even these dress decorations quite a study. Just now roses are the rage, and must be had in abundance, either in pink, yellow, red or white, as the colors best suit the wearer, with long stems and loose bunches fastened securely, to look as if they might fall off any minute. Carnations, with their delightful fragrance and variety in color, coupled with the fact that they are much less expensive and more durable, make them scarcely less in demand than the rose for evening wear. Begonia and Calendulas furnish the orange color now much worn, and vastly becoming to a brunette. Lillies of the Valley and Violets, or Mrs. Jolliffe Carnation, a delicate peach color, are very lovely for blondes, while nothing is more becoming than a dress decoration of Marguirite Daisies, with their bright yellow eyes.

Americans of to-day, with characteristic good sense, declare the blossom in season the most stylish one to use. For instance, in early Spring nothing equals the trailing Arbutus, with its stary pink flowers and delicate perfume so dear to the heart of ever New Englander. Then come the Dafodils, Tulips and Hyacinths, the Flower de lis, the National flower of France, in every shade of purple, yellow, pearl and white, Snow-balls and Paeonies, June Roses, unequaled for beauty and perfume by any new Hybrids, Sweet Peas, Phlox and Chrysanthemums, any one of which, would make a house georgeous for wedding or feast.

Summer flowers are so plentiful, one hardly knows whether to choose one flower to make a room lovely, or

the equally stylish mixture of all sorts loosely arranged, making a house look like an old-fashioned country garden, flaming with Four-o'clocks and Marigolds, Bachelor Buttons, Coreopsis and Touch-me-nots, sweet with Mignonette, Alyssum and the spicy Jerusalem Oak.

These mixtures *seem* easily obtained, anyone can have them in the house or garden; but, suppose you take a few hundred plants of most familiar varieties, and think which is low growing and which grows tall, what colors will contrast and what blend, what blooms late and which early, and you will find to make a success of what might be called a floral jamboree requires some thought.

For years the grower has been doubling up his Dahlias, quilling and fluting them in a style equal to John Chinaman's best effort. When he has reached the pinacle of success, has the flowers large and small, so full that not another petal could be put in with any degree of comfort, he beams with smiles as he exhibits the results of years of Hybridizing. When some upstart appears with a cluster of the original parent, with a big yellow center, and a single whorl of leaves, in yellow, red, bronze or white, so utterly surprising with their saucy faces, they carry off the premium and the quilled affairs must stand in the shade till the style changes.

During the holidays just passed, there was no question of, with what shall we decorate our homes, but how best can we use the Holly, Mistletoe and various Christmas green which come to us from near and far; for Holly and Mistletoe we must have, even if we call upon the hills of Pennsylvania and Virginia, the swamps of Wisconsin and Texas, or go over the sea for our decorations.

Though coal and pine knots represent our Yule log, the fire shines none the less brightly on wreath and

cross festoon and Christmas bell of Holly and Ground Pine, which add so much to the pleasure of great and small at the glad Christmas time. With these for a back-ground, carnations and roses, hyacinths and mignonette, go twice as far, the frugal housewife says, which is quite an object when flowers bring mid-winter prices.

For party decorations, ribbons with flowers are much used. A parlor in smilax and roses, with pale pink and blue ribbons; the library in orange begonia and calendulas, with ribbon the same color; a hall with an abundance of smilax, poinsettas and callas; the dining-room in carnations or geraniums, would make a house quite elegant, with here and there a palm in one corner, a group of ferns in another, Holly in the fireplace, smilax draperies for door-ways, and screens of foliage to cover a door or hide the musicians. Solid colors are much used. Scarlet, pink and yellow dinners and teas, have been the rage for the past year. The latest, a green table, an effect entirely in foliage, is very elegant. A round table is used, with a centre some three feet in diameter of fine growing ferns, begonias and the like; favors of ferns and asparagus pluniosa tied with pale green ribbon.

In the New York market, the question now is, not what we can find most elegant, but what is there so expensive the majority cannot afford to buy. And even at a Delmonico dinner, the decorations are first, the dinner second, not only in importance, but expense. Orchids now used, a single spray of which sells for five dollars, for bridal toilets and most elegant dinner decorations, are much sought after. Still, I will venture to say, a decoration of our native Yucca, with a sprinkling of the scarlet painter's brush, so plentiful in our mountains, on a satin or plush spread, would command a price equal to the regal Odontoglossun.

Our mountain flowers need only an introduction to become popular. And in these days of rapid transit, even in the far east, the day may come when a dinner of Rocky Mountain trout, venison and antelope, would be no more complete unaccompanied by wild Columbines, Penstamon, Scarlet Cypress and Kinnikinnick, than a Colorado picture of Rocky Mountain scenery without a jack or a cowboy.

MRS. A. L. WASHBURN then read a paper entitled:

## Horticulture for Women.

The subject assigned me for this occasion may be considered, like every other on our programme, of vital importance when we give it our individual attention, for attention is the microscope of thought, which, turned upon any part of human activity or interest reveals its hidden uses, beauties and possibilities. The first thought may be, "why say horticulture for women?" Is it not alike for all? As if we were to announce, "baby tending for men," if we can imagine an executive committee composed wholly of men requesting enlightenment upon such a topic, for men have been baby tenders ever since babies were invented, and still continue to ply the gentle arts of soothing, dressing, candy-giving and misgoverning their progeny whenever the maternal guardian will allow such scope for faculties which, it must be confessed, have been too long left but partially developed, or exercised under the difficulties and discouragements of a strong but false public opinion. Thus, while men have been doing what they could, under depressing conditions, to become adepts in the useful art of "baby tending," women have, per contra, been struggling with equal adverse conditions, and an

equally false public opinion, to develop themselves as genuine horticulturalists, the while they have for ages tilled the ground, sowed the seed, and reaped the harvests for mankind. No latter day saint or sinner, of civilized society, will deny the right, nay, the duty of men to "tend" their own babies, or of women to till their own garden, or still further, if they wish, to care for other people's babies and gardens to the best of their knowledge and ability. In fact, the many children uncared for—poor little waifs of an ill-governed human society—do cry aloud for the unspent strength, and love, and tenderness of many a childless man whose rich resources of heart and mind are wasting for want of an object. So, in the higher walks of horticulture, we need the ready invention, the executive ability, the wise economy and the love of the beautiful, inherent in women who, childless and homeless perhaps, deserve a permanent and lucrative employment suited to their tastes, their strength and their love of independence. We have but to call to mind the thousands of women now actively engaged in horticulture, to settle at once and forever the possibility, and the propriety of women engaging in this delightful, healthful and useful industry. Yet, such is the perversity of the human mind that gentlemen may be totally unable to recall at this moment, the name of any lady who has distinguished herself nationally as florist, gardener or vine grower. Indeed, they may not remember the names of more than two or three men who have filled the niche of fame in this direction. This is humiliating, indeed; but let us console ourselves with the reflection that, though the past may belong to others the future is all our own, and men and women alike, in the present liberal status of public sentiment, may become renowned and useful to their fellows in the many avenues open to enthusiasts who would develop themselves, or the means of subsistence.

When we consider the myriad forms in which horticulture responds to the prayers of her devotees,—when we think of the varieties of cereal fruit and flower suited to our physical, moral and intellectual growth, we wonder that everyone does not first seek "the earth and the fulness thereof."

When we dwell on the vast resources and supplies of food for all, the rich, the poor, the educated, the ignorant, the children and the animals, and the arteries of trade where circulate these vast supplies for general distribution, we must concede the need of workers in every field. Think of the lifelong labors of those who study, modify and improve from year to year our vegetables, fruits, grains and flowers! Think of the renewed health and comfort in fresh food from the garden-bed, the tree or the trellis! of the poetic thought born of the rose-bloom and the mignonette, lying on fair pages between richly embossed covers on the center-tables of the wealthy, who else might never feel the charity of nature, or learn of her loving educating power.

We stand amazed at the fairies we conjure up, whose deft hands hold within their almost invisible clasp so much of our destiny. They have fashioned the rainbow into bouquets for humanity—pansies for thoughts, and the red rose the emblem of that ideal love that forms the atmosphere of heaven. They weave the marriage bell which hangs, a floral canopy, lovingly over those who join hearts and hands for time and eternity, the snowy wreaths and the immortelles lying above the pulseless breasts of our loved ones, the glowing chaplets which crown the laughing, blushing Queen of the May. They dip the purple bunches of the grape in the mist of the morning to heal the sick, they paint with sunset hues the downy peach, they present again the apple for man's repentance. It is woman's mission, no less than

man's, to educate, to train, to develop and evolve from the tiny seed or the neglected way-side weed, be it of human or plant life, the fragrant flower, the beneficent tree or the soaring immortal soul, to grow in the sunlight,—to enjoy and dispense joy to all. The tender heart of a woman walking in a garden gave utterance to thoughts worthy of womanhood, and thus poetically transcribes her emotions:

IN THE GARDEN.

"Was it thou, Mignonette?
For while the south wind stills his low complaints
To bear the censer of thy rich perfume,
I read upon a terrace warm with bloom,
Flower-stories of the Virgin and the saints.
I read that Mary, passing through a field,
Her heart oppressed with that mysterious gloom
Which ever falls on those whom heaven has sealed
For glory's crown—and doom—
Stooped often in her meditative walk
To pluck some favored blossom from its stalk,
Some happy flower, which bowed its beauteous head
And summer's odorous benediction shed.
But one poor, fragile weed,
Nor beautiful, nor sweet
Which she would never heed
But that it clung so close about her feet,
With tender touch she gathered: to her breast
And to her lips the slighted floweret pressed,
Because so frail, so hopeless, loved the best!

"Oh, then the pale weed strove
To whisper forth its rapture and its love;
And while it mutely trembled and adored,
Like praise of spirit risen
From long and woful prison,
A tide of fragrance from its heart was poured.
Nor once in all the ages has it sighed
For beauty's coronal of brilliant hue,
Red of the rose, or violet's winsome blue;
By that one kiss of pity glorified,
The garden's lowly, well-beloved flower,
A miracle of sweetness from that hour—
Mignonette, was it thou?"

The scope of this paper will allow but a hint of the various directions where women may better their own condition by engaging in one or more of the branches of horticulture. First, do not be turned aside by the intimation (often not too delicately put), that you would "better stay in the house and mind the baby," for you and I know, though we may not stop to explain, that there is no baby, or he is long since grown to manhood, and has, perhaps, though we hope not, joined the ranks of those who would limit the usefulness, happiness and activity of their mothers and sisters to an imaginary sphere prescribed by the narrow-minded. We know, too, that some one must raise the plums, the berries and the forget-me-nots for the dear babies and their weary parents. The woman who places before them the best fruit of her hands, shall be praised "in the gates," with the recompense for her toil.

When we read that 250,000 women in London are employed as seamstresses, and needle women, whose average earnings are not more than a shilling a day or $1.50 for a week's work, we can but deplore the blindness or indifference of that society which allows slow starvation of mind and heart and body to overtake those who, out in the free air, among the fields, the birds and the flowers, might till the earth and train the vine, and add to the meed of the world in health, in wealth and virtue. When we hear of the button-hole makers obliged to live on $3.00 per week, and of all the underpaid and overworked women in cities who live on the blood and bones of the poor, we would conjure them, by all their hopes for the good of posterity, to overflow their ranks into the Colorado desert and aid us in demonstrating the fruitfulness of that once arid region; and when we hear our horticulturists complain of lack of competent help, we feel like whispering to the young girls behind the counters in "cheap stores," who work

for two or three dollars per week and "board themselves" (on bread and water, for all their employers care), who waste their youth and all its beautiful aspirations in the subterfuges and subservience of a sordid commercial life—we feel like imploring them to fly from the suggestions of an evil life to the pure, free country, to "hire out" manfully if need be to the gardener to dig and delve, to tie up vines in the spring, to cover them in the fall, and in the fruiting season to feast on their luscious offerings; to bend and to stoop to the labor of setting out strawberry plants rather than to the dictates of a city "boss;" to pick with other laughing girls and boys the fragrant hops and enjoy the quiet slumbers which they bring; to plow and sow the brown furrow, which shall yield its increase for the hungry toilers, rather than aid in filling the coffers of the merchant, be he prince or pretender, at the expense of health, hope and self-respect. What wonder that the wide-awake teachers of the east are overrunning Dakota, Nevada and the wilds of the west in the search for independent homes? Their education, their self-culture and their semi-independence in society enable them to see the benefit and economy of such action. But alas! for the enslaved wage-workers of the cities whose knowledge of books, of principles in nature, of flowers and of the loving breast of mother earth is as our knowledge of heaven—a dim and ofttimes hopeless vision of a blest "beyond," to become ours only by a miracle.

Notwithstanding the proverb that "a gracious woman retaineth honor and strong men retain riches," in these times it is possible for the gracious woman, if she be a skilled horticulturist, to retain some of the riches herself, and disburse them according to her own judgment without the aid and advice of the "strong men.". The fashion of co-operation so rapidly gaining favor among the monopoly-ridden people at present, offers peculiar

inducements to women horticulturists, since a few teachers, seamstresses or laundresses may combine and purchase a few acres of land, and reviving, perhaps, the experience and observation of their younger days, raise crops of fine berries, vegetables, poultry and bees, and build up, with discretion, a good market near home in the city. Especially by the system of "Co-operative Exchange," may they be able, with their own surplus productions for the surplus products of others, without the interference of a dollar in money, if so desired.

"Co operative Exchange" has been tested and has proved entirely practicable, and must, when systematically adopted, go far toward solving the financial riddles of to-day. Cheap labor and dear money, and the false idea that money is necessary in every transaction, are at the bottom of all the "strikes." When labor sets its own price according to principles of justice and is exchanged only for other labor, drones and idlers, (called by some impolite people robbers), and the money changers in the temple, will be overthrown and society will resume its normal state;—a brotherhood of workers, thinkers and lovers, "in honor prefering one another." Not only will Mary and Martha exchange early French radishes "over the garden wall," for settings of pearly white Leghorn eggs, but James and Harry will exchange horse-back rides for grape pruning, and early apples for tickets to the opera. And the women who cannot leave home because of the devoted care they give their little precious human plants, may take others and keep them lovingly for a few hours in return for a dish of strawberries or early peas raised by the enterprising lady in the next yard. The little colony of women who bring every day, in their jaunty little carts, the tastefully arranged products of their fruit and vegetable garden, with their fresh eggs and honey and their beautiful bouquets, will find it exceedingly convenient to carry

back the choice groceries, furniture, crockery, tools, music and books, which the city workers can offer them in return. Understand, also, that the sugar is manufactured here, at the suggestion of Governor Adams (who counsels us to produce more and import less), from beets and sorghum; the starch from home-grown potatoes and corn; the laundry soap (by permission of the Health Commissioner) from the select varieties of oleomargarine now on the market; the toilet soaps from the fresh oils of our animal or vegetable products; the candles also from home production; the crackers from from our own wheat and oats, and the dried meats dessicated in our own pure, dry air.

No doubt in the impending future of feminine horticulture, corporations will shrink to see us raising railroad tickets and perpetual passes; express receipts will ripen in the fall and invitations to inaugural balls grow in pods a foot long. The water which dilutes the stock of the south-western Gould system will be utilized to irrigate our small fruits, while the ever contending bulls and bears of the same system, and others of like ilk, will be found amicably harnessed to the triumphal car of Pomona as she bowls along to the horticultural fair over a shining road paved with United States bonds and trade dollars.

But, to curb the prancing steed of fancy and come down to the sober jog-trot of reason and common sense, the unlimited scope for women's powers in the practice of gardening, fruit farming and flower culture, as well as the noble art of forestry, draws the unerring instinct of women to this ideal life—to the time when she shall by the might of her own hand and eye and brain and loving heart build up and develop a new Garden of Eden into which no serpent of evil may enter;—where, with her husband and her children, she may walk and

muse on the fruitfulness of the earth and the beneficence of labor; where the red cheeks of the over-hanging peach vies with the bloom on her daughter's cheek; where the dewy blackberry is not more bright than the happy eye of her son; where the stately elm, drooping in grace above her pathway is the emblem of her husband's love, and where the rose and the lily vie with each other to beautify the life and bless the hand that ministers unto their smallest needs. Peace and plenty remind her of the lines which Emerson's pure spirit in a mortal fame has written for such as she:

"The rounded world is fair to see,
Nine times folded in mystery,
Though baffled seers cannot impart
The secret of its laboring heart.
Throb thine with nature's throbbing breast
And all is clear from east to west.
Spirit that lurks each form within
Beckons to spirit of its kin;
Self-kindled every atom glows
And hints the future which it owes."

COL. E. T. ENSIGN being present, was called upon and made the following remarks on "Forestry:"

The attention of horticulturists has been brought to this subject of forestry. I am interested in horticulture as well as forestry. I had expected to have been here before but was prevented by other meetings. What we want is to obtain your aid, sympathy and co-operation. Almost everyone takes an interest in fruits and trees and beautiful flowers. It is easy to interest them in that subject, but it is not so easy to impress them with forestry. You must take an interest in it. It is certainly a growing subject. It will, perhaps, be recorded that there is no subject to which we need to give so much attention in this State. Your ideas upon legislation I think are excellent. Your motion for a committee of three I think is most excellent. We have had bills introduced

into the house and senate for our benefit. We have also had a memorial introduced into Congress asking for the transfer of the public forest lands in this State to the State. Our association will, either to-day or to-morrow, consider this subject, and will also consult the legislative committee, and may find it necessary to make some suggestions. I certainly hope we will continue to receive your active help and encouragement in this question of forestry. We believe that the forests of public timber land should be protected from injury, either by the State or General Government. In this State we have 16,000 square miles of timber, a good portion of it is still owned by the General Government. In other States and in the Territories there are immense tracts of timber that have not been surveyed. Commissioner Sparks won't allow them to be surveyed. The other Territories are taking steps in the same direction, and will heartily co-operate with the former. We must work with them and get both National and State legislation.

The following report was then read:

MR. PRESIDENT—We, your committee to whom was referred the matter of the protection of the timber of our mountains, that the water supply may be maintained and increased, beg to submit the following; that

WHEREAS, The supply of water in some of the principal streams has gradually diminished during the past ten or fifteen years; and

WHEREAS, The timber acts as a natural reservoir, holding the snows and moisture until such time as the hot suns of July and August melt them, supplying water when most needed for irrigation and domestic uses, on the plains and in the valley; and

WHEREAS, If the present rate of decrease shall continue in the supply of water, many sections, now supposed to be supplied, will find that their supply will be insufficient; and

WHEREAS, We deem it of the greatest importance that some measures be taken to protect and encourage the growth of young timber, and to preserve from destruction the timber already growing in the mountains and particularly near the head-waters of the streams; therefore, be it

*Resolved*, That it is the sense of your committee, that the State should control the timber land of the State, that they may be better protected and the water supply thereby increased; and

*Resolved*, That it would seem wise for this Society to make some recommendation—by petition or otherwise—to our Legislature, looking to the end that by legislative enactment or recommendation to Congress, the consideration of this matter be not longer deferred; and

*Resolved*, That we think it wise to act in unison with the other State associations in this matter.

H. G. WOLFF,
DR. A. SHAW,
D. S. GRIMES.

MR. J. S. MCCLELLAND then offered the following preamble and resolution which were unanimously adopted:

WHEREAS, A movement is now being agitated, to unite the Agricultural College with other educational institutions of the State, which experience in all other states which have tried it, proves to be fatal to the school established for the education of the sons and daughters of the horticulturist, the farmer, the mechanic and the stockman; therefore, be it

*Resolved*, That we most earnestly and vigorously enter our protest against this movement, as one, if finally accomplished, sure to destroy the usefulness of the college and render it almost, if not quite, impossible to obtain an industrial education in the State.

## EVENING SESSION.

President Gipson in the chair.

The evening session was opened by HON. SAMUEL WADE, of Paonia, with the following paper, entitled:

# Fruit Growing and Fruits for the Western District of Colorado.

This new fruit district is in the western part of our State, known as the late Ute Reservation, and settled by the white man but about five years ago.

The pioneer fruit grower of this district labored under many disadvantages and met with very many lamentable discouragements in his first efforts in the direction of fruit growing.

All his fruit trees and plants were then shipped by rail from the States east to the town of Gunnison, thence by wagon over a rough and unmade road, a distance of from 60 to 150 miles, to their destination, when they had been packed in the crates or boxes from six weeks to two months, and perhaps not a rod of ground prepared for their planting, with scarcely an irrigating ditch in the whole country, and the planter a stranger to the chemical condition of his soil, and very rarely that he had any experience in the art of irrigating.

Under these conditions about all the first planting was done in this country the first year of its settlement. Therefore, about one-half of this season's planting was lost for want of water, care and proper management.

But the following spring a few close observing minds, who had long been skilled in the art of fruit growing, come to the conclusion that the problem of successfully growing fruits in this country could in all probability

be solved in due course of time, when a very few hopeful and experienced persons in Delta and Mesa counties put out quite an extensive collection of fruits in variety for trial.

In the spring of 1884, it was discovered that all the apples, pears, cherries, plums, grapes, and really the peach and apricot, had wintered fairly and bid fair to succeed, with all the family of small fruits showing up equally well and with wonderful promise.

### TREE PEDDLERS.

This fact soon became known, when the flood-gates of the eastern states opened and let loose a deluge of unscrupulous tree brokers, who, with their skilled tongue and attractive fruit picture plates, contrived to wrench from the hands of the unsuspecting pioneers several thousands of dollars, the earnings of honest toil, for a lot of unreliable culls of fruit trees, at from two to four prices, thus crippling the finances of the poor man in his desire to build up a home in this western country with the luxuries of the older and eastern states at his door.

This practice of deception and fraud continued through the seasons of 1884 and 1885, while 1886 disclosed the fact that western Colorado was not a field where dishonorable fruit tree men could long practice their fraud upon the people, the country, being too ready a witness against him, speaking forth in tones of undisputed truth by the early bearing of the different kinds of fruits. Thus we have, in a measure, disposed of the unscrupulous tree agent.

### THINGS TO LEARN.

The careful, close-observing fruit growers of this district have learned much in the past four seasons concerning the soil and the art of irrigation, as well as of

the varieties of fruits to plant, and yet there is much for him to learn. He should learn how to apply water for irrigation to the different kinds of fruit on the different kinds of soil to the best advantage.

He should learn that using a surplus of water in irrigating is not economy. He should learn to use the utmost care in saving all fertilizers, and applying it to his soil where most needed and with the greatest economy by leading it through his irrigating trenches where they emerge from the supply ditch at the upper side of his field, that his soil may have the full benefit thereof and not wash it away; and he should never put it upon the surface by spreading, as in the States east, except as a mulch. It should be fed well to all small fruits except the blackberry.

He should learn that fall plowing is the best great pulverizer of his soil, and that it is a wonderful neutralizer of the alkaloids, and renders the land mellow, pliable and moist, while it is put in excellent condition to drink in the atmospheric gases, such as carbon, ammonia and the like.

He should learn that a knowledge of agricultural chemistry is as essential to the fruit growers as it is to the general farmer; that he should know how and why plants grow. Other things being equal, the more the fruit grower knows the more he can do.

He should learn how and when to prune all and every variety of fruit he desires to grow, to know what he is pruning for, and to know just what effect every use of the knife will have upon his trees or plants before applying it.

He should learn what fruits need fertilizing most, and when and how to apply the fertilizer.

He should learn the varieties of the different kinds of fruits desired to grow on the different soils and local exposes of lands to yield the greatest profit.

He should learn how and when to market his fruits to the best advantage and let nothing go to waste.

And he should learn how to guard against the ravages of all the entomological insects and other enemies of the fruit grower with which he is liable to come in contact.

The fruit growing sections of this district are confined mostly to the valleys and lower mesa lands, which are wonderfully productive, and will, in a very few years become the fruit garden of the State of Colorado.

### IN SELECTING A SITE

For an orchard in this country I should avoid a warm, south slope, or a strong expose to the sun, as such a situation would be liable, at periods of several successive days of warm weather in winter or early spring, which would start the flow of sap, and perhaps the fruit buds, too early in spring. With this expose we are quite liable to have our trees sun killed, it being a fact that much the greater part of the so called winter killing of trees in this country is sun killing, which is done by the strong action of the sun during the day time, with repeated sharp freezing at night time, continued for a period of several days in winter or early spring.

A sheltered situation from the effects of the daily periodical winds is nearly as objectionable, on account of its being subject to late frosts in spring and early frosts in the fall of the year, thus rendering the success of the fruit crop uncertain.

It is a fact well known to the inhabitants of all narrow mountain valleys that there is a regular periodical draft of air passing up the valley in the day and down in the night time, which is as sure as the shining of the sun in the day and its disappearance behind the horizon in the west at night.

These periodical winds are a wonderful neutralizer of frosts, and serve to lengthen out the season from three to six weeks in certain localities. I have had ice to form on standing water in my orchard (two different seasons) in the spring, when my peaches, apricots and cherries were in full bloom, without the slightest injury to my fruit crop by freezing. Therefore we apprehend but little danger from the effects of late frosts in this country, if there is no wind brake on the upper side of the orchard and the other local conditions here recommended are complied with.

There is another situation objectionable in this mountain country: That is an east exposure where the sun will strike very early in the morning, before the atmosphere receives its neutralizing temperature to clear the frosts, if any, before the sun does the fatal work. This I consider quite an important matter in the selection of an orchard site. Any situation nearly level, or descending to the north or west, if easily drained, would be a good site for an orchard in this district, other conditions described above being favorable. In many localities in the narrow valleys of this mountain country, apples of the hardy varieties, some varieties of the cherry, the currant and strawberries, may be grown with a fair degree of success at an altitude of 7,000 feet. The strawberry will do well with a little care, at a much higher altitude.

### OLD THEORIES NO GOOD.

I find in this country that nearly all old established theories in fruit growing do not hold good, and in order

to succeed the fruit grower must apply himself to close observing practice.

It is conceded as a fact among all fruit growers that a young, thrifty fruit tree cannot make a rapid, vigorous growth of wood and fruit bud at the same time, but such is not my experience in this country. I have apples, cherries, peaches and apricots, that have made three to six feet of growth in their main branches, and they were full of fruit the following season, and not one of these trees over five years old, being three years planted last spring.

I find here more than in any other country where I have had experience in fruit growing, that we should head our trees very low, and if the winds sway them, stake them with guy ropes, fastened to the tree and staked down so as to hold the tree in position for a year or two, when it will throw out brace-roots and hold itself thereafter. I train my trees to branch from one to two feet from the ground; think I can raise more and far better fruit than by training them four to six feet.

I trellis my grapes low, to three feet trellis on two wires. I pinch back my blackberries and raspberries first to twelve or eighteen inches, then pinch back the laterals about the same length.

We are not required to lay down these fruits for winter here, as mercury seldom ever drops lower than four degrees below zero.

Strawberries, currants and gooseberries, when kept well cultivated, irrigated and fertilized with plenty of well rotted compost, will yield wonderful crops of fruit.

### THE GRAPE.

This excellent old time fruit we find it not absolutely necessary to lay down for winter, except a few Cali-

fornia and other tender varieties, yet I believe it better to prune as soon as the leaves drop in the fall or early winter, and lay them down on the ground and weight them down with earth. I think they will grow and fruit better by this winter treatment. I have forty varieties in my grounds for trial, though I have not yet fruited but thirteen varieties. Have condemned the Taylor's Bullet and grubbed it out of my ground, it being too small and tardy a bearer to be worthy of cultivation. I hold the White Niagara, Goethe, Salem, Lindley, Christina, Catawba, Janesville, Concord and two other varieties un-named, to be very worthy varieties to plant in this country, most of them superseding my most sanguine expectations.

### THE PEAR.

Prospects indicate that this fine fruit has a grand future before it in this country. Every variety I have seen growing in this district, I have seen perfectly at home, free from disease, growing vigorously and fruiting early. We have several varieties on trial, all doing well.

### THE APPLE.

The queen of all fruits has a prospect equalled by few, if any other section in the United States. Out of over fifty varieties I have on trial I have not yet lost a twig or branch by freezing, nor have I had the inner bark blackened in the least by the action of frosts among all these varieties of this fruit. I would advise the planting of the most hardy and earlier varieties in this district. I fruited ten varieties this last season, all of which seem to attain as near perfection as is possible to do in any county, being large, free from blemish, good flavor and of excellent keeping qualities.

### THE PEACH.

This most luscious fruit had but few friends to start with in this district, but by its unparalleled success it has gained a favored spot in every orchard and garden. All the early hardy varieties will succeed well, the Ameden being one of the best. We had on exhibition at our October horticultural fair in Delta county several varieties of as fine peaches as any one could desire to see, many of them being seedlings grown from seed planted on the farm of William Sheppard, of the North Fork valley. The peach requires a well-drained, moderately rich, sandy loam, and in order to preserve the continued healthy growth of the tree and fine fruiting qualities, the branches should be shortened-in every season and thinned out to admit free circulation of air and sun, and kept well-cultivated.

### THE APRICOT.

The same may be said of this fine fruit as has been said of the peach. It is a fruit tree like the peach, of luxuriant growth and an early and excellent bearer. I have several varieties of this fruit, they being American and Prussian varieties. So far all have given perfect satisfaction.

### THE CHERRY.

This fruit seems to be as hardy in this country as the oak. I have ten varieties in my trial grounds, all healthy, vigorous and wonderfully prolific after two or three years old.

### THE PLUM.

I am unprepared to say much for or against this fruit in this district. I have several varieties on trial, but they are yet too young to test their fruiting qualities, and I know of no reason why this fruit may not succeed well.

I have on trial several varieties of nut-bearing trees and find that nearly all the nut-bearing and forest trees, ornamental trees and shrubs that succeed in Missouri and Illinois, do well here if given proper care and treatment.

In conclusion, I do not hesitate to recommend the planting of any and all kinds of fruit grown in central Illinois and Missouri in the valleys of this part of Colorado, as where the Osage orange will flourish in this climate, the fruit grower need have no fears for the safety of his trees, shrubs and plants.

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Discussion after Mr. WADE'S paper on "Fruit Growing and Fruits for Western Colorado."

DR. SHAW: What is your altitude?

MR. WADE: Five thousand five hundred feet; a thousand feet higher than Grand Junction. The mountains give us protection.

MR. MILLETT: Have you made any trial of the foreign California grapes?

MR. WADE: I have five of these varieties that have not fruited. The Catawba ripens excellently with us and is an abundant bearer.

MR. FAUROT: Why do you prune your blackberries so often?

MR. WADE: To make them more stocky, as we do not cover them in the winter.

MR. FAUROT: It does not pay to weigh your vines down, as the buds are apt to start and be killed in consequence of being pressed down so tightly?

MR. WADE: I plant my apple trees twenty-five feet apart each way. Plant plums about eight feet. The variety has a good deal to do with the distance of planting.

MR. MILLETT: Have you noticed the leaf hopper?

MR. WADE: No, sir.

DR. SHAW: Is it not worse for a tree to head it low?

MR. WADE: No, sir. I like them and think they grow better, produce larger and more delicious fruit. They are more healthy.

MR. MILLETT: Have you noticed any signs of weakness in the low headed trees? I have noticed it in the Ben Davis.

MR. WADE: The low headed tree is a protection against sun-burn. Have practiced low heading for twenty-five years with good results.

DR. SHAW: The first orchard planted in the State was low headed. The trees were too weak.

MR. MCCLELLAND: There is a difference between individuals as to what is meant by low headed trees. Some cut the top branches and call that low heading. My idea is a tree that begins to branch low.

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The following paper on "Ornamental Planting" was then presented by GEORGE H. PARSONS, President of the State Forestry Association:

## Ornamental Planting.

Many men, not content with placing Shakspeare at the head of the long list of poets, claim for him a wisdom, a deep insight into all the machinery and workings of man and nature, an all-embracing knowledge of everything under the sun, that if wholly true would indeed be divine. They make him a master of law, of theology, of all the known forms of science. They

claim that he anticipated the discovery of the telegraph when he caused Puck to say, "I'll put a girdle round the earth in forty minutes." They show from his writings, that he had an intimate acquaintance with flowers and plants, was a great gardener, including the highest form of gardening, landscape architecture. And in this they seem more right than in any of their other assertions, for scarcely anywhere does he show more fully the universality of his genius and his great sympathy with nature, than when he embodied in a single phrase, the central idea of all ornamental planting, and wrote of it:

> "This is an art
> Which does mend nature, change it rather; but
> The art itself is nature."

Well may these words be taken as the test for all writings on this subject. This art of man is also nature's art, and it is to nature we must go, if we would attain any degree of perfection in the art of planting.

Ornamental planting is the grouping of trees, and shrubs, and grass and flowers, in such an artistic manner, that the result is a natural and harmonious picture, pleasing and satisfactory to the most fastidious eye. To do this requires an intimate acquaintance with all trees, shrubs and plants. We must know them by name; we must know their manner of growth, their height at maturity, their form of outline, the color and nature of their foliage, their usual length of life, and their requirements for natural growth and full development. As the chemist must know the properties of the substances he uses, and the painter or the sculptor must thoroughly understand the materials with which he produces his wonderful creations, so must the landscape architect have a full knowledge of the materials with which he forms his pictures of nature. Pitiful are the results if he attempts to work without this knowledge; like the

ignorant chemist, who wrecks his property and endangers his life, by bringing together antagonistic substances. This knowledge, being the Creator's work, can never be complete or perfect, no matter how much time is given to its study. But there are a few general lessons which nature presents to any inquiring mind, which may be easily seen and quickly learned by the study of any plantation of Nature. In the first place, there is

NO REGULARITY

About anything. The surface of the ground is undulating, with small hills rising here and there, and rocks of all sizes strewn around. The ground is covered with turf, dotted here and there with flowers, and the rocks are hidden with running vines. The trees and shrubs are scattered around, singly or in groups, without order or system, and the background is formed by a contiuous mass of trees of all sizes and shapes. The single trees are noble specimens, with all their beauties fully developed, round or pointed, upright or drooping, yellowish or dark purplish green, each according to its kind, and standing out fit representatives of the glorious beauty of vegetable life. The groups of trees are round and dense, or long and thin, of every conceivable form of irregularity, with the outline broken into deep bays and sharp promontories, and the sky-line pointed round or flat, and of all heights. They generally contain one species, never more than three or four, and those all deciduous or all coniferous. The groups and single specimens of conifers give a charming variety to the lighter green of the deciduous trees, and are indispensable in any picture of nature. Their coloring is in greater variety than that of the deciduous trees, and is there to please in winter and in summer. The groups of trees are often finished out and surrounded by shrubs whose beautiful foliage and form is embellished in cer-

tain seasons by exquisite flowers. These shrubs are also found singly, and in groups by themselves, or surrounding some single tree, and, as with trees, the single specimens are always especially remarkable in form and flowers. The background of this picture is formed of larger groups of trees, which, more or less mingled, seem, in the distance, to be a continuous outline of foliage. Thus, in a general way, is landscape formed by nature, and this rapid survey will give a certain idea of planting which will prevent too great blunders. The limits of this paper will not allow a deeper or more complete consideration of the ways of nature, nor will it allow a presentation of the whole subject of ornamental planting. Persons with large places and desirous of making large plantations, involving much outlay, should employ some one who has made this the study of a lifetime. But there is one branch of ornamental planting, which, though simple in its nature, is very general in its application, and, for want of a better name, has been called

LAWN PLANTING.

It refers only to the embellishment of small places, from a quarter to half an acre in extent, where the means of the owner and the size of the ground will not warrant the employment of a professional landscape gardener, and yet which requires for proper planting a knowledge of the same general rules as for more extensive grounds and parks. A lawn of only a quarter of an acre may be as fine a work of art as the most beautiful park in the world, and great care should be exercised in its formation. Being limited in its boundaries and adjoining the dwelling, every part of it is always under the eye, and an unsightly feature on it is an ever-present trouble. Too often a lawn is only made a receptacle for a lot of trees and shrubs purchased without any knowledge of their nature from some strolling and irre-

sponsible tree-dealer. The beauties given by the Creator to every tree and shrub, and which no one, however ignorant, can wholly take away, makes a lawn so planted, to a certain extent, attractive. But how much more attractive might it be made with the same expenditure of money and labor by following a little more closely the lessons of nature.

## THE PRINCIPAL OBJECT

To be kept in view, in planting any lawn, is to conceal, as much as possible, all its artificialities, and to endeavor to give it the appearance of being the entire work of nature. For this purpose, trees and shrubs must be planted where they will hide some part of the special handiwork of man, and round off all angles and break up all regular lines. In preparing to plant a lawn, the first thing required is a regular map, showing the position of the house and outbuildings, with any particular view marked, which it is desirable to shut out or leave open. The lawn should be made as large as the extent of the ground will allow, for one large lawn can be much better planted, and is much more satisfactory than two small ones. The paths should be only placed where absolutely needed, from the street to the front door and around one side of the house, to the rear. As a rule they should never be straight or circular, or serpentine, but follow such a natural, easy course, with large curves, so as to prevent any desire to leave the path and follow a different course over the turf. Along the paths, at every turn and at such irregular points as the fancy may fix upon, should be planted beds of roses, flowering and foliage plants, and single specimens of particularly handsome low shrubs, deciduous or evergreens. At the re-entrant angles of the house and at each side of the steps, the handsomest shrubs should be placed singly,

and vines should climb up all the angles. More than this should not be planted near the house. If shade is needed in the dwelling it can be obtained by vines and blinds, better than by trees, which only obstruct the view, and the passage of light and air. The turf should stretch unbroken from the house or path to the outside boundaries of the lawn, and when practical should be sloping or undulating. Stone and iron vases or statues are not permissible here. If such are wanted they can be placed next the house at the steps or corners, so as to be a part of the artificial nature of the dwelling. Fountains should be always made of rough rocks, and placed near the farther boundaries of the lawn. Too much can not be said against the common mistake of filling a lawn with trees of large growth, which in their early growth show a disproportionate length of trunk, and before long fill up the lawn, kill the turf beneath them, and shut out from the dwelling the life-giving rays of the sun. The points of sight are upon the lawn, and from the windows, and trees thus planted obstruct the view and present bare, unsightly trunks.

### THE BOUNDARIES

Of the lawn should be planted with irregular groups of trees and shrubs, with here and there breaks for some desired view, or to allow passers-by a glimpse of the most desirable parts of the place. A small group of the most beautiful flowering shrubs should stand at each side of the front gate and at all the entrances. If not too near the house, one or more of these groups may have one tree, of particular handsome form, to shade and protect the lingerers at the gate. The object of these groups is to form a background for the place, to break up the straight lines of the boundaries, to shut out objectionable views and to give a breadth to the lawn and an illusive idea of its extent. For this pur-

pose their outline should be irregular as possible, with deep recesses and sharp projections, and the sky-line made of varied height by trees properly assorted, which should be set at the back next the boundary line, and the shrubs around them, so that the group would present a continuous mass of foliage from the turf to the top of the trees. In the recesses and at the points of the projections, some strikingly handsome specimen of a deciduous or evergreen tree, of medium growth, should be planted, to create a point of interest for the eye to rest on. At the back of the lawn and where some unsightly building or view is to be shut out, groups of conifers should be used, for their dark color give a variety to the foliage, and their persistent leaves effect the desired object both winter and summer. Conifers should be also planted on the north side of the house to break the force of the cold winds. No lawn is complete without the use of evergreens, and in the beauty and variety of form and foliage, they are unequaled in vegetable life. But, unfortunately, this dry atmosphere and changable climate is very severe upon them, and their culture is so difficult, that we have to use them sparingly, and are limited to a comparatively few varities. And now that we have located the plan, the paths, the position of all the single specimens, and have traced the outlines of the groups, the next part of the work is to make out the

LIST OF TREES

And shrubs needed to form in reality the pictures we have planned. To do this properly requires a greater knowledge of plants than most people possess. But we can compute the number needed, placing the trees not less than ten feet apart, and the shrubs not less than three feet apart, and, after deciding upon the general character of each plant, we may go to some large nursery in the growing season and make our selections

when everything is in its full beauty. Or we may send the list and plan to some reliable nurseryman, who will generally make as good a selection as we, with much less delay. Planting in the country should always be done in the spring. In selecting the single specimens along the paths, the question of hardiness need not be considered so particularly, for, being few and small, they can be easily protected during the winter. As stated before, conifers are very uncertain in Colorado, but they are too beautiful to be entirely overlooked, and some of the dwarf varieties may be tried here with good hopes of success under proper treatment and protection. There is the conical spruce, dwarf, compact, dense and perfectly symetrical; the Gregory's spruce, with its peculial hemispherical form and very dwarf, dense growth; and the most interesting dwarf black spruce, still dwarfer and denser than the last, a cushion of compact, small, dark-green foliage. There is the dwarf hemlock, with its dark, yew-like foliage, and the compact silver fir, dwarf, round, flat, compact, with rich, glossy, green foliage, curious and beautiful. The large family of pines gives us the dwarf mugho pine, low, very symetrical and compact, with dark-green foliage; and the still more charming dwarf white pine, with its round head and soft, feathery, light-colored foliage. The *Retinosporas* from Japan give many varieties of dwarf and weeping forms and variegated color, which are among the most attractive of evergreens, and cannot be omitted in any collection. The same may be said of the Arbor-vitæs.

### THE DECIDUOUS SHRUBS

Adapted for planting along the paths are not of large number. First would be the roses, with their infinite variety of exquisite bloom, in beds of three or more. The Ghent Azaleas also stand pre-eminent for their

brilliant clusters in June, of white, red, orange and purple flowers. The Japan Daphne is one of the rarest and most interesting of shrubs, and the Mezercon Daphne is very pretty with its slender dwarf growth and very early pink flowers. The Trailing Daphne may be planted in a bed, and is noted for its profusion of light pink, rosette-like flowers, of delicious fragrance. Deutzia Gracilis is the most beautiful of Deutzias, and should be one of the first selected. The Dwarf Euonymus, is very curious and hardy, as also the Dwarf Mock Orange. The Spirea Crispifolia is the smallest and rarest of shrubs, compact, with curled, crisp leaves, literally covered with pink flowers during the greater part of the summer. The list may be finished by the Dwarf Variegated Weigela, which is, perhaps, the best of the variegated leaved shrubs, nor should be forgotten the showy and handsome varieties of Herbaceous Pocony, which are planted several in a bed. All these low shrubs and conifers should be shaded during the first summer, and thoroughly protected during that winter.

FOR SINGLE SPECIMENS

To stand at the side of the gate, in the angles of the house, or at special points on the outside edge of the group, where is needed something especially remarkable and beautiful to attract the eye, may be chosen the Hydrangea Grandiflora, with its immense pyramidal panicles of white flowers more than a foot long, lasting from early August until frost. The rare Japan Judas Tree, covered with rosy-pink flowers before the appearance in spring of its deep, rich green, shining foliage; the White Fringe with its numerous flowers in June, pure white, long, feathery and lace-like; the charming Spirea Thembergu, with its rounded form and delicate, drooping, yellowish green lanceolate foliage, covered in May with a profusion of small, white flowers; the showy varieties,

in all colors, of the well-known but never too common lilacs; the double flowering almond and plum, with their branches closely set in early spring with double flowers, white, pink or red; and to close the list, the purple-leaved berberry, with its dark, rich looking and effective foliage, in the bays of the groups, or at particular points a few feet distant from them, may be planted besides the shrubs named above, some of the more striking trees of low growth, as Young's Weeping Birch, with its fine thread-like branches drooping to the ground; the cut-leaved Weeping Birch, erect, slender and tall, and most effective of weeping trees; and the many beautiful and medium sized varieties of the Retinospora and Arbor-vitæ.

In selecting shrubs for groups, care must be taken to provide a variety in foliage. Low growing shrubs should be planted along the outer edges of the groups, and back of these larger ones, and beyond still larger, so as to present a sloping bank of foliage to the tops of the trees. Most of the shrubs should be flowering, and so chosen with regard to the time of bloom, as to bear flowers throughout the season. Certain shrubs have very ornamental berries, as effective in appearance as flowers and help to extend the season of color well into the autumn. The trees planted in these groups, being few, should be chosen for their marked and varied character in foliage and form; such as may be found drooping its spray on all sides, with elegant light foliage, and bark snow-white; the purple-leaved Birch with dark foliage in striking contrast to its own white bark; the Dwarf Birch, one of the rarest and most charming of miniature trees; the Dwarf Weeping Cherry, a curious and beautiful little round-headed tree; the Dwarf Crisp-Leaved Ash, vary rare and small, with dark green curled foliage; the more common but always beautiful

Kilmarnock Willow, with its umbrella form, and the curious dwarf and weeping forms of the Mountain Ash.

AT THESE POINTS

May also be planted some of the medium sized conifers, remarkable for their beauty of form; such as the Broad-Leaved Hemlock, compact, round and bushy, with dark green foliage; the Weeping Norway Spruce, with erect habit and drooping branches; the symetrical Weeping Silver Fir, with its solid compact columnar form, and branches curving regularly and closely to the stem; the Weeping Pine, one of the grandest among the many varieties of maple, elm, birch, ash, poplar, oak, willow and linden. With the grounds thus planned, and the list of trees and shrubs selected, the subject of ornamental planting ends. When and how to plant, and the care of the grounds when finished, are scarcely questions for consideration under this head. We have accompanied the planter through the most difficult part of his work, and may now pause, with the full assurance, that in after years, when we return to this spot, there will be a picture before us which will never tire; ever presenting new combinations of light and shadow, form and color, "a thing of beauty and a joy forever."

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Discussion after Mr. Parsons' paper on "Ornamental Tree and Shrub Planting."

DR. SHAW: Will the Daphne grow out of doors all the year round?

MR. PARSONS: In some localities it will, if placed in a sheltered place; but I think the best plan is to keep it in a pot and put in the conservatory window in the winter.

*Question.* What effect does the varying of lines have on the prairie? It doesn't look right to have curved lines on the plains; everything looks wrong. If you lived in a level country where everything was in straight lines, could you make curves and have them look well?

MR. PARSONS: You must look over the house and have these curved lines around the fences and it will be all right.

DR. SHAW: Would you set evergreens in a lawn 50x125 feet?

MR. PARSONS: Yes, sir. Have an unbroken lawn in front, and trees in the rear. Do not let them obstruct the view. You could not put spruce trees in so small a lot.

DR. SHAW: Would you put them on a curve?

MR. PARSONS: Yes, sir. There can be no rules laid down for planting in all places. You must make your lines agree with your surroundings. If you make a curve you must give a reason for it. The object in landscape gardening is to keep it symmetrical as far as possible with nature. This is seen in the mountains and everywhere else where evergreens grow wild. I always see beauty in curves. We are generally too mechanical in our planting. The Wisconsin weeping willow is the only perfect weeping willow we have here. We have the Kenilworth willow at Colorado Springs.

MR. WADE: We have been propagating them in our region.

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MR. W. L. PORTER, of Greeley, then read the following paper:

# Fruit Interests of Weld County.

In Weld county we cannot report the large yield of fruit that we hear reported from some of our neighboring counties of Northern Colorado. This lack of fruit we think is not so much due to non-capability of section as to lack of planting trees. We have not been fortunate in having an Evans, a Brothers or Lee, and many others who have struggled with fruits from the early history of the State.

The people of Weld have given more study to the raising of wheat and potatoes, and the latter we bring out to perfection. If we had had a Gipson in horticulture ten years ago we might now be shipping apples as we do potatoes. But there are many encouraging features to the fruit interests of Weld. Many standard fruits that have been planted long enough have borne this season. The specimens of fruit were fine, and the trees give promise of being perfectly hardy, having stood some of our test winters. We are beginning to appreciate the hard and patient toil of those who came here before us, and by experiment and great expense solved the knotty problem of raising fruits in the arid Rocky Mountain region. They have given us a list to select from, and modes of cultivation and care that will insure success. There is beginning to be an active demand for the standard fruit throughout the country, and we may predict that not many years hence farm homes will be supplied with a luxurious succession of fruit belting the year, from the tart and much-relished pie-plant in the spring to the fine Russet apples which last as long.

The crop of small fruits the past year has been very abundant, and thousands of dollars worth have been shipped out. The price has ruled low, gladdening the heart of the consumer, but looking rather discouraging

for the producer. The yield of strawberries was good and prices sustaining. The raspberry was not quite up to the standard, in yield and prices most of the time below cost of production. Crab apples, excepting Hyslop, were almost a failure. The early blooming habit of the crab makes it quite sure to be injured by the frost, and the planting of it extensively in our locality should be discouraged. A few varieties of cherries are promising with us. Our native dwarf cherry never fails to give a full crop. It is a shrub that should have a place in every home. A dozen bushes will give a beautiful effect as a background to a lawn, and will gladden the hearts of the children with a full crop each year. Plums are promising. The Weaver, De Soto, Moore's Arctic and Forest Garden, all seem to be hardy with us. Currants and gooseberries are so well established they need no mention. The grape has been thriving with us, but the ravages of the leaf-hopper the past summer entirely blighted the crop, and but few good specimens were ripened. The pear is doing well. Not many trees have fruited yet, but they are generally in a thrifty condition. The standard apples, of the iron-clad varieties, are very promising, and should be planted generally. Our fruit interests are equal with other industries, and may we never hear again the oft repeated remark, "I would not mind living in Colorado if we could only raise fruit."

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MRS. WASHBURN: Has there been any effort made towards starting a canning factory in Greeley?

MR. PORTER: Nothing of late.

*Question.* Did you make any attempt to be rid of the phylloxera?

MR. PORTER: It is not phylloxera there, but a fungus growth that attacked the grapes.

PROF. CASSIDY: I have tried pyretherum, but that has not much force in the open air, and was ineffective. You will find that the kerosene emulsion will rid you of the leaf-hopper of either the grape or the apple. The climate here is very favorable to the increase of both, being so dry. They are different species that work upon the apple and upon the grape. The apple insect is worse upon the Russian varieties. The grape hopper seldom touches the Concord, but confines itself to the thin-leaved varieties, such as the Delaware.

MR. FAUROT: What effect does the kerosene emulsion have upon the fruit?

PROF. CASSIDY: It has no bad effect upon the fruit. They have increased at a wonderful rate during the past two years. They are indigenous to the Rocky Mountains. The American ivy is the food plant for this hopper that preys upon the grape. Dr. Riley has pronounced these hoppers different.

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The following paper by Mrs. A. E. GIPSON, of Greeley, was then presented:

## Children in Horticulture.

From the time when the wee toddler, taking his first walk abroad, runs to pick the golden dandelion or the white daisy, the child and all forms of plant life seem inseparable.

To them all that grows is beautiful, and while we may look with dismay upon the profusion with which nature scatters her wild children around, they accept with smiling delight the abounding treasures, which

their little hands are free to pick, with no fear of reprimand, and they might truly say with the poet:

"Partakers of our joy
Shares of our woe—
These are the children of the sky
That by the wayside grow."

To the wise parent and teacher this natural love of the child for nature opens up a wide field. Nature has many and interesting secrets which she will whisper in the ears of those who will stop and listen; but, alas, how few of us in this busy, hurrying life of ours will take the time to sit in her leaf-covered temples, far from the din and bustle of the great world, and with folded hands wait and listen for the quiet voice which, in the murmur of the brook, the song of the wild-bird, and the rustling of leaves, would speak rest and quiet to tired, weary hearts. For most surely,

"To him, who in the love of nature
Holds communion with her visible forms,
She speaks a varied language."

We work and toil, rising up early and burning the midnight oil, restlessly seeking, we may well often stop and ask ourselves, for what? And all around us nature's beauties are spread, ever changing with the season, ever with something new and fresh; and we think that when we are older, and the bank account has reached the desired figure, the new house is built and furnished, then we will take time to climb the hill and watch the sunset glow and fade; then we will study and enjoy all the wondrous growth around us. But if ever this time comes we will find that our eyes are dimmed, and that our ears have so long listened to the loud roar of earth's rush, that nature's quiet whisperings will be slow to reach them.

But where is he who, knowing that he himself has missed much of the good which the earth might bring

him, does not look and wish to see in his children the fulfillment of many a cherished scheme? We would have their lives filled with all beauty, all happiness, and this question of what we may do to secure them this greatest measure of life's good, is one which demands our most earnest consideration. Where can we best teach them the lessons of patience, gentleness and love for the good, the true and the beautiful? In answer to our questionings, dear Mother Nature replies: "Come to me and I will show you pleasant paths, and teach you many and useful lessons." He who stands nearest nature's heart is nearest nature's God.

We may show the child how to plant the tiny seeds, and in the days, and perhaps weeks, which must elapse before the green leaves are seen above the ground, he will learn patience. In caring for the tender plants he learns carefulness and gentleness, and as the lovely buds and blossoms appear, he may learn, in watching them, a love for the beautiful.

The sense of ownership always brings an added interest. Children as well as grown people have their likes and fancies in regard to the variety of fruits and flowers, and in training our children a love of horticulture, we would do well to consult these preferences. Perhaps Edna loves best the pansy—while to Mary the rose is the most lovely of flowers. Take a little pains then, to select for each one the best situation and soil, help them to obtain the best seed and plants, and show them where they may find the plainest and most practical directions for cultivation. Do not let them attempt too much for fear of failure and discouragement, and occasionally yourself put in a little quiet help to make sure that the small beds are a success. Likewise, perhaps, John would like to try and grow plums—while James thinks he would prefer grapes. In this case also

give all needed aid and advice, and the little ones in caring for fruit and flowers will unconsciously gain much interesting and useful knowledge. Riches may take wings; but he who as a child has been taught to appreciate the everchanging panorama spread before him as spring and summer, autumn and winter succeed each other, who in the growth of plant and flower finds a never-ceasing delight, has a better heritage than one of Colorado's richest silver mines might give him.

In the city school of the future, a flower garden will be considered as necessary as a spelling book, and, perhaps, to the most incorrigible scholar will be given the care of the choicest and most beautiful plants. The child who has been taught to love the wonderful plant-life and find happiness in watching the swelling of buds, the unfolding of leaves and the bloom of flowers, will hardly be the one in whose heart there will be room for the growth of wrong passions or evil thoughts.

This is an age of unrest and dissatisfaction, when men all over the land are crying out against the apparent inequality with which the burdens of life are adjusted, are streching out eager, grasping hands toward the homes of the wealthy, and crying "Divide with us your happiness and riches."

The hope of the Nation is its children, and could the children in our public schools, all over this land, be taught that He who maketh his sun to rise upon the evil and upon the good and sendeth rain upon the just and upon the unjust, has made the best things of this earth free to all, the rich and the poor alike; has so planned that to him whose ears are opened to hear, and whose eyes are open to see, the rarest beauties of earth may come, and no man can take from him. Could this be taught, there might, perhaps, in their lives come more of quietness and resignation, more of that contentment, which with godliness is great gain.

## MORNING SESSION.

FRIDAY, January 14.

The session opened with the following report from S. W. DEBUSK, Vice-President of Las Animas county:

In Las Animas county are grown successfully, of apples: Dutchess, Ben Davis, Rambo, Fall Spitzenburg, Rawles' Janet, Cooper's Early White and Hyslop Crabs. Some other varieties are grown, the names of which the growers do not remember. The Transcendant Crab refuses to bear with us, although the trees look vigorous as can be. Many sorts of apple trees, in various stages of growth, are most healthy, and promise much when the fruiting season shall arrive.

Of plums are grown the Lombard, Weaver and German Prune. Native wild plums are coming to be highly prized—are sought after in market, and the trees cared for by owners. But the black-knot is making havoc among these fine wild plums.

The Early Richmond Cherry has been fruited and the Governor Wood considerably planted.

Of pears, not more than a few specimens have been fruited in the county.

We grow no peaches. A few reasonably nice specimens have been produced, but nothing more.

Concord, Hartford, Talman, Martha and Delaware grapes are grown successfully and profitably. Muscatel grapes are grown and matured.

Small fruits seem most perfectly at home with us. A fine crop of Blackcap raspberries was grown last summer from plants that had never been protected in winter.

It is still true, however, that our home market is supplied entirely, almost, with imported fruits.

As to public opinion, it has changed completely within three years. Skepticism has given way to large investments in fruit trees. But as many of these sales are made by tree agents who are both ignorant and unprincipled, many disappointments are inevitable.

So far as the evidences now appear, nature has dealt most bountifully with us. Only industry and care are needed to insure the most gratifying results.

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MR. DE VINNEY, of Jefferson, then presented the following paper, entitled:

## Fruits for Clay Soils.

It is a well-known fact among agriculturists, and among horticulturists as well, that every plant is by its nature adopted to a special soil and climate. That is, plants grow more thrifty and are more productive on soils adapted to them than on others. Thus, cranberries are suited to a marsh and yield well there, but are fruitless on a dry soil. So, also, wheat is most productive on clay soils, and less productive on sandy soils; while on the contrary, corn and melons are most productive on sandy soils, and not so fruitful on clay. When a horticulturist ascertains what crop is best suited to his soil, and raises that to the exclusion of all others, he is on the highway to success and competence. Upon this knowledge and the application of it, trifling as it may seem, is the one great golden secret worth knowing. I have in mind a man in Kansas who made a homestead on miserable land of hills and hollows, but by a judicious application of this principle, he grew pears and onions in the warm nooks between the hills, while on the hills he grew wheat, till he had money to loan to all his neighbors, who had rich, beautiful prairie

farms, but who grew the wrong sort of crops and consequently were unprosperous. I could point out remarkable cases of success and failure in Colorado, also due to this cause, were I not fearful of making a distinction between my neighbors, which would not be pleasant, but nevertheless would be highly instructive. It was my lot in life to become possessed of a farm whose soil is a heavy clay, and as I was both by necessity and choice induced to begin growing fruits and vegetables, I was the amused recipient of needless sympathy for undertaking what was thought by kind neighbors to be a fruitless effort. But I have persevered, and like many others, have encountered many difficulties and overcame them, and have now the consolation and comfort, after long years of hope, to have apples in vast abundance on my trees, grapes on my vines and small fruits on my plants and bushes. But that these are equally profitable, I do not pretend to say. The reason for this is due to the soil and the climatic conditions.

Thus, raspberries and blackberries, though they grow well and produce well on a clay soil, the tediousness and hardship of digging up a heavy clay to cover them with for winter protection, is so much more expensive than on a sandy soil, that I do not recommend their cultivation on clay soil as profitable for market. Grapes, as I have demonstrated, can be grown with profit on a clay soil. But I learn from my fifteen years' experience in growing the grape, that a greater profit could be made by growing them upon a more open clay or loam soil than mine, or upon a still better one of sand and gravel.

Strawberries can be grown on all varieties of soil with profit, for they are a bounteous fruit, bestowing their treasures upon rich and poor alike for little toil and little cost. But I have no hesitation in saying that when we arrive at that systematic and judicious cultivation

contemplated in this paper; when every market gardner shall be a specialist, that strawberries will be grown upon heavy clay soil almost entirely. The currant and gooseberry are likewise best adapted to a heavy clay soil, and, like the strawberry, will yield a greater profit on clay soil in return for the money and labor expended upon them than upon sandy soil, everything else being equal.

Tree fruits are suited to a great variety of soils, and being of a vigorous and coarser growth, can adapt themselves to adverse conditions better than shrubs. Thus on soils too light to sustain the young tree in an erect position, it will extend a tap-root down into the hard subsoil, and likewise on a too heavy clay, a tap-root will find its way down into a loose strata of earth and thus a tree may make for itself the required conditions of soil. But while there can be but little question as to the success of growing trees on either clay or sandy soil, I think there is a question as to the comparitive profits of fruiting them on these soils. For it is one thing to grow the trees and another to grow the fruit; for there may be conditions unfavorable to growing the fruit which would not effect the tree. Thus the early blooming of a tree, before the late spring frosts have passed would cut off the fruit, but would not effect the tree. I think, therefore, the growing of plums will never be a success in northern Colorado, in consequence of the late frosts of spring killing the bloom of the plum. Now, it is a well known fact that sandy soils warm up earlier in the spring, starting into growth all sorts of vegetation earlier than on heavy clay, that fruit trees bloom out earlier than they do on clay soils, and therefore more liable to be killed by a late frost. When it is considered that thousands of dollars may depend on this contingency, its importance can scarcely be overestimated. Certain localities possessing immunity from late spring frosts, from this cause alone have be-

come wealthy and prosperous. I refer to the fruit regions around the lakes, fanned by the cold winds from their bosoms, thus holding in check the opening of the beautiful bud till the late spring frosts have passed. Is it not reasonable to believe that a modified effect of this, at least, may be had by planting our orchards on a clay soil, which more sluggishly wakens from its winter sleep, and tardily opens the fruit bud. By analogous reasons, this would be a logical determination. I feel little hesitation in saying, with reference to the apple, what I said regarding the strawberry, that in the no distant future, when perfection and the glory of successful horticulture shall have been attained, that the most profitable apple orchards will be found to be growing on clay soils.

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Discussion after MR. DE VINNEY'S paper, on "Fruits for Clay Soils."

MR. DE VINNEY: I have been speaking in reference to the state of cultivation in the future. Manure should be used on a clay soil in order to have a profit. On sandy soil the manure would make it too light, while on clay soil it would put it in a proper condition.

MR. BROTHERS: Have you had any experience in highland or upland cranberries? I have, and mine are all dead. My Evergreen blackberries were given to me.

MR. MILLETT: The time of the blooming of the Transcendant crab may be changed by planting in a clay soil. The soil on the north Golden road is a sandy soil; on the middle Golden road it is mixed clay and sand; and at Mr. De Vinney's place it is clay. There is a very perceptible difference this year between the time of ripening at the three places.

MR. DE VINNEY: The best soil for the apple is a cold soil that will ripen up the wood early in the fall

and keep it back in the spring. The best argument in regard to a wind-break is to keep your orchard cold. The best wind break I can think of is barb wire fence.

MR. BROTHERS: Horticultural meetings are to stir people up. We have our views and give them to each other. I think the northern and southern slopes have something to do with the ripening and starting of the fruit. My neighbors on the north slope are two weeks later than I am on the southern slope. The blossoms do not come out nearly so early. I took grapes from my vines two weeks earlier than did Mr. Everett from vines of the same variety, the only difference being that I was on the south slope and he was on the north. I think fruits require more careful handling and cultivation on clay soil. This is the reason we have lost so many. A little more care is necessary.

MR. MCCLELLAND: I want some one put on by the Secretary for a paper on "Humbugs."

MR. MILLETT: And have no other business for that day.

MR. MILLISON: Want information. Can a man break land and plant fruit trees on it the same season, and expect the fruit to grow?

MR. DE VINNEY: Unless extra care is taken, would not recommend planting until the second year. I have had no experience in that. They should be watered every week. Be careful with trees on a clay soil. The soil should be very loose if only two inches deep. This is the reason why injury results and weeds grow so fast. The same thing occurs in the planting of an orchard.

MR. GIPSON: Fruits that bloom at the same time do not mature at the same time.

MR. DE VINNEY: He means comparatively. In the case of some kinds of fruit. The Victoria currant

blooms about a week later than the others, but the fruit ripens at the same time as the others.

MR. GOSS: There is but one instance in the State where trees were planted by simply digging holes in the ground. That is at Mr. Ackerman's, on the St. Vrain.

MR. BROTHERS: Planted the Siberian crab tree in 1868. That tree has never fruited to amount to anything. It blooms every year, but bears no fruit. Blossoms that are not so far advanced are less liable to be injured by frost. I have thirteen of these trees, and have had no fruit from them since in 1874. They are very strong and healthy trees and should be planted as a wind-break.

MR. WOLFF: The title of the paper has not been touched upon yet. We should know the point now. I think the best plan would be to sell your clay soil and buy some that is sandy.

MR. BROTHERS: I know a man who has thrifty, healthy trees on clay soil. They are the same kind that I have—Ben Davis, Wealthy, Snow Apple, Missouri Pippin, and several other kinds that I have. I know that it takes a great deal more work to start them in the sand. I would use no fertilizer. Mr. McClelland, and others I know of as having the best orchards in the State, are on clay soil. It takes more work there.

MR. MCCLELLAND: I am free to say that if I was going to choose soil for apples, I would choose clay soil every time. I think that people in the east and west know that the fruit is better. The apple raised on clay is better than that raised on sandy soil. It takes more work, but would choose clay soil every time. We all know that some varieties of strawberries will not do well on any other soil, and the same with the sandy soil.

MR. MILLISON: In your experience have you come to any conclusion as to whether the apple trees will live longer on clay soil than on sandy soil?

MR. MCCLELLAND: In my experience in the east I have found that the clay soil produces the better fruit, and it lasts much longer.

MR. DEVINNEY: I believe that on sandy soil the tree will be more healthy. I have evidence in my orchard, which is very heavy clay soil, and the trees can withstand the frosts so well. I have investigated the fruit closely and given the fruit a careful examination, and am pretty well satisfied that the Tetofsky will stand more freezing on the sandy soil.

MR. MCCLELLAND: How is the drainage?

MR. DEVINNEY: I have none.

MR. WOLFF: In this vicinity the fruit has done the best on sandy soil, with a clay sub-soil. That is the reason for my remarks. The soil at Wheat Ridge is a sandy loam on the surface, then comes several feet of clay. The apple tree seems to thrive there naturally and stands the winters well. As long as the trees do well on a soil we must not discard it. I like this kind of soil.

MR. EASLEY: Have you examined the apples you were speaklng of? Was the wood ripened up well in the fall?

MR. GRIMES: I believe the best soil is the soil we have. At least we should think so.

MR. BROTHERS: That would be the humane side of the question. If a man is doing better on a different kind of soil from that which is recommended, he should retain that which does the better.

MR. EASLEY: I think we can manage the whole matter by fertilizing and watering. I flood my orchard

all over. It forms a coat something like a mulch, and it makes a bee pasture the whole summer through, as I have it planted to clover. I get a crop from that. It makes a cool soil for the trees to grow in and it keeps it in a uniform and healthy growth. If you take the water off at the proper time you can get a crop every year.

Some California nuts were presented to the society by a gentlemen who said:

"These nuts are so plenty in their natural state that the boys will not pick them up. They had no water on them for five months. The tree has been grown in places where its roots are completely saturated in cold water. They are not so full of oil as others of the same kind. They grow differently in Colorado. I think they are more palatable. It is not known yet that they would be sufficiently hardy for the northern part of this State. I have seen the tree, but not the fruit, as grown in this State."

## AFTERNOON SESSION.

The session opened with an interesting paper by DALL DEWEESE, of Cañon City, entitled, "Origin of Fruits and their Advancement," which unfortunately has become lost.

MR. W. E. PABOR then read a paper on drainage, by HON. E. S. NETTLETON, State Engineer, filled with valuable suggestions, but which has also become lost.

In the absence of MR. JOHN GRAVENSTOCK, of Cañon City, the Secretary read the following paper from him, entitled:

## Sub-Irrigation.

Having been requested by your society to write a paper on sub-irrigation, I will do so as far as my experience goes. Between two and three years ago I

had a pamphlet sent me by the Colorado Artisan Cement Pipe Company, on sub-irrigation. I saw at a glance that it was a good thing for Colorado (if it would act as stated by their pamphlet), and was just what I needed on my place.

### FIRST EXPERIMENT.

I therefore purchased a machine and a right to use it. This was in July, 1884. I had three ditches dug; about 1,000 feet in all, sixteen inches deep and sixteen inches wide, on a hill-side facing north; twelve feet apart; the ground had partly been planted to squash and partly to grape vines; the squash had nearly all died out from droughth, except a few hills which had a little life left yet. One of my ditches was dug within two feet of six of these hills of squash. Pipes were laid, a plug inserted every twelve feet for outlets, the outlets were surrounded with guards four inches inside diameter; raised six inches above the surface to keep dirt from outlets; pipes covered with soil to top of ditch, water turned in five days after laying pipe.

Squashes and grape vines seemed now about dead. Judge of my surprise on the following morning, squash and grape vines had taken a new lease of life, and in a few days looked as if nothing had ever given them a setback. In the fall we gathered a wagon load of fine squashes; kinds of squashes, American Turban and Hubbard. My grape vines made a growth of over ten feet; variety, Concord. So much for my first experience in sub-irrigation.

### SECOND EXPERIMENT.

In 1885, I planted tomatoes, sweet potatoes and norbiton giant mangel-wurtzel on same patch. All did well five feet around each outlet, and brought splendid crops, beyond that not so good. This proves that for sub-irri-

gation garden crops, laterals should not be laid more than eight feet apart and outlets the same distance (perhaps seven feet would be better); kind of soil, sandy loam.

THIRD EXPERIMENT.

In the spring of 1886, I planted the three rows to fruit trees and grape vines; one row to quince—Mammoth, Champion and Orange, the orange did the best; one row to pear trees—Bartlett, Burre D. Angou, Seckell, Flemish Beauty, Buffam and Osborn's Summer. Trees that I had raised here did splendidly, some I had shipped were injured when received and died out; one row to plum trees—Shropshire Damson, large Yellow Egg, Duane's Purple, Lombards and German Prune, all did splendidly, not one of them died.

How I planted: I planted one tree within two feet of each outlet and one row of grape vines between each row of trees. Kinds of grape vines planted—Brighton, Lady, Concord, Salem, Prentiss, Duchess, Iona and Chasselas, all did well except Lady, which made very slim growth. From one Concord vine, 6 years old, I picked this fall fifty pounds of splendid grapes, through sub-irrigation. Time of irrigation—once in two weeks; let water run from one to one and a half hours at each irrigation.

I have, therefore, come to the conclusion that sub-irrigation, when properly applied, is a perfect success in Colorado. I think a little improvement might be added by having the plugs in the outlet six inches in length, instead of two and three-quarter inches, but I would particularly recommend the use of nothing but the very best English Portland cement for making pipe, as I have tried other kinds, with very poor success. Some one will say, perhaps, if sub-irrigation is such a success, why don't you use sub-irrigation all over your place?

To which I would say, because many of my apple trees are ten years old, and many grape vines eight years old. I would be afraid in digging my ditches of doing them a great injury by cutting too many roots, but if I was going to plant a new orchard and vineyard, I would, if possible, put every foot of it under sub-irrigation.

P. S.—This paper is my own practical experience and observations, and no theory of some one else. Sub-irrigation is just the thing for a lazy man, because he can turn on the water when irrigation is needed and go to the house and read his paper, smoke his cigar, and when it has run long enough he can go and turn the water off in about one minute, and weeds will not grow near as much where sub-irrigation is used.

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MRS. C. A. HOLLEY then presented the following paper on

## Flower Gardening.

Even on an ordinary city lot all should make an effort to cultivate a few flowers, which might be grouped in patches on the lawn.

The admiration for flowers is natural in all. The first development in babyhood, is to creep to your pots of plants and snap the gay bloom. Woman is graced when adorned with them. Few men will not feel flattered when you pin upon their lapels a bouquet. The mansion is a fairy land, with its array of flowers, during a reception. But this is tame when compared with the growing and caring for a well selected collection of flowers, from the crocus and pansy of early spring, to the chrysanthemum (old fashioned), and annuals of hardihood which defy the frost and snow of late fall.

Encourage the culture in your children. You may, as some do, call it a waste of time. When you look out upon the streets and see the scores of children who are each day sowing and gathering tares, instead of beautiful plants, in their own private homes, then you may call it idleness.

PATHETIC.

A trifling incident occurred last summer which will show you somewhat the influence of flowers. A small boy was looking at his verbenas, which were a fine mass of bloom, when a little girl came up to the gate and said to him, "My little cousin is going to be buried this afternoon, and we have no flowers, would you give me some?"

"I will ask my mamma," said the boy.

The mother had heard the appeal, and was out among the flowers as soon as the request was made.

They soon gathered a sufficiency, and the girl left with a face radiant with the thought of the offering she was making her sacred dead.

The little boy looked on; but as soon as they were alone, he said, with tears of sympathy, "Mamma, she said they had no flowers. I'll keep my bed nice, for the next little girl that comes," and it was only a few days until another came. Let me add, these flowers were watered from the ditch that flows through our city.

There has been for many years a stereotyped plan of gardening, among those who have grounds on which they can display this art, such as an immense bed of geraniums, some times all of one color; this is monotonous. Although you may be limited in space, you can have variety, which will be ever changing. In the autumn months, from any nursery-man, get a few dollar's worth of early blooming bulbs in variety. Plant in beds,

or patches on your lawns, and after the bleak winter is passed, the grass scarcely starting, look out at your charming bed of blossoms. The crocus first, and before the snow is gone, then the hyacinth with its dainty flowerets and lovely perfume.

THIS BULB

Has also a history. Hyacinthus was the son of a Spartan king, and a favorite with the god Apollo. While at play, Apollo accidently killed Hyacinthus. To atone for the deed and as a token of affection, he named this beautiful flower hyacinth.

In this family there is an extensive variety and succession of bloom. Then comes the narcissus, so lovely and varied, not much behind the hyacinth. Its origin is also mythical. A vain youth by that name, was so flattered by his image reflected in a fountain, it "turned his head." He must have been a dude. For this frivolity, he was transformed into this flower which bears his name. I am glad it occurred, for in his stead we have a beautiful flower, white and yellow with vinings of shades of red. Daffodils and jonquils are of this family, and the flower known to all of you, as the Chinese Sacred Lily, is Polyanthus Narcissus. The endless beauty in these early blooming bulbs, is too infinite for a minute description, and is increasing each season in variety. For cemetery decoration, they are of great value. In the spring months, before bedding plants can be set out in open ground, you have from these bulbs a profusion of bloom and foliage, with your fondest anticipations gratified. Moreover after these bulbs have remained in the ground for two or three years, with your utter neglect, you find on digging them up you are rewarded with a bountiful harvest. The numbers have increased, so you have more than you need. Give them

to those who are less favored, thus fulfilling Christ's teachings of charity to your neighbor, which is love, the noblest of our attributes.

Although so much can be said of bulbs, perennials and herbaceous plants must not be left out. They have long been neglected. Perhaps because they are old fashioned. Nevertheless they have great beauty, and an advantage over annuals, bedding plants, etc. You make a permanent investment, whose value increases yearly, with an overflow of satisfaction to their owner, who may scarce spend a moment with their culture. Of these, many bloom when *all* wish an abundance of flowers for *Memorial Day*. This was an inspiration to the mind that gave it birth.

THE BOYS IN BLUE.

As one great band we strew the sacred and beloved mounds with flowers, ennobled by the ceremony. I heard a man say, not long ago, that it was a beautiful thought to him that the "boys in blue," as long as one remained, would strew his grave with flowers. And when they had passed to the beyond, custom would take it each year, so that the vernal time would ever be repeated.

A great study is also taught in floriculture. Before you are aware, you are learning the proper names of each species. You are learning their lives as you would an author's—what they most like, heat or cold, wet or dry soil, rich or impoverished food, their utility, which will give you the best returns, which will bloom when you most desire their blossom, and not select a bouquet of oxalis for evening wear, they fold their petals with the going down of the sun. And instead of ordering from your florist this yellow flower and that pink, be ready to say: "I wish a pink coronation and yellow pansy."

I would point to a little garden as an advantage to the kitchen as a consumer of all the waste vegetable matter, such as peelings and leaves. I have for several years dug holes in the soil and buried all such material, thus creating a compost for the growing vegetation, as well as destroying a nuisance.

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MRS. A. L. WASHBURN then presented the following invitation from the State Grange of Colorado, in annual session at Denver, January 11 and 12, 1887:

*Resolved*, That a committee of one be appointed to extend to the members of the State Horticultural Society, soon to convene in this city, a cordial invitation to become members of the order of Patrons of Husbandry, since the Grange, in its objects, includes all the interests for which they, as an organization, are working, that we may join hands to overcome monopolies and to obtain justice for the food-producers of the land.

The following was adopted in respect to the above:

*Resolved*, That the Secretary of the State Horticultural Society be directed to acknowledge our fraternal relations with the Grange, and to extend our thanks to the State Grange for their kind invitation to become members of the order of Patrons of Husbandry.

The following was then submitted:

MR. PRESIDENT:

Your committee, to whom was referred the recommendations contained in the President's address, beg leave to report that they fully appreciate the great importance of the work set forth in said address, and do recommend that in regard to "Arbor Day," and with a view to secure its annual and regular observance in this State, that our representatives in Legislature assembled be requested to secure the passage of an act legalizing and setting apart one certain day in each year for the

observance of this excellent custom, and which is in harmony with the practice which obtains in many States of the Union.

The importance of tree planting on every homestead on the plains, and of the proper protection of existing forest growth in our mountain regions, is worthy of encouragement, stimulation and protection by an enlightened public sentiment, as well as by legal enactment, and which may very fairly be considered a sanitary as well an economic necessity of the greatest importance to our people.

One of the greatest needs of the horticulturist all over this land is a more competent and ample provision for testing and determining, in as many localities as may be deemed advisable, the many so-called new varieties of fruits and flowers sent out annually with such methods of management as shall comprise the various climatic regions of our State and country.

European nations are wiser than we are in this respect. Not only do they establish these stations at home, but they do so in their colonies.

A policy, which long experience in these countries has been found to be wise, is surely worthy of the consideration of our National as well as State Governments.

The random planting of orchards in the Western States has resulted in losses amounting to millions of dollars annually in the past twenty-five years.

Such losses are in a measure inseparable from the new and unusual conditions which obtain in these regions, and which most earnestly plead for the early and prompt establishment of such experiment stations as shall render the labors of the pioneer horticulturist more certain and reliable than they are to-day.

Not merely do our states differ from one another in climate and soils, but in the so-called arid region; and with irrigation there is a positive necessity for a totally different planting from that adapted to the moister region near the great lakes, and which changes with every degree of latitude and every successive geological formation, as we trend toward the gulf.

Bearing these facts in mind, we earnestly recommend the passage of the following resolutions in reference to what is known as the Hatch bill now before Congress:

WHEREAS, It is understood by this society, that the Hatch bill, which provides for the establishment of experiment stations in connection with the several agricultural colleges, has been reported favorably upon by committees of both houses of Congress, but is in danger of not being reached during the present session of that body, unless taken up out of the regular order; and

WHEREAS, This measure is of exceptional benefit and interest to Colorado, on account of the great variety of soils and climate existing within the State, which daily bring our farmers and horticulturists face to face with undetermined problems requiring systematic and scientific investigation for their proper solution in the best interest of industrial progress;

*Therefore*, Appreciating the great practical importance of the proposed measure, we earnestly request our senators and representatives in Congress assembled, to use every effort to speedily bring said bill before that body, and to secure its passage.

C. S. FAUROT,
WILLIAM DAVIS,
D. S. GRIMES.

Also, the following:

We, the undersigned members of the Executive Committee, find the above report correct.

C. S. FAUROT,
A. GALLUP,
S. WADE.

The following were then appointed as a committee on legislation, viz: S. A. Osborn, H. G. Wolff and Nelson Millett.

The following was then unanimously adopted:

*Resolved*, That the thanks of the Colorado State Horticultural Society be hereby extended to the Denver Chamber of Commerce and Board of Trade for the free use of their hall for our meetings; to Secretary Frank Hall and Janitor Thos. Monshaw, for courtesies extended; to Walter E. Hall, for the use of his fine pianos and his able professional services; to Governor Adams, Dean Hart, President R. W. Woodbury, Rev. Thos. J. VanNess, for their eloquent addresses; to Mrs. Milo B. Smith, Miss Julia Large, Prof. Pfeffercorn, N. E. Skinner, I. E. Blake, John Hamlet, John H. Blood, Geo. A. Brown and Archie J. Davis, who so delightfully contributed to the musical success of our Wednesday evening entertainment; to Miss Lizzie Field, for her charming recitation; to the railroads and hotels, for reduced rates to our members and visitors; to the press, for the full and accurate reports of our meetings; to the various exhibitors of fruits and plants, and to all those who have contributed papers and essays for our entertainment and instruction.

Adjourned *sine die*.

# PROCEEDINGS

OF THE

JOINT ANNUAL MEETING

OF THE

# State Forestry Association

AND

## State Horticultural Society,

HELD AT

DENVER, COLORADO, JANUARY 11 AND 12, 1888.

## ANNUAL MEMBERS FOR 1887.

| | |
|---|---|
| C. L. Hughes | Denver |
| W. H. Davis, M. D | Denver |
| J. S. Ibbison | Wheat Ridge |
| David Brothers | Wheat Ridge |
| Mrs. David Brothers | Wheat Ridge |
| W. A. Helm | Cañon City |
| Dall Deweese | Cañon City |
| A. E. Gipson | Greeley |
| E. Millison | Denver |
| Mrs. E. Millison | Denver |
| John D. Long | Williamsville, N. Y. |
| Nelson Millett | Denver |
| C. S. Faurot | Boulder |
| M. B. Townsend | Denver |
| Thomas P. Reynolds | Wheat Ridge |
| W. L. Porter | Greeley |
| Mrs. W. L. Porter | Greeley |
| Stark Nurseries | Louisiana, Mo. |
| Salkeld Smith | Jefferson County |
| Mrs. Martha A. Smith | Jefferson County |
| Allen Lewis | Golden |
| Mrs. A. L. Washburn | Loveland |

John Tobias . . . . . Denver
Mrs. John Tobias . . . . . Denver
G. W. Webster . . . . . Hygiene
P. D. Goss . . . . . Loveland
R. J. Cory . . . . . Denver
J. W. Eastwood . . . . . Rocky Ford
Elwood Easly . . . . . Golden
Mrs. Elwood Easly . . . . . Golden
Mrs. S. F. Powell . . . . . Denver
T. R. Burch . . . . . Denver
Mrs. T. R. Burch . . . . . Denver
Levi Booth . . . . . Denver
Mrs. Levi Booth . . . . . Denver
R. A. Southworth . . . . . Denver
S. A. Osborn . . . . . Denver
Mrs. B. L. Carr . . . . . Longmont
Edgar T. Ensign . . . . . Colorado Springs
W. E. Johns . . . . . Sioux City, Iowa
Dr. W. H. Buchtel . . . . . Denver
Mrs. W. H. Buchtel . . . . . Denver
Mrs. S. M. French . . . . . Denver
Mrs. G. C. W. Shiff . . . . . Denver
E. P. Horne . . . . . Argo
Mrs. O. H. Harker . . . . . Denver
C. M. Kellogg . . . . . Jefferson County
W. H. Reynolds . . . . . Wheat Ridge
Mrs. W. H. Reynolds . . . . . Wheat Ridge
F. G. Wilmore . . . . . Wheat Ridge
Platt Rogers . . . . . Denver
R. K. Walker . . . . . Highlands
Prof. James Cassidy . . . . . Fort Collins
M. Hodgson . . . . . South Pueblo
John G. Dingwall . . . . . Denver
Ira A. Scott . . . . . Denver

In pursuance of a resolution of the Executive Committees of the two societies, the State Forestry Association and State Horticultural Society met in joint annual session in the Denver Chamber of Commerce at 9:30 a. m., January 12, 1888.

It had been arranged that the first day should be devoted to forestry, and the second to horticultural matters.

In the absence of MR. G. H. PARSONS, of Colorado Springs, President of the Forestry Association, the meeting was called to order by S. A. OSBORN, the Secretary of the Association.

MR. A. E. GIPSON, of Greeley, President of the State Horticultural Society, was unanimously chosen Chairman of the meeting.

On motion, the meeting was then adjourned till 2:30 p. m.

## AFTERNOON SESSION.

The meeting was called to order at 2:30, with President A. E. GIPSON in the chair.

The reports of the Secretary and Treasurer were then received, showing a balance in hand of the Treasurer of $11.10.

The meeting then proceeded to the regular programme of the day, and first listened to remarks from President A. E. GIPSON, on the subject of "Best Forest Trees for Colorado," in which he recommended the cottonwood, box elder, soft maple, butter-nut, black walnut, wild black cherry, black locust, white elm, native pines, white ash, Russian mulberry, catalpa, Norway maple, Carolina poplar and linden. Mr. GIPSON made an eloquent appeal for the cottenwood and box elder, as pioneer trees, and in preparing the ground for other and more permanent timber. He also strongly recommended for shade and ornament the soft maple, but he considered the white and green ash preferable to all others for general planting. He also highly recommended the wild black cherry, it being well adapted for this climate and altitude, and its wood valuable for mechanical purposes. The white elm was a grand street tree in many parts of the country, but did not do

quite as well here in Colorado as in the east. The Norway maple, Carolina poplar and linden were recommended as trees of great promise for this State, but not yet fully tested.

MR. DEVINNEY objected to the black locust in fields, because of its tendency to send up suckers, and recommended the honey locust as preferable. He also recommended the native quakingasp as preferable to the cottenwood, but objected to the black walnut on account of its liability to have its limbs broken off by the snow and wind.

MR. MILLISON strongly urged the planting of black walnut, and spoke earnestly in its favor.

Remarks were also made by COL. E. T. ENSIGN, MR. NELSON MILLETT and MR. WILLIAM DAVIS.

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The Association next listened to the following paper by COL. E. T. ENSIGN, on the subject of

## The Relations of the Federal and State Governments to the Public Forests.

No intelligent person will deny the great utility of forests, and the importance of maintaining a certain proportion of land in forest growth. The immense value of our mountain forests to this State is not fully realized. It is difficult to conceive the loss and injury which would result from their destruction.

In considering the question of the maintenance of forests, it may be taken as a truism that individual effort is entirely inadequate to protect and preserve them, and that the power of the Government must necessarily be invoked in that behalf.

Both the General Government and that of our own State have, to some extent, recognized their duty in this connection, and have given more or less attention to the preservation of the public forests.

The Secretary of the Interior is charged with the care of the public lands, and through him the immediate supervision of such lands is delegated to the Commissioner of the General Land Office. The responsibilities of the latter officer are very great, for upon him devolves the care of the entire body of public lands, amounting to many millions of acres, and situated for the most part in widely separated districts of the newer States and Territories. These lands are, for administrative purposes, divided into two general classes—agricultural and mineral; no distinct classification of timber or wood lands being made. The practical result of this is that of the public funds at the disposal of the Commissioner of the General Land Office, a very limited portion only can be used for the protection of the timber or forests on the public lands. The attention which the Commissioner can give to the subject of forest preservation is in no degree commensurate with its importance. This is clearly shown from the fact that of the few special agents of the Land Office now in this State (four or five only), none are allowed to give exclusive attention to the forests, and but one or two are employed to any considerable extent in that connection. It should not be assumed, however, that this slender provision for the care of our forests occurs through the fault or indifference of the Commissioner of the Land Office, or his assistants. The State has 10,000,000 acres, more or less, of public timber lands; they are scattered through thirty-seven counties, and for their proper protection there should be at least one responsible officer in each of such counties.

In further recognition of the need of forest preservation, the Federal Government has established in the Department of Agriculture a Division of Forestry; it has, however, no control or authority over the public forests. Its functions are advisory only. By means of annual reports, and other printed matter, it seeks to disseminate useful information upon forestry subjects, and to create a just public sentiment with respect to the preservation and cultivation of forests. It also distributes each year a limited quantity of forest tree seeds, seedlings, etc.

Both of these agencies of the Federal Government do some good. Their influence, however, is necessarily confined to

WITHIN QUITE NARROW LIMITS.

With our State forest laws you are of course somewhat familiar. I may speak briefly as to their scope and general effect.

The forestry act of 1885, created the office of State Forest Commissioner, and constituted the county commissioners and road overseers and forest officers in their respective localities. These officers are authorized and enjoined to protect to the extent of their power the forests of the State, to prevent depredation known, to prevent and extinguish forest fires, to encourage the planting of trees and groves, and to co-operate with the Federal officers in the protection of the forests.

The act is founded upon the theory that the preservation of forests is of the first importance, without special regard to the ownership of the same. The State in its corporate capacity has comparatively little timber land. Considerable land of that character has been acquired by individuals, but the bulk of it still remains as a portion of the public domain.

In this State we also have laws providing penalties for the willful or careless setting of forest fires; for depredation upon or injury to growing trees or forests; requiring the posting of notices warning persons to extinguish camp-fires, and citing penalties for failure to do so; and imposing liability upon railway corporations for fires along their lines of road,

NEGLIGENTLY CAUSED BY THEM.

Theoretically, at least, it would appear that our State laws upon the subject of forest preservation and maintenance is all that could be desired. Practically that may not be the case. Our forest laws are to a degree inoperative, for the reason that the State has no authority over the public timber lands, which, as before stated, constitute the bulk of our forests. Again, at this period of rapid internal development, the legitimate demands for timber supplies are most pushing, and neither the existing Federal or State laws seem competent to prevent the unlawful and even wasteful use of timber. On the other hand, it is believed that forest fires are less prevalent and destructive than was formerly the case. The natural reproduction of forest growth is of no mean importance, and it is confidently hoped that further useful forest

LEGISLATION MAY BE HAD.

The doctrine of State control of the public forests, at least so far as relates to those of our own State, has been repeatedly and distinctly enunciated here. It was first voiced in the Constitutional Convention of 1876, and subsequently in resolutions of the Colorado State Forestry Association and the American Forestry Congress, and finally by legislative joint memorial to Congress. It should be noted, however, that at the last annual meeting of the American Forestry Congress that association declared in favor of a general enactment

covering the entire body of public timber lands, leaving such lands under the control of the Federal authorities, but conferring upon them greatly enlarged powers and responsibilities.

The bill drafted for that purpose provides for the withdrawal from survey, entry, sale or disposal under existing laws of all public timber lands of the United States, classifies such land, restoring a portion to entry; provides for the sale of another part, or the timber thereon; and reserves certain portions in permanent forest. It institutes in the Department of the Interior the offices of Commissioner of Forests and four assistant commissioners, the assistant commissioners to act as a council to the Commissioner of Forests, the latter officer to subdivide and arrange districts of proper size, and organize a service, and appoint inspectors and rangers. He is also required to co-operate with State forest officers, and may employ them as his agents. The proposed act also provides for the protection of the public forests, by military force if necessary, and names penalties for injury to or trespass upon such lands, or for illegally handling or transporting the timber therefrom. It aims to secure a revenue to the Government by sales of timber or imposition of royalties, and appropriates $500,000 for carrying out the provisions of the act. Other details of the bill I cannot enumerate here.

The several members of the present delegation in Congress from this State, have been consulted with a view to ascertain the practicability of passing a bill transferring to the State the control of public timber lands within the State. They express grave doubts as to the success of such a measure should it be proposed, but say that a bill, general in its provisions, and embracing all timber lands, would be likely to meet with favor.

In common with others I have heretofore favored the idea of State control of the public forests; but in view

of all the circumstances, and to the end of seeking the "greatest good to the greatest number," that opinion may well be modified. I am now inclined to believe that some measure similiar in character to that outlined above, should receive our support.

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PROF. VAN DIEST read a paper as follows:

I know but very little about trees. I cannot tell you anything in regard to their species, habits, growth, cultivation, etc. I do not know a single Latin name for trees. But I love trees. The cutting down of a tree unnecessarily, I consider, a cruelty; the wanton devastation of a group of trees, a calamity. Any measure to preserve the forests, I consider a benefit to the country and a boon to coming generations. There is no part of the world where a greater variety of trees exist, where their forms are more lofty and graceful than under the tropics, principally the Islands of the East Indies; Java, from whence we get most of our coffee; Bangha, from where we get most of our tin; Sumatra and other Islands. I cultivated my love for trees in that country, where I was employed years ago, at and later conducted a geological survey for the Netherlands Indian Government. Being nearly all the time in and near the forests, I could not help paying attention to their forms, sketch their characteristic features, and make observations in regard to their growth and their influence on the surrounding country. Part of my recollections in this regard I wish to communicate to you, as they may have some bearing on our aim to preserve the forests and make the most out of the benefits of such preservation. It is necessary to sketch you in outlines some of the features of the Island of Java, not the largest, but the most important island of the Indian Archipelago. Consider that we cut off from Colorado, one-third on the east side and one-third on the west side, down to a level with the sea, and

that we swing the remaining middle third part from north to east, place it under a latitude of four degrees south, surrounded by a calm sea, and you have an idea of the configuration and the site of the Island of Java.

### THE MOUNTAIN RANGE

Running through the middle of the Island has an altitude between eight and ten thousand feet. Looking at this range from the sea shore, at a distance of forty miles, it appears much higher than our mountain range seen at the same distance from an altitude of 5,000 feet. The slopes of the mountains are less abrupt than here, run gently down to the shore and are culivated to near the highest tops. On these slopes live more than twenty millions of people, whose principal food is rice. Rice is a marshy plant, requiring water for its growth.

The cultivation on terraces made along the slopes is dependent entirely on an elaborate and economical system of irrigation, and the supply of water for this irrigation is again dependant, to a great extent, on the forests which clothes the highest mountain ranges. The principal timber growing in the mountains is the teak, a hardwood resembling oak, but excelling it in many properties. Once the whole island was covered with a teak forest.

After ages of wasteful destroying of this valuable timber, without any care for replanting, the greatest part of this forest disappeared. Mountain tops became barren and in other places scrub plants of different kind took the place of the timber.

The influence of this was felt thirty years ago in an alarming degree; streams became after rains roaring floods, thence ran dry; the successful cultivation and the plentiful harvests of rice were threatened.

The Netherland Government was for a long time indifferent, but awoke in 1865 to a necessity and made efficient regulations to preserve the forests. A corps of foresters was created, and for the first officers, were engaged Germans of experience at high salaries. A school for forestry was instituted in Holland, principally to form young men for the position of wardens and foresters. The still existing forest was surveyed and carefully mapped, the best places for planting of young trees selected, the exploitation of the forest was restricted and placed under the control of the government. Foresters designated where, how much and what kind of trees could be cut at contract prices.

THE REVENUE OF SUCH CUTTING

Served in the first place to defray the cost of planting and of the care of young trees. When the income increased to more than was needed for this planting, the balance was applied to aid in paying salaries of foresters and wardens. Soon the beneficial effects of these measures were felt, and at this moment the exploitation of the forest, is a paying enterprise for the government. There is now considerably more forest and timber in the island than fifty years ago, and no fear exists about irregular supply of water for irrigation.

The regulations about the forest and its preservation, were copied to a great extent from those in vogue in Germany. There the forest is maintained, preserved and cared for in an admirable manner, and I am told that in Germany the amount of available timber for the trade, is now double what it was a hundred years ago.

It is hardly necessary to say that the story I told of the forests of Java repeats itself, though on a much larger scale, in this country, and that the federal government, and the state governments also, will be compelled to make and enforce regulations to preserve the

forests, restrict the exportation, and guard against waste and spoliation by fires. I do not remember figures, but the decrease of the American forest is alarming, and this fact has attracted the attention of European countries. I wish to recall to your mind in that regard the remarkable statement made by the efficient chief of the forest division under the commissioner of agriculture, Mr. Fernon, in his last report. He mentions that foresters from Austria and Hungary were sent by their governments to study the kind of trees most in demand for lumber in America, so that they could cultivate such kind of trees in Germany, and supply in future times, when America must get its lumber from Europe, just the quality preferred by the trade. Another recollection in regard to the forest in Java, is of enough interest to mention here.

As I said before, most all the slopes of the volcanoes which form a range of mountains running through the middle of the island, are clad now with forests. The upper slopes of the Soemberg, Sindoro and Merebahoe, three mountains in the very middle of the island, are an exception to this rule. Although the soil is very fertile, it is entirely bare of trees. The reason is that the population keeps there large herds of cattle. Cattle prevent the sprouting of trees in their very first start.

This is also the case in Holland, Denmark and in Westphalia, where large herds of cattle are grazing. But as soon as in some of these places the herding on the common is abolished, these heaths begin to be covered with wood, first with raspberry bushes and oak brush, thence rapidly with firs and pines. Since the lands previously held in common, are divided and came in private hands, the extent of forests in the eastern part of the Netherlands, has doubled in the last fifty years; the streams carry off the rain water much slower

and more regularly, and a considerable change to a milder climate is observed in these regions.

The decaying needles of the pine trees form a vegetable mould, changing the original unfertile ground into a rich soil. Very sandy places, unfit for cultivation, are artificially redeemed by planting pine trees. In ten or twelve years the young trees are cleared and the soil seeded with barley, wheat, etc., giving good crops. It looks to me that the reason why our plains are treeless, must be sought in the grazing of vast herds of buffalo years ago, and since of cattle and sheep. Where the prairie is fenced in and ploughed deep, trees will grow. In many places on the plains, crops can be raised even without irrigation, as experience of the last two years in the eastern part of Colorado has proved. But in other places this is not the case—for instance, I presume along the lower Beaver, Badger and Sandy creeks. Although these creeks carry water at their heads, they are dry over a great extent lower down; the water sinks through the sand and is carried at considerable depth towards the Platte river, which swells in places by invisible supplies. It looks to me that the sandy plains through which the above named creeks run, could be redeemed for cultivation by planting trees. This will create in the course of time, a vegetable mould and a spongy sod, which shall absorb moisture, retain water, and form a fertile soil fit for cultivation, while the creeks now dry will change to rivulets.

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At the close of the reading of the paper, COL. ENSIGN announced that he desired to introduce a memorial and resolutions endorsing bills now introduced in Congress.

Copies of the following were distributed, and the further discussion of the subject was deferred until to-morrow's session.

Memorial of the Colorado State Forestry Association and other citizens, to the fiftieth Congress of the United States.

*To the Senate and House of Representatives in Congress assembled:*

Your memorialists, the Colorado State Forestry Association and citizens of the United States, respectfully represent:

WHEREAS, The present laws in regard to the public lands, so far as they relate to the disposal of timber lands, or of timber from the same, are entirely inadequate to the requirements of the present state of our civilization; are unreasonable, pernicious and prejudicial to the best interests of this country, and have a tendency to induce fraud, theft and perjury; and

WHEREAS, Especially in the Rocky Mountain and Pacific Slope region, the mining interests in regard to material supplies, and the agricultural interests in regard to favorable distribution of water supply, are threatened with danger, or have already been endangered, by the thoughtless and unnecessary destruction of forest growth on the mountain slopes and hillsides; and

WHEREAS, By the axe and by fire many millions of dollars' worth of public property have been destroyed without benefit to any one, owing to the neglect on the part of the Government to protect the property of the people; and

WHEREAS, Favorable agricultural and climatic conditions of a country are largely dependent upon a proper amount of well distributed forest areas, and especially upon the preservation of the forest cover on the mountains; and

WHEREAS, Such preservation cannot be had under the existing laws, nor can be expected at the hands of private individuals; and

WHEREAS, By the disposal of the timbered areas now in the hands of the United States, and by their devastation under present conditions, the power to insure proper forest legislation passes from the people;

*Therefore*, The undersigned memorialists, imbued solely by a desire to further the best interests of the country at large, most respectfully and urgently pray that you will, without delay, give consideration to and enact as law, the subjoined bill, which provides for the withdrawal from entry or sale, classification and proper disposal or administration of public forest lands, or that you provide such other legislation in the same direction as may best appear to your honorable body.

PROF. VAN DIEST then read a paper on the subject of "Legislative Control of the Forest in Foreign Countries."

It is to be regretted that PROF. VAN DIEST'S paper was not furnished the Secretary for incorporation into the report. It was an exceedingly valuable and instructive paper, and elicited general discussion. Remarks upon the subject were made by COL. ENSIGN, GIBSON, DE VINNEY and others, at the close of which the meeting adjourned till 9 A. M. the following day.

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## MORNING SESSION.

JANUARY 12, 1888.

The meeting was called to order by the President.

NELSON MILLETT, Secretary of the State Horticultural Society, made his financial report, which is as follows:

RECEIPTS.

| | | |
|---|---|---|
| Cash on hand from last report | | $ 6 80 |
| Received from Wm. Davis, Treasurer | | 8 50 |
| 37 annual memberships, at $1.00 | | 37 00 |
| 16 annual memberships, at 50 cents | | 8 00 |
| Total | | $ 60 30 |

DISBURSEMENTS.

| | | |
|---|---|---|
| Expenses of January meeting, 1887 | $ 42 03 | |
| Postage—mailing reports | 5 50 | |
| Expressage on other State reports | 4 40 | |
| Drayage | 1 50 | |
| Incidentals | 50 | 53 93 |
| Balance on hand | | $ 6 37 |

WM. DAVIS, Treasurer of the State Horticultural Society, made his report, showing:

| | |
|---|---|
| Balance on hand from last report . . . . . | $ 8 30 |
| Paid on order of Executive Committee . . . . | 8 30 |

Leaving nothing in the treasury at the present time.

PRESIDENT GIPSON then delivered a short address on the outlook for horticulture in the State and the needs of the Society. He regretted that the Legislature at the last session did not appropriate $2,000 for the Horticultural Society, and hoped that at the coming session it would see the wisdom of appropriating that amount. The salary of the Secretary should be at least $1,000 a year, as the arduous duties of the office merited that amount.

A general discussion followed, participated in by NELSON MILLETT, DR. SHAW and others.

The Secretary then read the following communication from C. S. FAUROT, of Boulder:

CORTLAND, OHIO, January 8, 1888.

*To the President and Members of the State Horticultural Society:*

When our worthy President suggested to me that I should write a paper on "Needed Legislation," I promised him to try and do so, but the more I think of the subject assigned me, the more I am convenced I have "bit off a larger piece than I can chew."

Since leaving home, I have traveled through Iowa, Illinois, Indiana and Ohio, and upon seeing the condition of the orchards I feel as though I could better write a paper on the "Failure of Fruit Growing in the States East of the Missouri River." It is a sad sight to see large orchards, with trees from twelve to eighteen inches through, with half to two-thirds of the top dead, and on other trees now and then a dead limb. I have yet to

see a single healthy orchard old enough to bear. One will see, now and then, some quite thrifty young orchards, but none that will compare with our fine, smooth trees of Colorado. It is a wonder to me they can grow as fine fruit as they do. I think the horticulturists of Colorado should take renewed courage, for certainly we have a very bright future before us, as it is only a question of time when we will be shipping apples east instead of shipping them west, as we are now doing, to supply our markets.

I sincerely regret my inability to be with you at our meeting, but hope and trust that it may be a successful one, and that the work done may rebound to the good of the cause we are engaged in, for if there is any one branch of industry in the State of Colorado that should receive the united sympathy and support of the people, and their law makers, it is the cause of horticulture and agriculture, for it is to this branch of industry that all others are dependent upon. We represent more wealth, and pay more taxes than any other branch of industry in our State, yet our wants are ignored and our demands laughed at by our law makers. And who is it that places these men in position to make laws for us? Is it the capitalist, or the honest tiller of the soil? I leave it for you to answer the question. I will endeavor in this paper to make some suggestions whereby we can remedy the evil, and hope you will, at this meeting, take such action as you, in your judgment, deem best for the good of our cause.

First, let each member of this Society and all auxiliary societies throughout the State, consider themselves a committee of one to make a thorough canvass of such men as are placed in nomination for our Representatives and Senators, and see that they are men who understand the wants of the horticulturist and farmer; that they

are men who have firmness of character; men who will assert the rights of their constituents; men who cannot be be influenced by ditch or railroad monopolies; men who will not place their knowledge and influence on the market to be bought by the highest bidder; men who have something to loose in place of everything to gain; men who hold the wants of their constituents of a greater value than all the wealth of our monopolies; men who are God-fearing, and hold the trust that has been placed in them of greater value than all the gold in the Rocky Mountains. Then, and not until then, can you expect or hope for any reformation in our present system of law-making.

Then when you have accomplished this much see to it that those men to whom you have intrusted the honor and welfare of our cause, and the honor of our glorious State, that they are thoroughly conversant with our wants; and to do this, I would suggest that before the next Legislature convenes that you hold a series of meetings throughout the State, and have the representatives of the different sections meet with you and confer with and recommend to them such amendments to our present laws, together with the enactment of any new laws, that you may in your judgment deem best, for the promotion of our cause. There are a great many questions of vital importance to every tiller of the soil which should be brought before our law-makers at their next session and should receive their attention at at the earliest moment, to the end that they may receive careful and due consideration, and the laws they may enact stand the test of our higher courts and be found to be in conformity with the Constitution of our State.

The water question is becoming a very serious one, and should receive the earnest consideration of our legislators, for we know that there is a tendency on the

part of capital to monopolize the waters of the State. Now is the time to throttle this growing evil and forever banish it from our midst, and thereby allow the water, which God in His wisdom hath given us, go with and belong to the land, instead of being held by companies and sold to the farmer at a ruinous price.

The State should appropriate sums of money from time to time for the purpose of building reservoirs for storing the surplus water. But one will say, to do this will increase our taxes and they are already too high. With an economical administration we could, under our present system of taxation, have plenty of money for this purpose.

There should be some judicious legislation in regard to railroads. They should not be allowed to discriminate in favor of one part of the State, or country, to the detriment of some other part, as they are now doing.

The law regulating the taxing of mines should be changed. In place of taxing the improvements on the mines alone, tax the net output as well, and let the mine owners help carry the burden that is now borne by the farmer. There are a good many miners and mining companies, drawing thousands of dollars from our State annually that do not pay a cent of taxes.

I hope you may at this meeting be able to formulate some plan of action whereby we shall be able to bring influence enough to bear on our next legislature to get an appropriation large enough for the maintenance of a State Horticultural Society that will be worthy of so grand a State—one that we can all point to with pride. It makes me blush with shame for our law makers when I think of the shameful way the State of Colorado has treated the Horticultural Society. When it asks for a little help that it may maintain and carry forward the grand and noble work it is engaged in, it is told there

is no money in the treasury. But at the same time the House of Representatives has money enough to hire about ten times as many clerks as are necessary to do the work of that honorable body. And then there is that wonderful document called "The Railroad Commissioner's Report," which cost the State five thousand dollars, and is not worth the snap of your finger. We find no lack of funds until the Horticultural Society asks for money enough to print a few hundred copies of its Annual Report. Then it is found that there is no money. I tell you, gentlemen, such things ought not to be. We should have a law that creating the office of State Entomologist, with a sufficient appropriation for maintaining a good and competent man. Unless we can get some aid from the State in this direction, it will work great hardship to those of us engaged in horticultural work, for, with our dry climate, Colorado will become the home of insects. There is, with the horticulturist and the gardener, a war against insects as well as against weeds, and unless there is something done to check this growing evil it will destroy one of Colorado's greatest industries.

I should like to see a law passed that would compel the use of some simple text book on entomology in our public schools. Our boys should be taught to know their insect friends, as well as their enemies.

We also need a law in regard to the English Martin that has just begun to make his appearance in our State, and unless there is some prompt and decided action taken to check this evil, which now is like the cloud of ancient times that was no larger than a man's hand, but grew until it covered the Israelites and protected them from those who were seeking their destruction, so it will be with the Martin. He is small in stature and few in numbers, but if let alone will spread as did the cloud of old, and drive from our State those birds that

are the friends of the horticulturist. Let us nip this growing evil in the bud by using every means in our power to procure laws that will compel the extermination of every English Martin in our State.

We also need laws that will punish, by fine and imprisonment, every act of stealing from our gardens and vineyards. The act of taking melons and grapes is looked upon by boys (and, I am sorry to say, a great many grown people) as a good joke on the man who is so unfortunate as to have such tempting things growing. They seem to think such things are free plunder, and it works a great hardship on those growing such produce, and stimulates within the boy a desire to steal things of more value than water melons or grapes.

There should be a law passed prohibiting the sale of worthless nursery stock by unscrupulous tree peddlers. Every nursery-man sending agents into this State should be compelled to give bonds in such sums as would insure the farmer against fraud; and let every offender, who misrepresents stock, be punished with a heavy fine. I should like to see a law passed compelling foreign tree peddlers to pay a license for the privilege of selling stock in this State. I think in this way we could put a stop to so much worthless stuff being palmed off on our unthoughtful farmers.

We should have more and better laws passed for the protection of our forests, for in protecting the forest along the water courses through the mountains we will greatly increase our water supply.

At the last meeting of the Northern Colorado Horticultural Society, there was a committee appointed, called the Legislative Committee, said committee to act in conjunction with a like committee to be appointed by this society. I hope and trust you will place on that

committee such men as will work for the good of our cause.

With my best wishes for you all, and the welfare of our cause, I remain

Very truly yours,

C. S. FAUROT.

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MR. E. MILLISON then read the following paper on

## Forestry on the Plains.

To my mind it is possible to grow a great many varieties of hard wood as well as all kinds of soft wood on the "Great American Desert" wherever water can be obtained. The question arises: First, what kind of timber do we want? Second, how to produce it in the shortest time possible? To successfully plant and grow forest trees, a man should have some practical knowledge of how to save, prepare, and when to plant and how to plant the seeds, pits and nuts, or cuttings, as the case may require.

Of the hard woods, of course we want the seeds and nuts. For all kinds of soft woods, such as willow, cottonwood, Lombardy poplar, balm of gilead, and, perhaps, a few others, cuttings are always used. In any and all soil and localities where corn can be grown successfully, almost any variety of our American forest trees can be grown successfully. So far as my experience goes, we will succeed best by planting all acorns and nuts just where we want the tree to grow, as all hard wood trees are known to have tap or central roots that penetrate the subsoil to far greater depths when left to grow where first planted, then would be possible if the tree is grown in rows until from four to six years old, as is usually the case.

Many times it is impossible to plant just where the tree is wanted to remain permanently. In such cases transplant at one or two years, if possible. I have planted many kinds of seeds and some pits and nuts, and wherever I have let the tree remain where the seed was first planted the result had been much more satisfactory than when transplanted. Walnuts, hickory, butternuts, all kinds of oaks and pines, seeds should be planted in the fall or buried in moist ground and not allowed to dry out during winter. Soft maple seeds should be gathered and planted in the same season. I have known fine groves to grow by planting them with and in the hills of corn.

This practice has proved very satisfactory as a rule where there is moisture enough to produce a crop of corn. Tree seeds will grow on all our great plains where water can be had. Any man, with care, can grow all kinds of soft wood and many hard wood varieties.

I noticed the past fall, as we traveled away from the water supply, that even the cottonwoods did not grow so vigorously as in the vicinity of Denver, where there was plenty of water to irrigate with. The same is true of ash, sugar tree, maple, oak, elm, basswood and Lombardy poplar. With our system of irrigation to aid us, we can surpass the world in growing American forests on our great plains.

I have in my mind's eye such a forest as I would like to grow. First, I would, in any locality with water supplies, deep soil, clay subsoil, rolling and mostly facing the north and north-east, plow as deep as practicable in the fall, and plant (after thoroughly soaking the nuts, seeds or pits) four to six inches deep, according to kind; then run furrows parallel with the rows so planted, and leave it so all winter, and in the spring as soon as water can be obtained and the ground becomes

dry an inch deep from the surface, begin to irrigate, and as soon as the weeds appear, start the cultivator or harrow, and be sure not to let the ground set or get hard until past the season for weeds or grass to grow. In all probability the young trees will appear above ground through the months of May and June, and even in July. I have had pits come up the next summer, more than one year after planted. I can show fine trees now one and two years old, all planted at the same time and treated the same way in planting.

I would plant hard wood seeds with the rows twelve feet apart, and with the seeds drilled not more than one foot apart. Then, as the trees grow and as you want to transplant for yourself, and perhaps for your neighbors, thin out as your judgment may dictate.

After having thus planted your hard wood seed at the proper time, run a furrow midway between the rows and plant cuttings about fifteen or twenty inches apart—thus you will have protection for the trees that need it, and very soon soft wood trees for your neighbors and timber for many things that will come so handy on the farm. In selecting acorns be sure to plant white oak seed. It is the most valuable of all our northern oaks. For chestnut trees, scatter the seed very thin and never transplant if possible; and for windbreaks, don't forget the slips from the Lombardy poplar.

Be sure to send to California for several bushels of California walnuts. Be sure they are from the new crop. Also plant freely of the honey locust. It is all of the locust family that my experience will allow me to recommend. The seed of this tree is very hard to sprout, and will require a great amount of moisture to make it germinate. Some that I planted lay for two winters in very moist and rich soil before germinating, but when they do come up they seldom die.

You will be well satisfied with a sprinkling of linden or basswood seed. It germinates very readily. I recommend also the sycamore or buttonwood. It is a long-lived foliage tree, which needs transplanting very young.

I hope you will pardon me for referring to my own experience in tree culture in this short paper. Just now is a good time for me to report the result of my two California walnuts that I received one year ago from a gentleman direct from California. We agreed to plant and report the result this meeting. I took the walnuts home, soaked them in hot water—not scalding hot—forty-eight hours, then planted them six inches deep. Now I have one California walnut tree a little more than three feet high, and one about two feet high. I only had the two nuts to begin with.

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The discussion of this subject was led by MR. DEVINNEY and participated in by COL. ENSIGN and others, the discussion being quite general.

This was followed by a paper by S. A. OSBORN, on the subject of "Consolidation of the Two Societies," followed by discussion.

COL. E. T. ENSIGN, MRS. A. L. WASHBORN and PROF. JAMES CASSIDY were appointed a committee to report at 2 p. m. a basis of consolidation.

The meeting then listened to a most valuable and interesting paper by PROF. JAMES CASSIDY, of the State Agricultural College, on the subject of "Scientific Horticulture," at the close of which the meeting adjourned till 2 p. m.

It is much to be regretted that PROF. CASSIDY'S instructive paper cannot be given here, it having failed to reach the Secretary's hands.

## AFTERNOON SESSION.

The meeting was called to order by the President at 2 p. m.

PROF. ELWOOD MEAD, of the State Agricultural College, presented the following paper on

# Irrigation in Colorado.

The subject assigned to me on your programme has such a general comprehensiveness that I was for a time at a loss to know how or where to begin with its treatment. The possibilities of our irrigation were in so many directions that to discuss all of them would give me steady employment for the winter. Fortunately for my hearers, the time allotted to the preparation and delivery of this paper, is limited, and I shall confine my remarks to a brief review of the two elements which most vitally affect the prosperity of any industry. These are the character and extent of our natural resources, and the ability and disposition of our people to make the most of them, leaving its possibilities in the direction of horticulture to more practiced pens than mine.

The possible or ultimate development of our agricultural interests, is a subject which demands the careful consideration of every citizen who feels concerned about the State's welfare and progress. The prosperity of irrigation depends in a greater measure on just laws than does the success of any other productive industry. And the experience of the older irrigation districts of the world, has proven that it is absolutely indispensable that the State should control and regulate the distribution of the water supply, in order that justice may be secured and oppression and abuses be averted. In our own legislation there has been a failure to forecast our

ultimate agricultural greatness. The early legislation was wise but inadequate, and much that has followed has been temporizing, fragmentary, and, to judge from the recent judicial decisions, not always legal or beneficial. We have now reached a point, however, where wise and comprehensive laws are indispensable, and also where the magnitude of the interests involved will not permit of experimental legislation. The enactment of proper laws, and the placing of our system on a basis which accords with the results of the best experience and thought of our time, will depend, in a large degree, upon the enlightened public sentiment and active interest and efforts of the agriculturists of the State. It is with pleasure, therefore, that I present a few considerations which seem to forcast the ultimate and early agricultural greatness of the State.

The area at present under cultivation cannot be stated certainly, owing to the imperfect character of our statistical records, but is somewhere between one and one and a quarter million acres. It is watered from canals whose aggregate capacity is about 40,000 cubic feet per second, the capacity of these lands being largely in excess of the area irrigated. Estimating the duty of water at one cubic foot per second for eighty acres, the capacity of the canals already constructed is sufficient for the irrigation of more than three million acres. As the area of land susceptible of irrigation is only limited by the water supply, it is apparent that we have already made provision for more than doubling the area at present under cultivation, and only await the incoming tide of emigration from the East and South. The exhaustion of the canals already completed does not, however, mark the ultimate extension of our irrigated area. While on some streams in the northern and eastern part of the State the capacity of the canals equals or exceeds the discharge of the streams, there is still a large surplus of

unappropriated water and available land in the west and south, the utilization of which is only a question of time. Without going into detail as to location and value of these streams, I believe it to be a conservative estimate to place the amount of land susceptible of being brought under cultivation by irrigation at between four and five million acres. This is an agricultural area greater than that of either Massachusetts, Rhode Island, Connecticut, New Jersey or Delaware. But the best conception of the wealth and greatness of the State which will result from the development of our irrigation resources, can be had by a study of the irrigation districts of the old world. At present our irrigated territory surpasses that of France and Spain combined, is about one-fifth that of Egypt and one-third that of Italy. As the countries last named are the classic lands of irrigation, a few of the results of this phase of agriculture in those districts may not be without interest.

The valley of the Nile has an extent of only 6,000,000 acres with an agricultural population of about 2,000,000, yet from the fruits of whose toil are supported the govenment and people of Egypt. The result of their labors sustain the monasteries with their hosts of religious fanatics, the towns with their bazaars and beggars, the army, the court with its train of officers and dependents, in all a population of 7,000,000 people. And not only is this done, but the interest on their national debt of $515,000,000 has to be paid out of the products of their teeming soil, the whole furnishing a record of agricultural wealth and resources without a parallel in the most favored regions of abundant rainfall. The irrigation district in the north of Italy has for us, however, the greatest interest, not only because of the beneficent result of irrigation there manifested, but because they are achieved under conditions which in many respects resemble our own. The valley of the Po has an eleva-

tion almost equal to Denver, is five degrees to the north of us, its rivers are like ours, fed from the melting ice and snow of its mountain reservoirs, and among its products are found many of our own.

The total irrigated area is 3,150,000 acres, having doubled within the past thirty years. The volume of water employed is estimated at 32,000 cubic feet per second distributed by fifty main canals. The district watered by these canals is the garden of Europe, and in agricultural opulence and commercial stability, no country, perhaps, equals it. The provinces of Piedmont and Lombardy are the chief contributors to the revenues of the Italian government, the water rentals from the state canals alone amounting to $600,000, and the capital of one of the provinces is the commercial metropolis of Italy. A late writer, recounting the results of a tour of observation of the agricultural districts of Europe, says that a town of 20,000 people in the irrigated district of Northern Italy had more evidences of prosperity and thrift than any town of 50,000 he had visited elsewhere. It must be remembered also, in considering this matter, that irrigation in this district is a matter of choice and not of necessity, the rain fall being sufficient to produce crops without artifical watering. The introduction was made under the most discouraging circumstances and involved an immense outlay. The result has, however, fully justified the expenditure. The introduction of irrigation into these two provinces alone has added one hundred millions to the resources of the Italian government. It has enabled them to withstand the increasing competition of Asia and America and to add new fields each year to the irrigated lands.

So much for the fruits of Italy's efforts. Of the estimate of the advantages of irrigation here and all other irrigated districts of Europe, the writer above referred

to has said: "No land once watered has returned to dependence on rainfall. No canal has been closed. Wherever irrigation has been introduced, it has been maintained, and though conditions have altered and products have varied it has steadily increased in area and the capital invested, the products raised by it, the number of those engaged upon it and supported by its means." It may, however, be questioned whether these results have not been attained under exceptionally favorable conditions, and that the different circumstances which prevail here prevents our drawing the conclusion that *our* future development is destined to be equally prosperous and important. An irrigation development equal to that of northern Italy would make Colorado one of the most important agricultural States of the Union. Whether we are to anticipate this or not the following facts are worthy of remembrance: The certainty of return for labor performed makes profitable a more intense culture and higher form of agriculture in irrigated districts than prevail in regions subject to the vicissitudes of rainfall. All irrigated districts of the Eastern hemisphere are districts of dense population and great wealth, except where burdened by oppressive taxation or ruinous local customs. In addition to this, when we consider the character of our material advantages, we find there are few countries possessed of so many favoring conditions. So admirable is the configuration of the surface of our soil and the character of our water supply adapted to the economical construction of canals, and distribution of water, that even had this been a region of abundant rainfall the practice of irrigation would have only been delayed.

EXCELLENCE OF OUR IRRIGATION.

The cheapness and effectiveness of our irrigation works have been a source of surprise and admiration the world over. To illustrate this, I might mention that the

cost of one canal in France, only fifty miles long, and which only waters 46,000 acres, equals the aggregate cost of all the ditches and canals in this State, and that the expense incurred in removing the silt from Nile canals would in three years pay for the building of ours. In variety and amount of our productions and fertility of soil, there is little to be desired. Few countries are so favored as this in its present and prospective home market. The mines now consume more than the valleys produce, and the mountains will continue in the future, as in the past, to furnish the stimulus to production and the market for the products. Our future market will not, however, be the mining camps, but the homes of the toilers of our mills and factories. No State in the Union has greater promise of a varied industrial life. The mountains of iron, coal, marble and stone, are the fitting complement of the agriculture of the valleys. When to these are added a climate that makes mere animal existence a delight, and scenery that is an inspiration, we need have no misgivings as to the future.

This partial enumeration of our material conditions is supplemented by equally important social and political advantages. We are laying the foundations of our system in a new commonwealth, and are not restricted by privileges, prejudices or customs, which time has hardened into laws. As yet there are few vested interests to cramp our developments or hamper our progress. We have the experience of the past to light our steps, and a people of an exceptional degree of intelligence to apply its lessons. The question then follows, in what direction lies our danger, and what is the field for our efforts?

I advance my own views on these questions with a diffidence born of a knowledge that there are many opinions and a multitude of counsel. But I think I am

not far wrong when I say that our chief danger lies in our indifference to our resources and our undervaluing their future importance. It has thus far led the State to adopt a *laissez faire* policy until abuses have crept in and the strength of conflicting interests makes it difficult to secure needed reforms. Our system is inadequate to the proper distribution of the water supply at the present time. What will it be when the irrigated area is double and the population has quadrupled?

PRESERVE THE SUPPLY.

Of the matters that demand our immediate attention I can only indicate a few, the first of which is the conservation of our water supply by more effectively retaining the snow on the mountains. How to prevent the deforesting of the mountains is one of the most important economic problems confronting us. We need to stop mountain fires, the mountain sawmill and the railroad tie cutter. Every acre of forest shorn from the high mountain ranges means a loss of more water for late irrigation than an acre reservoir in the valley will impound. Let the construction of reservoirs wait; what we want first is the preservation of our natural ones. If we can keep the sides of our mountains covered with timber we won't need a mountain reservoir for the next decade. But let the sun's rays fall directly on their bare and blasting sides, and all the reservoirs in Christendom would fail to give us a satisfactory water supply. We need to din this matter into the ears of the General Government and to insist that it shall either effectively attend to this matter or turn it over to the State, which will.

We need also to correct the abuses which have fastened themselves on our methods of distributing water, and which for the past five years have operated as a bar to immigration and threatened the very prosperity of

our agriculture. I refer to the inequitable water contracts and oppressive charges of the many canals engaged in the business of selling water. You are all familiar with the enormous development of canal construction which followed the belief that appropriations from the stream conferred absolute ownership on the canal. Between 1880 and 1885 many parts of the State were girdironed with canals built in advance of their need, simply and solely because of the belief that by thus securing possession of the water supply they controlled the values of all land tributary to their ditch.

You all know the results; the price of water rose steadily with the value of land; $10, $12, $15 and $20 per acre for water rights were the prices marked up each year, as the increasing tide of settlement made land more scarce and dear, until at last the charges became almost prohibitive. A fortune was necessary to begin farming in this new State, with its free land and State water. The poor man of the East seeking a home could not find it here, however much it was desired.

But the most excessive charges were not the only, nor perhaps the most serious evil of these corporation water contracts, (I speak of these as past because I trust the recent decision of the Supreme Court will put an end to many of them). I have yet to find a contract for the sale of water, whose provisions are fair toward the buyer, or that offers any incentive or inducement to secure its economical use. To illustrate what I mean, I will read the provisions relating to the delivery of water, from a contract taken from a dozen in my possession, all having the same conditions, but slightly different language.

A DEED FOR WATER.

Now, this purports to be a deed for water, but you will notice that it is a deed that conveys no absolute

volume, and which is so weighted with restrictions and reservations, as to make the ditch company a sort of guardian and director of the farmer's operations. I wish to invite your attention particularly, however, to the inducements it offers to the economical use of water. If the farmer, by the expenditure of time and money, prepares his land for irrigation, and by deep plowing and careful attention to distribution, manages to diminish the volume required, what is his reward? Simply an obligation to hasten to the ditch company, implore them to shut off his supply and sell it to some one else; the ditch company to pocket the proceeds.

Next to the obligation to husband the sources of water supply, it is the duty of the State to foster its economical use, and to restrict, and if possible prevent, everything which encourages wasteful and pernicious habits. The way to accomplish this is to adopt a system of delivering water, that will make it to the interest of the individual irrigator to practice economy. Throughout all irrigated countries, it will be found that the duty of water is high or low precisely in proportion to the incentives offered the irrigator to save or waste. Where it means a saving of money to make a small amount of water suffice, the duty will be larger. But where water is sold, as with us, by the area or crop watered, there will be waste and low duty. A recent writer, in speaking of this, truly says: "Neither climate, soil, crops, rainfall, nor the intelligence of the irrigator, will in the least account for the vast difference between the duty of water in Spain and Colorado. Spain gets a duty of one hundred and forty acres per cubic foot per second; Colorado one of fifty-six, (we do better than that now), and the sole reason is that in the early days it was the custom in Colorado to use and waste water at that rate—and larger and later canals have encouraged it by selling water by the area irri-

gated." These conclusions are as much in accord with common sense, as they are strongly supported by human experience, and I might add further, that not only the extension of our irrigated area but justice to the saving and industrious irrigator as against the improvident and slothful, demands this reform. The present system puts both on the same basis.

## REGULATION.

Without discussing this subject further, it is clear that much remains to be done that can be trusted to less authority than the control of the State, and that the sooner its definite and fixed policy is determined upon, the better for all concerned. Whether we are to have State ownership of canals, as in Egypt, Italy and India; a mixed system of State ownership and government aid, as in France and Australia, or private ownership of canals under rigid State regulation and supervision, is not so important as that we should have one of the three. I regard it of the highest importance that there should be early but intelligent action on this matter. That such action can be secured through ordinary legislation is, I think, to be doubted. The time allotted to such work, and the multitude of interests needing attention, prevents the expenditure of time which this complicated question requires. Besides, our next General Assembly elects a Senator.

How then shall this action be secured? In my opinion, we can do no better than to follow the example of Australia by the appointment of a commission whose duty it shall be to investigate our needs, and frame and submit to the succeeding General Assembly an irrigation code which shall systematize our laws and define clearly the policy of the State. Let this commission be composed of men of intelligence and acquaintance with this subject—farmers, lawyers and engineers. The

results of its labors would be an efficient means of informing and educating our people—a vital matter and worth all the expense it would entail, and is the only systematic method of dealing with the problem. Its labors ought to, and I believe would, result in securing comprehensive legislation and in making adequate provision for the prosperity of our agriculture and the populousness of the State, which by proper effort we may surely attain.

This paper elicited general discussion and at its close PROFS. MEAD and CASSIDY were extended a vote of thanks for their able papers, and the daily papers of Denver were requested to publish the same entire.

The subject of sub-irrigation was briefly discussed by PRESIDENT GIBSON, DR. SHAW and others, the general opinion being in favor of sub-irrigation where practicable, although some of the members were strong in the opinion that on account of frost and sediment in the waters of some of our streams, the system was impracticable in Colorado.

The meeting next listened to the following paper:

# Orchard Culture and its Variations.

BY ELWOOD EASLEY, Golden, Colo.

The Society has imposed upon me the duty of a paper upon that old, old theme, that of orchard culture, the time being very brief, and no chance for escape, I reluctantly accepted the situation and proceeded to jot down a few thoughts as they occurred to me.

Though old and time honored, it is a theme fit for kings and queens to dwell upon. The perfections of the art will never be fully known; they are as varied as they are

grand; there is always something new, always something to be learned. I have read it and studied it from my youth, and have to-day more in theory than I can or ever will put into practice. It is seemingly usless for any man to line out a course for others to persue; but we must push on in the great work. Progress is the watchword of the age, and we should try to overcome every obstacle that besets our path. While I will not confine my paper strictly to the care and cultivation of an orchard, though such knowledge is eagerly sought for by new beginners, but will try to show some of the causes of failure, as well as success, of horticultural persuits.

The first question arises, will it pay? Will fruit growing pay? will farming pay? will chicken raising or bee keeping pay? in fact, will anything pay? Thus you see the first question to come up is the one of finance. No money in it, no good. Yes, but I say fruit growing does pay, has always paid, and will pay so long as the world stands. Can you tell me of any kind of business that does not pay if wisely undertaken, judiciously and persistently pursued? I think not. If any business should become permanently unprofitable, it would be discontinued. The question is, will fruit growing be profitable to you? will it pay? if not, why not? if others make it profitable, why not you? You can buy two boxes of matches for five cents; one yard of calico for six cents; one yard of muslin for ten cents. If there is money made at manufacturing these articles at these prices, does your business pay you a less profit? Your location may not have been wisely selected; you may be short sighted, not looking far enough ahead; you may be a poor financier; you may not possess enough capital; your expense of living may be too great; in fact you may not be adapted to the business. These are a few of the things that unfits a man. But whatever the cause of your not making your business profitable, the

fault is not in the particular pursuit, but in yourself and your surroundings.

Does not the increase of planting decrease the price? It has to some extent in Colorado, since the primitive days, but in a general way, take it all over the country, it has not. Since canning and evaporation began, prices have stiffened, and the gluts in the market so frequent of old, are seldom experienced. This will always be a means to an end of disposing of the surplus. The more abundant the supply of fruit, the more the people form the habit of eating it. You can educate the people to eat strawberries. Say at ten cents per quart at retail they will almost live on them during their season. Strawberries can be raised at a profit to the grower, for two dollars per crate. Apples can be grown in Colorado for two dollars and fifty cents per barrel, with a profit. I have raised and sold many bushels of apples in Illinois at fifty cents per bushel, and thought I was getting a good round price for them. That would be about one dollar and twenty-five cents per barrel. It looks to a casual observer, like it would be many a day before apples would be raised in Colorado at the last named price. But even that would not be on a level with the poor wheat farmer of to-day. So the increase in acreage will not necessarily decrease the price for a decade or two, at least, in this fairy land.

Is there not danger of over-production? There is not a permanent danger of over-production, considering that there is but a small part of the United States that is adapted to giving profitable returns, and in such States as Iowa and Illinois the old orchards are on the rapid decline and will have to soon succumb to the rigid winters of recent years. When I was on a visit to Illinois four years ago, I found the orchards in a deplorable condition. The old monarchs, which used to bear their twenty to thirty bushels of apples, are lying

prostrate on every hand. The sight was a sad one to look upon. I asked some of the best informed fruit growers the cause of this condition of things. The answer was, the excessively cold winters. Thus it will be seen that those of us who contemplate setting out orchards to-day will have an even race with our far-off neighbors in that frigid clime. We do not know what may overtake us in our young State; suffice to say there will always be enough to contend with. Among some of the enemies are the apple-tree borer. I had one tree entirely destroyed by them some three years ago. Why they attacked that and no others I cannot tell, but I have never found any more; they are sure to be here, sooner or later. Do I consider them hard to overcome? It takes vigilant watch when you know they are present.

The codlin moth is another, and, in my opinion, the worst enemy the apple-grower has, and he is with us now. This is what causes the wormy apples. He is hard to exterminate, and I presume never will be totally eradicated in this dry climate, which is so conducive to insect life. I fear when they become old settlers here nothing short of eternal vigilance will be the price of all our apples.

The English sparrow, which has taken up his abode in nearly every State in the Union, but has not yet reached here that I know of, is another very great enemy of the orchard. We cannot plot against them any too soon. Where they are the best known they are the most despised of all the feathered tribe. They are small, but very prolific, raising five or six broods each year. When they become numerous they not only destroy the buds of our fruit trees, but destroy the eggs of many other birds which are our best friends, and are guilty of many other depredations. There being no natural forest here for them to live in, they will be that

much more destructive to our orchards when they do arrive. It is said that their flesh makes a dish fit for an epicure. If that be so, perhaps it will not be long ere we hear some restaurantaur crying: "Sparrow on toast." That may be one means of getting rid of some of them. These and many other things may prevent an overproduction.

Are people going into fruit culture intelligently or blindly? There was a time when men rushed into it blindly, but there is not so many failures as there used to be. They were alike ignorant of varieties, the habits of species, the peculiarities of soils, and many other questions. They failed miserably. Later on others have begun the work who have fitted themselves by experience and observation. Never before in the history of the country have we had so intelligent and competent a class of fruit growers as to-day. Men now have many advantages over our pioneer fruit growers. Horticultural literature contains many books and periodicals by able writers, which make it reasonably certain that a man who embarks in the business of fruit growing, if he has a love for his calling, and will devote the necessary time and study, he may soon become master of his profession.

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The discussion on this paper was led by MR. TOBIAS, and participated in by DR. SHAW and others.

The Secretary then read the following paper from JUDGE W. B. FELTON, of Cañon City:

## Profits of Fruit Culture in Fremont County.

The subject given me by MR. MILLET, Secretary of your Society, was "The Profits of Fruit Culture in Colorado," but I have taken the liberty of changing the subject to Fremont County, that I might confine my

remarks to that which I could vouch for from my own personal observation. Colorado is a State of vast area, and within its borders are found almost all degrees of temperature and extremely varing climatic conditions. In some portions of the State fruit culture can be carried on with as much profit as in any portion of the United States, while at points, only a short distance away, fruit could not be grown at all. Again, there are so many things to be considered that it is difficult to make any general statement about the profits of fruit culture. The man who grows the fruit has very much to do in determining the success or failure. If the man be a man of brains, perseverance and industry, and has a love for horticulture, he will make a success, provided other conditions are all right. The other conditions are that the climate and soil should be adapted, the varieties of fruit selected should be the best of their kind, and the location should be such that the fruit when raised can be advantageously marketed. The soil is often quite different within a short distance and varieties of fruit that will do well on the soil at one point will not thrive at all on soil half a mile distant. For instance, at Cañon City, the soil on the north side of the Arkansas river is heavy adobe, while on the opposite side it is a sandy loam.

Some varieties of fruit do well on one side of the river that cannot be grown on the opposite side. Knowing how to adapt varieties to soil is one of the very important things to insure success. From the experience of the past, Colorado fruit growers now understand many more things about fruit growing than when they commenced the undertaking. In a general way, it may be stated that fruit culture in Colorado, at favorable points for its growth, is more profitable than in any other portion of the United States. The area upon which fruit can be successfully grown is quite limited,

and will not be able to produce enough fruit to supply home demand. It is several hundred miles east to the fruit producing sections, and a longer distance to the fruit producing sections west of us, therefore the price of fruit in Colorado will always be what it will cost to lay it down here from these distant points, and the producer in Colorado can obtain the price equal to the price received by the producer elsewhere, with the cost of transportation added.

The producer of grapes in California gets about one and a half cents per pound for them. They are shipped to Colorado and sold for eight or ten cents per pound. The producer of grapes in Colorado receives from eight to ten cents per pound for his grapes. The apple grower in Kansas or Illinois gets a cent a pound for his apples, which are shipped to Colorado and sold for four cents. The Colorado apple grower gets four cents for his.

It will at once be seen that if as much fruit can be raised to the acre in Colorado as in Kansas, Illinois, New York or California, the profits must be three or four times as much in Colorado as in either of the other States named.

Now for a few facts that we can personally vouch for:

In 1879 we first visited JESSE FRAZIER'S orchard, near Florence, eight miles east of Cañon City. His apple trees at that time were from six to twelve years old. There were about one thousand trees, and they were very heavily loaded with apples. He sold abot $6,000 worth of apples that year; in 1880 he sold $5,000 worth; in 1881 about $4,000 worth; in 1882 about $5,000 worth; in 1883 about $7,000 worth; in 1884 about $5,000 worth; in 1885 about $3,000 worth; in 1886 he had fully 10,000 bushels, worth $15,000; in 1887 his crop was nearly a

failure. In what section of the United States can a better record, for nine years, be produced?

In 1881 we set out about five acres to apple trees. The past season (1887), we had our first crop, amounting to 1,300 bushels, which sold at an average of $1.75 per bushel. But for a heavy hail storm in August the crop would have been much larger.

In the way of small fruits we have had good success, but will mention the results attained by some of my neighbors:

MR. B. F. YOUNG has one acre of land adjoining mine in South Cañon. In the spring of 1885, he set out one-tenth of an acre with strawberry plants (Manchester and Wilson) and the other nine-tenths he set out with blackcap raspberries. He had a good crop of strawberries in 1886, and about 400 quarts of raspberries. In 1887 he had 1,200 quarts of strawberries, and 3,200 quarts of raspberries. His net income was about $600 from one acre.

MR. W. S. DUNBAR, also adjoining my land and YOUNG'S, had about the same amount in strawberries and raspberries as YOUNG, and his receipts were about the same. There wasn't $50 difference between the two.

MR. T. BLANCET, less than a quarter of a mile distant, has two and a half acres, from which he sold last season $2,100 worth of small fruit, apples (his trees bearing but few apples the first time) and garden truck. He had 2,800 quarts of strawberries from one-third of an acre, and sold them for twenty-two cents per quart. All three of these gentlemen have the Manchester and Wilson strawberries. The Manchester is the best berry for the soil of South Cañon that has been tried.

To digress a little from our subject, we want to say that our observations lead to the belief that it makes

much difference what kind of a berry is used to fertilize a pistillate berry. We have noticed some discussion in eastern papers upon this point, and it does not appear to be a generally admitted fact, but we have no doubt about it. For instance, in 1886, MR. EDWARD PAULS, South Cañon, had a bed of Manchester between a bed of Wilson on the one side, and a bed of Charles Downing on the other. The Manchester berries on that part of the bed next to the Downing were very different in appearance and much handsomer than those next to the Wilson. We interject this thought as one that may be interesting, and possibly of profit, to some who may listen to or read this paper.

To return to our subject, we do not deem it necessary to spend more time upon this question. Fruit culture is but in its infancy in Colorado, but hundreds are now engaged in it where only ten were a few years ago, and the number will be very largely increased in a few years to come. As the trees and vines, set out in the last five or six years, come into bearing, the product of fruit raised in Colorado will be increased an hundred fold, and those who have planted and waited will begin to reap their reward. We know of no more profitable business to engage in than fruit culture in Colorado.

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The Secretary then read the following:

## Report from Bent County.

BY J. W. EASTWOOD, Rocky Ford, Colo.

In order to produce crops, the soil to be cultivated should be considered. We have a soil adapted to various crops, ranging from adobe in the bottom land along the Arkansas, to a rather light sandy soil on the higher land. We have seen good crops grown on all, but it is

generally conceded that the heavier soil is our best corn land, while all seems to be well adapted to vegetables and general farm crops.

Agricultural interests have advanced rapidly during the past two years. Many acres which were used only for grazing, are now cultivated. This has been brought about by the timely construction of irrigating canals which furnish an abundant supply of water. Hundreds of acres of raw land are to be broken next spring. As the supply of water in the Arkansas is large, it is hoped that in the near future other irrigating canals will be constructed, that the many idle acres may be cultivated.

As the elevation of the county is only about 4,000 feet it seems faborable to vegetables, and we trust, is to fruit, though neither have been tried on a large scale, except a few kinds of vegetables, which have proved a success. Most attention has been paid to melons. Bent County melons, from Rocky Ford, are noted throughout the State. Some growers plant as many as fifty acres, and tons of melons are shipped daily during their season. Last season, sweet potatoes were planted more extensively in different localities, and as far as I know, they have been a success. Some large ones from Las Animas were exhibited at the State Fair at Pueblo. In the western part of the county several acres were grown, and were fine in quality and yielded well. A few patches of Irish potatoes were planted in the valley, and gave an encouraging yield. I had one-third of an acre and had at time of digging, forty-four bushels, after using from them during the after part of the season. Only few have engaged in general vegetable gardening, but those thus engaged are encouraged to go on.

I wish I were better prepared to speak on the subject of fruit, as I believe it needs encouragement. The people of the county are being aroused on the subject. I

have loaned former reports of this society to enquiring friends, hoping they would get encouragement from the valuable information in them on this subject. Some fruit in the county is in bearing, and at Rocky Ford on "Watermelon Day," September 7, 1887, were some fine apples exhibited which were grown by MR. JOSEPH GRAHAM, in the western part of the county, near the river. Near by his ranch is that of MR. ROBT. MCCLAIN. MR. MCCLAIN has a fine young orchard of 200 apple trees; also, crab apples, cherries and pears. He only lost four apple trees during the two years he has been putting out his orchard. Among others he has ten Ben Davis', thirty Red Astracans, nine Duchess of Oldenburgs, all of which he recommends. He speaks favorably of the Jonathan, but thinks the Willow Twig buds too early. His trees surely have a sturdy appearance, and some have sent out branches during the past season from three feet to five feet long.

MR. MCCLAIN is well posted on fruits and is making some valuable tests. He intends to plant more in the spring, but will send direct to his favorite nurseries for his stock.

MR. L. HARTIG and MR. M. B. IRVINE, who live eight miles further down the river, each planted a small apple orchard last spring.

MR. G. W. SWINK, who lives at Rocky Ford, ordered a lot of 1,000 apple trees last spring, which were planted by himself and neighbors, your humble servant taking part of them. MR. SWINK has had fruit trees planted for several years, but has paid little attention to them until lately. He now thinks it will pay to plant fruit. He now has fine grapes in bearing.

MESSRS. J. H. CROWLEY, J. C. KAIN, G. H. SWIFT, and others, have started orchards.

I have been unable to visit the eastern part of the county, but have verbal reports which state some fruit is being grown there. Thus you will see that with us this great industry is in its infancy. But as more attention is given it from year to year, we trust it will have a steady growth.

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S. A. OSBORN then read the following report of the committee on re-organization, as follows:

## The Constitution.

This Association shall be called the COLORADO STATE HORTICULTURAL AND FORESTRY ASSOCIATION, and shall have for its object the promotion of forestry, pomology and floriculture.

This Association shall hold its regular annual session beginning on the second Tuesday in December each year, at 10 o'clock A. M., at such place as the executive committee may designate, for the purpose of electing its officers and the transaction of such business as may be necessary, and shall also hold such other meetings as the interests of the Society may demand, at such time and place as the executive committee may designate, and seven members shall constitute a quorum for the transaction of business.

The officers of this Association shall consist of a President, a Vice-President at large, a Secretary, a Treasurer, who shall be elected by ballot, and a majority of the votes cast shall be necessary to an election; also a Vice-President from each of the counties of the State interested in the promotion of the objects of the Association, who may be elected by the Association at its annual meeting or by the executive committee.

The President of any district or county horticultural forestry society of this State shall be *ex-officio* a Vice President of this Association, and shall have all rights and privileges of the regular members.

The President, Vice-President at large, Secretary, Treasurer, and other members, to be elected at the annual meeting, shall constitute an executive committee charged with the general supervision of all matters of interest to the Association during the interim of meetings, with power to act in all cases of emergency, and a majority of the committee shall constitute a quorum for the transaction of business.

The Association shall contract no debts unless by a two-thirds vote of members present at any regular or called meeting.

The Association shall in every proper way encourage and assist in the organization of county and district societies.

The Association may, at each annual meeting, offer premiums for essays on such subjects as may be determined on; such essays to be read before the next annual meeting, and immediately after reading, the premiums to be awarded by a majority of members present.

Representatives from organizations formed in the interest of horticulture and forestry shall be admitted to all the rights and privileges of members upon certified credentials and without payment of membership fees, upon the following basis: Four societies, one representative; county societies, two representatives; district societies, three representatives.

The Association may adopt at any such meeting such by-laws, rules and regulations as a majority of the members present may determine, not inconsistent with this Constitution.

This Constitution may be amended at any regular meeting of the Association upon a three-fourths vote of the members present at such meeting.

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This report was accepted and adopted as the Constitution of the Society.

The meeting then proceeded to the election of officers for the ensuing year, as follows:

A. E. GIPSON . . . . . President.
G. H. PARSONS . . . Vice-President at Large.
DR. ALEX. SHAW . . . . . Secretary.
WILLIAM DAVIS . . . . . Treasurer.
E. MILLISON . .
DAVID BROTHERS . . . Executive Committee.
S. A. OSBORN .

COLONEL ENSIGN introduced a memorial to Congress, in reference to protecting timber on public lands, and it was adopted unanimously.

MR. OSBORN introduced a resolution extending thanks to the directors of the Chamber of Commerce for the use of a room, to the city press for fair reports of their meetings, and to all others deserving of their thanks. Adopted.

MRS. OLIVE WRIGHT introduced a resolution regretting that immigration to Colorado was not fostered as it was in other States, and providing for a committee of three to be appointed to act in conjunction with a similar committee from the Denver Chamber of Commerce and one from the Real Estate Exchange, to see if some plan could not be devised to secure our share of immigration now flowing elsewhere.

The resolution was adopted, and PRESIDENT GIPSON appointed MRS. OLIVE WRIGHT, MR. S. A. OSBORN and MR. G. H. PARSONS as such committee.

MR. MILLISON moved that DR. SHAW be instructed to solicit annual and life memberships with other contributions of money.

The motion was carried.

The following legislative committee was announced: NELSON MILLETT, COLONEL E. T. ENSIGN, C. S. FAUROT, S. A. OSBORN, W. B. FELTON.

COLONEL ENSIGN moved that the consolidated society assume any indebtedness heretofore incurred by the two societies.

The motion was carried.

DR. SHAW moved that the status of the life members as it existed in the two former societies should be preserved.

The motion was adopted and the Association adjourned.

NELSON MILLETT,
*Secretary.*

# PROCEEDINGS

OF THE

# Colorado State Horticultural

AND

# FORESTRY ASSOCIATION.

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**OFFICERS FOR 1888.**

A. E. GIPSON, . . . . . President
G. H. PARSONS, . . . . . Vice-President at large
DR. ALEX. SHAW, . . . . . Secretary
WM. DAVIS, . . . . . Treasurer
E. MILLISON,
DAVID BROTHERS, . . . . . Executive Committee
S. A. OSBORN,

*Office of the* FOREST COMMISSIONER
OF THE STATE OF COLORADO,
DENVER, February 25, 1888.

Next in importance to the preservation of our mountain forests is the growing of artificial forests, groves and shelter belts. For the information and encouragement of *bona fide* timber culture claimants and others in this State, practically interested in the subject of tree growing, the following suggestions are offered:

### 1. PREPARATION OF THE SOIL.

A proper and thorough preparation of the soil is essential to successful forest tree culture. Unless the ground has already been brought under cultivation, it should be broken, and used for a year or two in the growing of some hoed crop, that being preferable to small grain, because it secures for the land just the treatment it needs to fit it for tree culture.

### 2. WHEN AND HOW TO PLANT.

In this State the spring of the year is usually the best season for planting; the particular time or season in each instance to be governed by attending circumstances.

Under the timber culture act, not less than twenty-seven hundred trees must be planted to the acre, of which at least six hundred and seventy-five per acre must be growing at the time of making final proofs.

The best authorities recommend close planting, the trees set three to four feet apart each way. Forest trees, when planted close, shade the ground quickly and keep down weeds, grow upright and straight, pruning themselves of lateral branches by a natural process, retain the leaves as a mulch, shield each other from drying

winds, hold the snow, and soon establish a forest condition. Nature produces forests by planting thickly, and thins by the "survival of the fittest."

Horace Greeley said: "Plant thickly and of diverse kinds, so as to cover the ground promptly, and choke out weeds and shrubs, with full purpose to thin and prune as the circumstances may dictate."

### 3. TIMBER CULTURE WITHOUT IRRIGATION.

An experienced arboriculturist writes as follows concerning the growing of trees in arid and semi-arid districts, where water cannot be had for irrigation:

"A correspondent who has a timber culture filing on government land in the eastern part of the State, asks: Can timber be grown here without irrigation?

"We answer, it certainly can. But we must reverse the system of eastern tree culture. There our trouble existed in the excess of surface moisture, requiring drainage from the trees. In preparing for tree planting the land was deeply plowed, thrown up into narrow headlands and the trees planted on the highest part, so the surface water would drain from the trees into the middle, a 'dead furrow,' and be carried from the field.

"Here we must adopt a system of surface drainage to the trees.

"This is done by planting in the 'dead furrow' instead of on the headland. By reversing this order of planting, trees not only receive the benefit of the rain fall, but the snows drift into this 'dead furrow,' protecting the trees through the winter, and thoroughly soaking the ground when melting in the spring. In addition, leaves and all manner of decaying vegetables drift and collect in this low ground, forming a valuable mulch to retain moisture."

### 4. WHAT TO PLANT.

Among the hardier forest trees recommended for planting in this State, especially in the plains region,

are the cottonwood (broad leaved), balm of gilead, Russian mulberry, American white ash, black locust, honey locust, western gray willow and wild black cherry. In localities south of the Arkansas-Platte divide the osage orange and catalpa speciosa might be tried. It is probable, also, that a fair degree of success might be attained with some of the native species common to dry and exposed portions of the foot-hills and mesas, as for instance: Cedar, scrub oak and piñon, which might be propagated from the seed. Where irrigation is practicable, the hickory, butternut, black walnut, white elm, linden, box elder and other varieties of maple are likely to do well.

### 5. SELECTION OF SEEDS, CUTTINGS, ETC.

Great care should be used in the selection of seeds, cuttings, or seedlings, to insure choice varieties and healthful condition. Seeds should be tested thoroughly before planting, to determine the presence or absence of vitality.

### 6. CULTIVATION.

While the preparation of the ground and planting are necessary, and important processes, let it not be forgotten that subsequent care and cultivation are requisite to final success. Some recommend mulching the young trees after planting; others say that persistent and continuous cultivation is better.

## DISSEMINATION OF INFORMATION.

It is very desirable to learn what species of trees are best adapted to the trying conditions of our plains region, and to determine the best methods of cultivation, etc. Any facts or information which may be obtained upon these subjects, or the result of experi-

ments made in that connection, if transmitted to this office, will be disseminated for the common good.

EDGAR T. ENSIGN,
*Commissioner.*

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# The Forest Laws of Colorado.

BY EDGAR T. ENSIGN.

## FOREST FIRES.

In the year 1877, by act of the General Assembly of the State of Colorado, penalties were instituted for the willful or careless setting of fire to timber or prairie lands in the State; and railroad corporations were made liable in damages for fires set out, or caused, by operating the lines of road of such companies.

An act approved March 27, 1885, prescribes penalties for the willful and malicious setting of fire in any woods or prairie, or grounds of another, of any description; or for permitting fire to pass, intentionally or by gross neglect, to the grounds of another, to the injury of any other person or persons. And any person who shall build a camp fire in any woods or prairie, or other grounds in the State, and fail or neglect to extinguish the same, is made liable to fine or imprisonmeat, or both.

A contemporaneous act makes it the duty of the Board of County Commissioners of each county of the State, to cause to be erected, in conspicuous places along the traveled highways of their respective counties, notices in large letters, calling attention to the provisions of the law requiring the extinguishment of camp-fires, and citing the penalties for failure to do so.

### INJURY TO TIMBER AND TREES.

In 1877, also, an act was passed providing that persons cutting down, girdling, or otherwise injuring trees, timber or underwood, on the land of another, or on the common or public grounds of any city or town, without lawful authority, should be liable in treble damages to the owner of the trees or timber so injured. Also, in case of damage done to planted trees by domestic animals, the owner of such trees may recover triple dama ges, as above.

### PREMIUM FOR TREE PLANTING.

An act of 1881 authorizes the payment of a premium of ten dollars for every one hundred trees planted along the lines of highways and irrigating ditches, and kept in good growing condition for three years; such premium made payable on the fourth year, and annually for the six years following.

### FOREST COMMISSION.

By legislative enactment in 1885, the office of State Forest Commission was instituted, and County Commissioners and Road Overseers were made Forest Officers in their respective localities. These officers are charged with the duty of protecting, to the extent of their power, the public forests from fire and depredation, and to encourage tree planting along water courses and irrigating ditches, and in other proper places. The State Forest Commissioner is also required to promote, as far as possible, the extension of the forest area, and to preserve the sources of water supply.

### INADEQUACY OF THE PRESENT LAWS.

Although the State Forest Officers have been useful in preventing disastrous forest fires, and in other ways, their powers are quite limited, for the reason that the

State authorities have no direct control of the public timber lands, the General Government still retaining the sole jurisdiction over such lands. The Federal authorities should be authorized and required to more efficiently protect these lands, or else the care and control of them should be transferred to the State.

That section of the State law authorizing the payment of a premium for the planting of forest trees seems to be inadequate; at least but few, if any, persons have availed themselves of its provisions. In my opinion, it should be supplanted by an act more liberal and comprehensive.

It has also been suggested that there should be some legal provision to prevent the wasteful use and destruction of our mountain conifers during the winter holidays.

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# The Uses and Beauty of Trees.

BY RALPH MEEKER.

We have been interested in what has been said of the practical benefit of forests for shade and wind-breaks, but I think that the usefulness and beauty of trees are also worthy of consideration.

It has been said that the earth would be uninhabitable were it not for its trees. However true or false this may be, it is a fact that no product of the soil enters so largely into the industries of the world as timber. The table on which we eat, the bed on which we sleep, the floor on which we walk, the roof that shelters us, the chest that contains the relics of a generation, the car on the railway, the ship on the ocean, the house, the barn, the plow, the reaper, the fence—in fact, nearly

everything made with tools for the use of mankind is more or less indebted to our forests for its existence.

Coal mines may become exhausted, oil wells may cease flowing, but trees will grow and flourish while the earth remains habitable. Practically considered, our forest are necessary to civilization; æsthetically considered, trees in their way are as beautiful as the ocean, or the mountains, or the sky.

The man who rears his family in the center of a township of black prairie, six miles from a school-house, and sells corn for ten cents a bushel, may see no benefit in the beauty of the forests, which all the poets from Homer to Shakspeare have immortalized. Byron says, "There is pleasure in the pathless woods;" and Bryant speaks of the groves as "God's first temples."

But we need not go to the poets for authority on this subject. Our trees speak for themselves. The cedars of Lebanon, that bowed their heads in ancient Palestine, so deeply impressed the people with their solemn grandeur and stately magnificence, that their names were used as figures of speech in all the great writings of that day.

Any object of nature that purifies a man's thoughts or awakens his reverence is of as much benefit as a teacher, a poet, or the evangelist, so far as influence extends. There can be no doubt that beautiful groves and long, shaded avenues soften rugged natures as they modify the climate in which men live. A great writer has said that "Imagination rules the world." Inhabitants of a wooded country are undoubtedly more given to sentiment and imagery of a higher character, than those living in mud-flats and low countries.

It is fashionable in this age of machinery to speak lightly of the schemes for expending money in beautifying land that one does not own. It was with difficulty

that the Yellowstone Parks were set aside for public uses. The Adirondacks have been a subject of legislative discussion for years, but still the work of destruction goes on. Niagara Falls, that marvelous combination of the sublime and beautiful, is treated as if it were a circus to be viewed for so much a head, while its trees and lovely natural shrubbery are mutilated and destroyed. In our own State of Colorado, we see the mountains robbed of their green covering every year. Careless hunters and woodsmen leave their fires to blacken and deface the finest scenery in the world. The spirit of vandalism is becoming a characteristic of the American people, and the literature (the dime novel literature) most read by our young people, is in keeping with this vandal spirit. A reverential regard for the beautiful things on earth exists only in sentiment among comparatively few people. In Germany, where the strongest feeling is for the fatherland, trees literally cover the great empire. Groves crown every hill-top, and shadow the humblest dwellings. The phrase "Unter den Linden" has become a household word throughout Europe. All the parks and gardens which are open to the public are as much respected as if guarded by soldiers. The flowers and trees of Germany are the themes of song and poetry. A child is taught from its youth to revere the forests; and the same is true, to a great extent, of France and England, both countries celebrated for the beauty of their wooded parks. What is the result?

English literature is an apostrophe to the beauty of the forests. Every line of Chaucer and Wordsworth breathes a spirit of affection for the trees of the land. In Germany the love of country amounts to a passion. It is there and in Switzerland (similar in all respects to Germany), that patriotism is most heroically defined. The best of literature is read and every boy is familiar with Schiller and Goethe, while the common music sung

in the schools and around the hearthstone is recognized as classic throughout the world. Large appropriations of money have been made by the governments of those countries for the protection of their forests. It is generally true that the best laws and the deepest patriotism are founded on sentiment. In the old countries wanton destruction of timber is punished by law and condemned by all good citizens. In this country the great forests are looked upon as public property, and every man who can wield an axe does not hesitate to chop a tree. In fact, the most peculiar event in the life of Washington was the cutting down of his father's cherry tree. The story has been repeated to every child, until the ruling ambition in life is to destroy a tree without lying about it. Of course we must have lumber and trees to make it from; but there is no reason why other trees should not be planted to take their places.

A few years ago Clear Creek, Boulder and the other cañons were filled with forests. To-day their naked rocks present melancholy pictures of desolation. On the west side of the range it is different. There one imagines he is in another country. The scenery is the most beautiful in Colorado. Lofty trees cover the mountains, and the traveler can easily believe himself in the loviest portion of Switzerland. Colorado has 63,000,000 acres of land. A few years ago it was said that 3,000,000 acres could be irrigated. Now the estimate is reduced to 2,000,000 acres. Fully one-half the entire State, especially that portion devoted to mining, can never be cultivated nor used for stock raising, except in a limited degree. The timber now in it should be protected. If the mountain timber were burned and all the trees growing along the rivers and foot-hills destroyed, precious few tourists would remain here beyond a few weeks. The hunting would be of little value, the rainfall would decrease, and the mountain districts would

become as unattractive as the broken wastes of Syria. Visitors to Colorado cannot make any visible use of trees. They cannot eat them nor carry them away as souvenirs. They can only admire their beauty, and appreciate their usefulness in breaking the monotony of the landscape, and in shading the water-courses. The Great American Desert can be made as beautiful as any of the eastern countries. With alfalfa to keep the soil moist, comparatively little irrigation will be required to nourish trees. The groves of Greece and those lovely wooded parks of England can be reproduced here in Colorado. If the trees in Denver and Greeley were burned, real estate would depreciate ten per cent.

It is not claimed that the cottonwood trees in Colorado towns add to the length of human life or the healthfulness of the climate. It is their shade that is prized. The man who walks to his friend's house under arching trees is conscious of a charm that neither architecture nor imposing walls can give. The tired traveler who has seen nothing more inviting than the shade of his mule during his journey across the plains, at last reaches the bank of some swiftly flowing river, where, weary and begrimed with dust, he throws himself on the ground beneath the overhanging trees. Does he stop to consider whether they are maples, or elms, or cottonwoods? He only looks at the blue sky through the fringes of their foliage, and, closing his eyes in grateful repose, thanks Heaven for the beauty and shade around him.

In regard to the uses and influences of beauty, there ought to be but one opinion. Beauty is one of the elements of civilization. There is an indescribable charm about trees that awakens the best side of one's nature. We instinctively associate beautiful faces with beautiful surroundings. The well-kept lawn and deep-shaded

avenue generally betoken a man of intelligent refinement. The drapery which clothes the earth is as beneficial to mankind as the decorations and carvings in our houses. A shiftless, worthless man, always in debt, with a swarm of ignorant, sore-eyed children about him, lives in bare walls, with no vines around his gate, no grass in his yard, no shade to welcome the visitor who comes to his door. What is a tree to such a man? Corn and pork are his life.

How beautifully Bret Harte writes of the forests of California. It was this poet spirit of reverence for trees manifested beyond the ocean that made the early fathers worship in the groves of Britain and Germany.

It was this spirit that led the masters of the artistic centuries to make cathedrals like the aisles of the forests. In this way we know that Gothic architecture was created, and those who have walked with uncovered head under the arches of Westminster Abbey realize the sacred beauty of the place. Man does best when he follows most closely after nature. Who has not been moved by the eloquence of the trees. What a history have the pines on our mountains. Their rings date them back to the French Revolution. What august events have transpired since their young boughs first swayed in the wintry storms. The contemplation of beautiful nature is medicine for the mind. Philosophers and poets have found inspiration under their favorite trees.

What lessons of innocence and beauty come on the the wings of the whispering winds from the trees. Columbus was in despair until he saw drift-wood floating on the tide. It was a branch of the olive tree that brought joy to the ark.

In the far-away lands of Circassia and Georgia, where the lofty peaks of the Caucasus lifts vast forests above

the clouds, the world is as beautiful as a dream. The beauty of the people in that historic clime is celebrated, and their costumes are the admiration of Paris to-day. Even the imperial garments of the Czar's household are fashioned after the wardrobes of Circassia. It is there in the cradle of civilization, in sight of snowy Ararat, that beauty in the human face blend like the imagery of a poem. Here in Colorado we have the mountains, plains, rivers, valleys and skies of Persia. All we need is verdure. "With verdure clad," sings the chorus in the Oratorio of the Creation. "With verdure clad" shall be these everlasting plains and mountains, and then the beauty of the thoughts within us shall agree with the beauty of our Centennial Heritage.

## A Woman's Views of Forestry.

BY MRS. A. L. WASHBURNE.

I regret exceedingly that circumstances over which I have no control (a polite name for "hard times"), prevents my attendance at this, your first convention. I hope to be present at your first annual meeting, for I foresee a great work before you, and one which calls for a permanent organization.

There is certainly "cause for action." Already our mountain sides present a bare and uninviting appearance compared to the dark wooded slopes of twenty years ago; and destruction of their beauty has, as is almost always the case, kept pace with that of their utility. The beautiful pines which once formed for the eye of the lonely emigrant and settler, so agreeable a contrast to the gigantic rocks which lifted their seamed and scarred surfaces to the sunlight, have been mostly destroyed by fires wantonly set or carelessly neglected.

The use of the house-log and fencing of the scattered settlers are but as a drop in the bucket to the loss by fire. But lamentations are in vain; the question now is how best to repair the damage of the past, and to replace our beautiful and useful forests. While to many minds this question will present itself in a purely financial light, involving the loss and the replacement of millions of dollars worth of lumber, cordwood, ties, fencing and charcoal, to me there is also a moral aspect to be considered, reminding us of the golden rule, and the perpetual obligations of moral beings to work for the "greatest good to the greatest number." The higher law, which keeps each within the sphere of his own personal rights, and teaches us to as carefully abstain from infringing on those of others, must be applied in daily practice to the timber question, and would do much to put an end to the terrible conflagrations which have denuded our hillsides of their verdure, for even a mountain fire of six weeks' duration, extending over many miles of forest, *began* somewhere in a tiny flame which might, in most cases, have been extinguished in a moment, if the unselfish will were present. The love of trees, and the intimate knowledge of their characteristics, should be taught to the young. There is no study of nature more enchanting. It is a study which lures one on and on after the attention is once directed to it. I have seen a class charmed and interested while a teacher spoke of the different trees in their school yard, their habits of growth, their smooth, shiny leaves, or those beautifully notched or scolloped, all so similar that each tree was recognized at a glance, and yet so diverse that of the thousands or millions of leaves on one tree, no two were alike.

And from their own trees to those in the neighbor's yards, from the hill to the river bank, from the plain to the mountain, each native tree fitted to its own location,

and each one of foreign origin adapting itself, as best it may, to its new surrounding. An occasional question brings forth surprising replies from the children, some of the bright ones showing unusual powers of observation and original thought. From their appearance, natural situation and habits, children are easily led to consider the uses of trees, whether as ornaments in a rural landscape, for shade or for application in the thousand and one arts where wood is used; and thus, as we cherish what we love, the rising generation will, for the love of the trees and each other's welfare, preserve the forests. And, further, as we cannot truly love even a tree or bush without becoming more gentle and refined, the improvement of character and consequent multiplication of kind acts, and the amenities of life, will be, in time, the work of this Association, and future beneficiaries of your present wise and unselfish action will murmur: "They builded better."

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# Tree Planting on Farms.

BY J. H. BERRY.

The preservation of the timber on the mountains will no doubt require State or National legislation, but if tree-planting in the mountains is to be a success, which in course of time it may be, a great point will be gained by having the lower valleys planted first. To gain this end it would be very necessary to get the farmers to understand that it would be to their interest to grow trees on their farms. Why should not the farmers in the valleys have a belt of trees round their farms? and where fields are divided have a row of trees? If they don't want to plant forest trees, such as ash, elm, maple,

sycamore, and such large trees, why let them plant fruit trees, such as apples, pears, apricots, peaches, etc. They will beautify the country, and at the same time help to fill their own pockets, besides supplying the family with all the fruit they want to use. These rows of trees spread across the valleys will act as a shelter to the field by breaking the force of the strong, dry winds, that at certain seasons of the year sweep over the valleys and carry away the last particle of moisture there is in the ground. Everyone who has lived for a few seasons in these valleys knows how drying these winds are. Now, if these valleys were protected by rows of trees stretched across their whole breadth, evaporation would go on much more slowly, and consequently there would be less necessity for so much irrigation with cold water, and the crops would be all the better, as the water in the early part of the season is apt to chill the ground, and consequently retard growth.

To keep trees growing there is always an abundant supply of water running in the ditches, at all necessary seasons, so that irrigating them would be no extra labor or expense. If this plan were carried out as far back towards the mountains as the highest ditch, of course time would be required, but if only once fairly started, and a little patience exercised, these valleys could be made to look lovely, and more than pay for all the expense incurred, and be an ornament to the State, and form a splendid contrast to the mountains in the vicinity. Such would be the result in a few years, if each farmer would lend a hand; every little town shows a good example. The streets are scarcely laid off when up start rows of trees as soon as a drop of water can be had, even if it has to be hauled from the rivers. Why should the country people be so far behind, where shelter and shade is so much wanted?

The quantity of cottonwood seed annually carried down by the water in the main ditches will soon have the banks one mass of these trees, but what is wanted is a better class of timber. Could not some of the enterprising owners of these ditches see that it would be to their interest to plant some of the hundreds of miles of the banks of their ditches with some good forest trees, say catalpa, ash, elm, maples of different kinds, sycamore, tulip poplar, hickory and walnuts? Cedar, spruce and pine would also grow there, and by so doing, in a few years they would save enough on evaporation alone to pay for the work, and strengthen their banks and have the timber getting ready for use.

As far back as this the planting and growing of trees would be comparatively easy, and sure from the first start. Now we come to the foot-hills, where irrigation is necessary as a rule, but where water is scarce when wanted. Of course in early spring there is plenty of rainfall most seasons, and trees planted as early as possible in the spring may get enough moisture to keep them growing till July, at which time they can have a good hold of the ground. After that time the rains are uncertain, and success would depend mainly on the hold the roots had got in the ground, and whether there was any vegetation to shade the ground. Higher up in the mountains, with the exception of the moist valleys, success would be very uncertain, as the quantity of seeds that annually fall from the trees and find no place to vegetate amply shows.

# Relation of Forestry to Irrigation.

BY GEORGE H. PARSONS.

Forest culture is of vital importance in the United States, and of special importance in the dry climate of Colorado on account of its relation to the rain-fall. Too strong language cannot be used to describe the great necessity of arboriculture in this State, and the benefit will be incalculable if the people can be aroused to a sense of the need of prompt action and to the consideration of the best methods to be employed to secure the required end.

The most important branch of forestry to the people of Colorado, and the one to which legislation should be first directed, is protection of forests. This sort of protection is one in which all intelligent people can unite, even the most pronounced of free traders, and is closely connected with the future development of the prosperity of the State. It is now a well-established fact that while the forests have little direct effect upon the amount of rain-fall, they do act as conservators of the rain that has fallen; they are the reservoirs from which are drawn the supplies of the streams.

The trees in the forests reach out their leafy hands and catch the moisture that falls, even that which does not fall, but would otherwise pass by in the air. This moisture they store in the spongy reservoirs of leaves, moss and roots they have prepared at their feet, protected from the drying effect of the sun and wind by their heavy foliage. In these spongy reservoirs the water is held in suspense and trickles gradually away into the brooks and rivulets, and thence into larger streams, or sinks into the deeper soil to re-appear in the

sparkling springs. The result is that the streams flow with an almost equable supply of water from season to season.

What will now be the result of the removal of these forests? The spongy soil exposed to the sun and wind is soon dried up, and being no longer held together by the roots of a thick vegetation, is gradually washed away. Then the heavy rains flowing over a surface freed from any natural barriers, or the snow deprived of the shelter of the forests, and melting suddenly, reach the main stream so rapidly that it is unable to carry off the volume of water, the banks are overflowed, and destructive floods ensue.

In mountainous districts the damage attending the removal of a forest is greatly increased, and the rapid melting of a great body of snow, which accumulates at high elevation during the winter months, is followed by more disastrous results. Torrents are formed which increase every year in force and extent. The stream during a few weeks pours death and destruction from the mountain to the valley, and then, its natural reservoirs being exhausted, dwindles to a slender brooklet, or dries up entirely. To quote an authority on the subject: "This has been the history of many streams heading in the Alps and other mountain ranges in Europe, and this must always be the history of every stream flowing from a high mountain range on which the forests which regulate and protect its flow are incautiously disturbed. Southern Europe has thus lost many of her fairest and richest provinces, and judged by the damage which has followed its removal under such circumstances, it is not too much to say that the highest claim for care and protection which the forest can make upon man lies in this power it possesses to regulate and protect the flow of rivers."

For these reasons the preservation of our forests is the preservation of our streams, and the preservation of our streams is the maintenance of our whole system of irrigation, which has cost millions of dollars and without which the State would be almost depopulated. Who can gainsay this, and yet what has been done? Costly canals have been built to carry the water from the streams over vast areas of formerly desert lands. Better irrigation laws than in any other State have been made, and surveys of the streams instituted that irrigation may be carried on to the best advantage. But what will avail all these costly canals and the wisest laws for the distribution of the water, if the source of that water fail. We have indeed been building from the top downward, and must go back and start right.

The principal object of all law and government is protection—protection to the individual in his daily life and business, protection to the masses that the greatest good may come to the greatest number, and above all, protection to the unborn generations, who will receive this land as a legacy from us. Government, as the trustee of future proprietors, is bound to take all action which may be necessary to secure to them their rights, among which is the enjoyment of their inheritance with its productiveness wholly unimpaired.

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# Forestry in Colorado.

BY PROF. JAMES CASSIDY.

I cannot indulge in the hope that what I may say to you to-day will have the novelty of freshness, but I content myself with the reflection that it is often profitable to review again principles and facts in nature that may have been once familiar, and especially important I

deem it, assembled as we are here in convention, for the purpose of impressing public attention with the importance of the forestry question in its several aspects, to the citizens not alone of this State, but to the people of the United States at large. The word forestry is as yet a new one to many people. This is but natural, inhabiting, as we do, a country wealthy in timber resources, to which, until recently, we felt there was no limit. Forestry is the application of science and skill to woodcraft. It is the result of long continued observation and study of all that relates to the planting, treatment, disposition and utilization of trees produced on lands especially set apart for them. Its subject matter is so voluminous and varied that it has been found necessary to classify and subdivide it into five separate divisions, *i. e.*, sylvaculture, conservancy, utilization and organization—the history, laws and political economy of forest administration.

Without stopping to inquire into the relations forestry bore in earlier times to hunting and the chase, we may, for the present, assume that for us forestry has special reference to the conservancy, utilization and organization of existing public forest lands, by means of an efficient State Forestry Department.

Our tree planting on the plains may be more appropriately termed woodlands than forests. Planted in lines of one or of several rows of trees, intended to break currents of air, they constitute hedge-rows, wind-breaks and shelter-belts.

In all ages of the world's history man has been a destructive agent rather than a conserver of the gifts of nature, in fitting the earth for his continued occupancy on a high plane of civilization. The pages of history exhibit abundant evidence of this in the progress of man up to the present day, exhibiting, as it does, his

ability and desire to investigate the physical condition of the earth, and to estimate the past, present and prospective result of his own labor, as it has helped shape the conditions to suit his own purposes.

As man multiplied and extended his agricultural industry, he naturally trenched on the forest, which once covered the greater part of the earth's surface. In the removal of the forests, with all their vast consequential influences, we are brought to realize man's ability as a transforming power, seen in the changed condition of earth and climate. Countries once densely peopled are now a vacant and bleak wilderness, brought about, we know, by the slow and sure result of man's own improvidence. And as we look at the evidences of a high civilization that showed once a dense population over the present thinly inhabited districts of Western Asia, Northern Africa and Southern Europe, we may apply to this vast region our present theory of cause and effect, and in the gradual diminution of the forest area, a corresponding change in climate, and a diminished productiveness of soil. Such physical changes in this once garden of the world extended over vast epochs of time, but owing to the advanced condition of science and art at this time, these people were enabled to conceive and execute gigantic works of irrigation, by which the mountain streams were spread upon the thirsty land and so prolonged man's occupancy of these fair fields. It is, indeed, lamentable to compare the present physical condition of these countries with the account given us by the ancient historians of their glorious agriculture of the past; their luxurious fields of cereals waved over hill and dale, and every accompaniment of a successful system of agriculture was theirs. All this wealth, however, the cumulation of ages of toil, has been surrendered to desolation, and extensive districts are now without commerce, art or agriculture. Their forests are

a thing of the past; the virgin earth, the cumulation of ages, has disappeared; the once fruitful meadows are unproductive, because the water supply, the reservoirs, have dried up. Rivers like the Jordan fail to reach the sea, and the trees that shaded and protected their banks have disappeared; the rivulets cease to exist in summer, but in spring are roaring torrents. And all this the result of man's selfish disregard of the laws of nature. While man may for a time fight oppression and the destructive forces of inorganic nature, he eventually, however, after a contest more or less extended, yields the fields he has won from primeval nature to ruin and desolation. And so on down to modern times has man's evil abuse of nature been extended, until to-day a halt is called on this great continent that we may avert the threatened ruin. It is but a few years ago that this country awakened to a realizing sense of the situation, to the necessity of restoring the disturbed harmonies of nature, whose well balanced influences are so propitious to all her organic offspring, repaying to our mother earth the debt which the improvidence of former generations has left us as a legacy. The value of forests must be measured solely by their usefulness to man in some form or other, and as the chief wealth of any Nation is its population, so the forest, as well as many other things, has had to give way to that, but notwithstanding the recognized importance of the preservation of a due proportion of the land in forest growth, it is indeed but seldom that a civilized country has ever seen fit to preserve a proper proportion of its surface in forest growth.

The art of forestry must grow in importance as the world grows older and becomes more populous—the needs of a growing population must be met. Sylvaculture here steps in and provides the remedy, for it aims at the culture, in the smallest practicable area, of the

greatest number of the most desirable forms of trees best adapted to our local wants. In earlier times, for obvious reasons, the removal of the forest caused no uneasiness. But in course of time unfavorable results began to manifest themselves, and led to the framing of many laws at an early period in the history of many nations; and even where no laws were passed, indications are not wanting to show that the waste of trees by ignorance or cupidity was not unnoticed. Among ancient nations we find the forests were placed under officers of high rank in the state. In Japan, an ancient law provides that where a tree was cut down another must be planted in its stead. The ancient Germans framed laws for the marking of trees to be felled, and in certain cases punished with death, infractions of these rules. But in spite of all laws, man's ignorance, selfishness and want of forethought, combined to waste and ruin forests which should have been preserved as an inheritance for future generations.

So intimately connected are plants and animals, that if we interfere with a species we cannot tell what results will ensue. The mere enclosure of a piece of land to exclude cattle from it, induces great changes, as was frequently noticed by Darwin. By cutting down our forests indiscriminately, we destroy a number of species of plants that cannot live in a dry climate, and with these go a number of insects, which depend upon these plants exclusively for their food. Again, the change in the insect fauna effected by the abolition of the forest, will propably have a marked effect upon the birds of the district. The latter are the natural protectors of plants. Insects are nature's checks upon plants to prevent their too rapid increase, for if the former were to increase too rapidly, certain plants would disappear altogether. To obviate this contingency, the smaller birds are given us as a check upon insects, and that the latter shall not

increase unduly, the smaller birds of pray hold them in check, and so all created things have an indirect connection with one another, and the result is that the most perfect harmony is the law of nature. To man is given the power to modify these conditions, either for or against his interests, as he will; too often, indeed, the latter, due no doubt in a large measure to his ignorance of those laws by which the whole universe is governed, and by which the most perfect harmony in nature, notwithstanding its diversity, is maintained. It follows, then, from the close inter-dependence that obtains throughout all nature, that many plants and animals, are dependent for their continued existence, upon circumstances created by trees, particularly when grouped as forests. In man's case, there is no necessity, there is no possibility of exagerating this obligation; for man himself is absolutely dependent upon plant life for his existence. Except salt, and water, and air, there is not a mineral substance which animals can use directly as food. Their food must be organic; and forest growth, in common with more humble vegetation, serves to link together the animal, the mineral, and man the clod of the field.

But it is gratifying to know that a knowledge of the powers of nature, its elements and manifestations, so indispensable to the welfare of the whole people, is so rapidly gaining ground among us; as, upon a right use of this knowledge, so much is dependent. The health of the forests, is the health of the people. Our Nation, after slumbering one hundred years, is beginning to open its eyes. The reason of the profound sleep is that, till a little while ago, nobody knew what air, water and earth were made of, how plants grew, or whether their growth had any relation to animal life, or not.

By promoting forests we shall preserve the streams. Fountains and purling brooks can only gladden our summer by having a sufficiency of forest growth to pro-

But it is to be regretted that monarchies alone are competent to guard and preserve physical nature, so that it may yield its sustenance in one unbroken round. Evidently our principle reliance is upon such notions as appeal to individuals; of these, the most powerful is self interest. Let it be known that it pays a man to preserve his woodland, or to plant out trees for profit, and the future of our forests is assured and secure. Notwithstanding the importance which a philanthropist or general economist may give to the arboreal industries in a money getting country and among a mining people, there is still an argument more potent, in fact, all powerful—the argument of pecuniary interest. This argument successfully applied to any subject will commend it to the public ear, endear it to the public heart. The fact that more money is involved in the tree question than in any other interest in our country, should clearly enlist public sympathies in favor of arboriculture.

Here is work for practical horticulturists all over this land, and here is work, too, for the State, the Nation, and the municipalities. Our agricultural population is not easily convinced of the necessity for tree planting. Its benefits are too vague, the profits too prospective, to cause them to look with enthusiasm on what seems a doubtful undertaking. Still, in this respect, too, it is a pleasure to note that public opinion is fast changing, experiments in sylvaculture are being made on a sufficiently broad scale to promise the most gratifying results, and it is highly probable that at no distant day, when its benefits are understood, this branch of agriculture will receive at the hands of farmers the attention its importance demands.

A great deal of influence has been ascribed to trees in relation to atmospheric moisture, but the opinion is now gaining ground that this influence has been much exaggerated. The truth probably is that trees favora-

bly effect the earth's surface and the sub-soil. Forests may influence the rain-fall in two ways: First—By constant evaporation through their leaves they may have a tendency to bring air in their immediate vicinity nearer to the point of saturation, and so induce a saturated air-current to yield its moisture, if any difference in temperature occur between the two currents. Second—The leaves being covered by evaporation of water present a surface that would readily attract moisture from passing air, and thus secure water for that portion so covered by forest.

But forest growth, if it doesn't influence the rain-fall in a general or local way, has a marked influence in regulating in availability for the needs of agriculture. The foliage of the trees of the woodland certainly mitigate the force of the wind storm by breaking it up into currents of lesser force, compelling the rains to percolate gradually through the moss and leaf-covered humus, to be gradually given off by retarded evaporation, the surplus finding its way to swell the volume of the great rivers. On the open plains the rain-storm descends on a surface already impacted by previous rains and the fervid heat of the sun. Water will not penetrate such a surface, but rushes madly down its slopes to swell the brooks and rivers, and instead of being a blessing to the earth is a very demon in sacrificing and wasting it. In reflecting for a moment it is easy to see how forests are a preventive of floods. Practical foresters know that woods generate springs, and that the soil in woods is often dry when the same ground in the open would be swampy. Trees produce both these contradictory effects, by means of their roots boring into the soil, and so enabling water to reach lower level whence springs take their rise, and again by continually absorbing quantities of water by their roots, they act as subsoil drains and keep the surface from becoming sodden. In forest countries the changes of tem-

perature are greatly modified by the presence of timber, and the effect upon water and the development of the fish industries is even greater. Forests regulate the flow of water as well as purify it, which fact has been frequently noticed in Australia, when streams have been polluted by the wool cleansing industry. Such streams, after passing through a dense forest, will appear as clear as if it was above the wool-wash.

The office of trees in relation to terrestrial and atmospheric moisture may be summarized as follows:

*First*—They help counteract the effects of long summer droughts, by the transpiration of water through their leaves, and by their foliage and branches protect decaying vegetation which acts as a mulch to the earth's surface.

*Second*—They prevent dangerous floods by holding the gentle rain in abeyance until it has had time to penetrate the earth's surface.

*Third*—The water thus reaching a lower level by means of the boring power of the roots, collects and forms springs.

*Fourth*—Some trees absorb vast quantities of water, as the eucalyptus, and thus act as sub-soil drains.

*Fifth*—By preventing the accumulation of bodies of water on the earth's surface, the removal of valuable soil is prevented; and, lastly, as wind-breaks and shelter-belts, especially in large quantities, they equalize temperature both in summer and winter, and at the same time add to the value of any farm so protected. And this is not all, much more can be said of the relation trees bear to the economy of nature. Trees are intimately associated with the welfare of their fellow plants of the lower animals and of man. There is probably no way in which the farmers of this State could more easily

or more rapidly increase its agricultural product than by planting shelter-belts to the north and west of their farms. They would, of course, be too limited in extent and too widely scattered to have any general influence on our climate, or the flow of the water courses, but as a means of direct profit it does not seem unreasonable to predict that each protection to our fields would increase the profits of their culture by fully twenty per cent. Orchards thus protected would have their conditions measurably improved, and all horticulturists know that plants generally supposed to be too tender for an open, airy situation will thrive when planted under the protection of a wall or among trees. What garden walls are to the horticulturist, these plantations ought to be and would be to the farmer. The subject of the proper distribution of fruit trees, in their relation to climate, may well engage the attention of the agriculturist, for although in the main, his success depends upon the action of forces which he cannot control, the distribution of moisture is dependent upon conditions which he may determine to a limited extent, according to his will. Excess of forest in some parts of our country, and their entire absence in others, are alike undesirable. The early explorers might well call these plains the American Desert. It is susceptible of proof, however, that its limits are gradually receding with the advance of civilization, the breaking up of the prairie soil, and the gradual planting of timber trees, and shrubbery. All the evidence that can be obtained goes to show that the grass covered area is getting larger; the cactus, artemisia and buffalo grass are surely disappearing. This very fact of the tall grasses taking the place of the short, crisp and dense buffalo grass, explains why our American Desert is so rapidly disappearing, and why grateful showers reward the labors of the husbandman. Small as this change in the herbage may seem to some, it is not without its significance to the observer

of the phenomena of nature. As to the general climatic changes that need not concern us at this moment, it is enough for us to know that we can measurably ameliorate our local surroundings by plantations of trees, and this is what is most desired, that every land-holder may protect himself and his possessions from the untoward influences of wind and weather. The functions that the forests perform in the economy of nature are many and varied. They are the great fertilizers of the soil, while their value to us for economic purposes cannot be overestimated; they are, in fact, the foundation of every industry. The ancient philosophers had an axiom which the progress of time and scientific thought has not disproved, that "Nature abhors a vacuum."

Wherever man has adopted such agricultural methods as have resulted in the sterility of his land, and his own forced abandonment thereof is the consequence, we see nature endeavoring by means of the humble lichen, the sedge and myriads of similar auxiliaries, which soon set in, and in their successive growth and decay, establish a nidus by which the development of the mighty oak is rendered possible. This is the round of organic life (if conditions be favorable) so often observed, and is suggestive to us of this much that in the successive growth and decay of plant life we must recognize the salvation of the soil from sterility. In respect to the profitableness of tree culture in most of the prairie States so many facts could be adduced, established by actual trial, as to convince the most skeptical. In this State we are too young in forest planting as yet to have determined more than a few years' growth, but even this is quite encouraging, as what has been done on a small scale may surely be accomplished on a much larger one. We know but little as yet of the possibilities of these plains for the production of tree growth under improved methods of culture. Yet it is worth

much to us to know that we don't. Some men know it all in the various branches of human knowledge, though, perhaps, some may be sufficiently modest to admit that they are not quite thoroughly versed in matters that concern the pursuits of others. It will, indeed, have been happy for us in this new field of investigation, if we can have progressed to this point safely; that there are some things in regard to forestry generally, but especially on these plains, that are as yet a sealed book to us; and, further, it is hoped that we shall set about finding out from this day on what that new field is about, of which we are so ignorant in the premises, and this can only be accomplished by the heartiest individual and collective efforts. First, there is work here for and by the people; second, there is work here for and by the Agricultural Colleges; and third, there is work here for and by the State through the legislature. Colorado is but a young State, but she has a full complement of young men who will follow your lead in this matter of tree planting, and thus early secure an interest in them, and we may thus rest assured of success. The best laws remain dead, the best counsels are preached to deaf ears if the youth of the land be not enlisted in favor of every good and wholesome innovation.

Every person should be familiar with the appearance of trees under all circumstances, in summer and winter, standing erect or prostrate on the ground; or, when worked up by the artificer into any of the secondary and ultimate forms to which trees may be applied. All trees and plants possess peculiarities of trunk, branch, stem, twig, buds and seeds, and we should know them by their peculiarities. There is a broad field here for investigation, through the intricate labyrinths of which we may wander at will, always finding something to excite our desire for knowledge. From the meanest weed to the gigantic eucalyptus there are influences at



work upon the soil beneath us, and in the air above us, the silent working of which to us we never notice. Tree-planting, too, is fitted to give the juvenile mind a useful lesson in forethought. Living only in the present and for the present, too often youth will only sow where they can quickly reap. Youth should learn to forecast the future as the condition of wisdom. Arboriculture is such a discipline.

We are but tenants of this beautiful earth, and so have no right to trench on the inheritance of others, but rather it is a duty incumbent on all patriotic citizens to have this earth better for our having occupied it our allotted time. The great lessons inculcated by the facts of history for the benefit of man, is that he is endowed with ability to become an ametiveating agent of the earth; that he, within certain limits, can control the elements and make them minister to his welfare and happiness, by planting trees where they have been destroyed or where absent, and thus realizing the truth of Mohamed's benediction: "Blessed is the man that planteth a tree." In an æsthetic point of view, trees cannot be too highly extolled, as they give an added charm and beauty to the landscape that nothing else in nature can bestow. There is no other agency of nature which is so intimately connected with all that is worth living for, so necessary to the continued fertility of the soil, as the trees of the forest. Says Washington Irving: "There is something nobly simple and pure in a taste for trees." It argues a generous nature to have this strong friendship for the hardy son of the forest. He who plants an oak looks forward to the future, and plants for posterity. He cannot expect to enjoy its shelter, but he exults in the consciousness of the fact that he has accomplished an unselfish act. It was the trees of his own planting, more than the beauties of the surrounding landscape, that bound Irving to the Hudson.

It was the simple beauty that Webster created at Marshfield, the smooth lawns and shady approaches that bound him so strongly to that sequestered spot. The charm of Abbotsford, the grand Mecca of Scott, comes mainly from its ivy-clad walls, beautiful shrubbery, and the now majestic trees, planted by the hand of its illustrious owner. An American, whose thoughts drop like sparkling gems, has put in my way the words that so beautifully express the emotions that should animate every citizen of the State: "If I have no coaches and horses, I can at least have a tracery of vine leaves along my porch, so exquisitely delicate, that no sculptor can imitate it, and if I have no conservatory with their wonders, yet the sun and I together can build up a little tangled coppice of blooming things in my door-yard, of which every tiny floral leaflet shall be a miracle. Nay, I may make my home, however small it may be, so complete in its simplicity, so fitted to its offices, so governed by neatness, so embowered by wealth of leaf and flower, that no riches in the world could add to it without damaging its rural grace and beauty, and my gardeners—sunshine, frost and shower are their name—shall work for me with no crusty reluctance, but rather with an abandon and a zeal that asks only gratitude for pay."

May the beautiful thought conveyed in the above words prove to be the monitor of every citizen of this State, that we may the more quickly realize the work before us to-day; so that the almost boundless expanse of prairie by which we are surrounded, and which is terminated only by the distant horizon, shall have its due proportion of tree growth, and this fair land clothed with fruitful farms, the abiding place of a grand civilization. The preservation and planting of forests is a duty we owe to posterity and to our ancestors who left us the picturesque elm, the mighty oak and other denizens of the forest.

May we, in the future, so perform that duty as to be qualified to utter the beautiful sentiment of the poet, Whittier, in the following lines:

"Give fools their gold and knaves their power,
Let fortune's bubbles rise and fall;
Who sows a field or trains a flower,
Or plants a tree is more than all.

"For he who blesses most is blest;
And God and man shall own his worth
Who toils to leave as his bequest,
An added beauty to the earth."

# REPORT

OF THE

# Colorado State Bee-Keeper's

# ASSOCIATION,

FOR THE

YEAR 1887.

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## OFFICERS FOR 1888.

PRESIDENT,

E. MILLISON, Denver.

VICE-PRESIDENT,

MRS. LEVI BOOTH, Denver.

SECRETARY,

J. M. CLARK, Denver.

TREASURER,

MRS. R. H. RHODES, Arvada.

EXECUTIVE COMMITTEE,

E. MILLISON, J. M. CLARK,
MRS. LEVI BOOTH, MRS. R. H. RHODES,
WM. DAVIS.

# Bee-Keepers' Association.

The Colorado State Bee-Keepers' Association was first organized in 1882, at Denver. The industry was at that time in its infancy, and the formation of the Association was the first organized effort to give the home interest an impetus. The early records of the Association appear to have been lost, as the first minutes now in the office of the Secretary record a meeting held on September 13, 1884, at which a report was made that the records and copies of the constitution and by-laws were irrecoverably lost.

At a meeting held November 13, 1884, a new constitution and by-laws were adopted, which, with some amendments adopted at subsequent meetings, are still in force.

During the year 1886, the Secretary, MR. G. C. U. SHIFF, succeeded in obtaining the names of about two hundred persons in the State, who kept bees, though very few kept them in large numbers.

No statistics are attainable, showing the amount of honey produced up to the year 1887.

The bees gather honey from many native flowers, but chiefly from the *Cleome Integrifolia* or Rocky Mountain Bee Plant. In sections where small fruits are cultivated, the red raspberry yields honey in considerable quantities. The cultivation of alfalfa, however, has more than any other thing, given new hope and life to the business of honey production. Thousands of acres of alfalfa are already sown, and thousands more are added every year. The honey produced from this plant is of a superior quality, very white and of excellent flavor. The greatest flow of honey from alfalfa is said to be just before the plant goes to seed, or when the blossom is fully matured, hence many fields produce no honey because the alfalfa is cut for hay just as it is

beginning to bloom. The value of alfalfa as a honey producing plant, is now so generally recognized, that a well grounded hope appears to have taken possession of those interested in bee culture, that Colorado is destined to become one of the leading states in the production of honey. The length of the honey season which is from sixty to ninety days, the dryness of the atmosphere which is unfavorable to the development of the diseases so destructive in the Eastern States, and the mildness of our winters, all point to the success of the industry if properly managed.

The meeting of the Association on the nineteenth of January, of the present year, 1888, was enthusiastic, and all seemed confident that success was assured for the future.

An adjourned meeting held on the twenty-third of February was the largest and most enthusiastic meeting ever held since the Association was formed.

Numerous subjects of interest to bee keepers were carefully discussed, and the desire to adopt the best methods of conducting the business was apparent.

Delegates to the National Bee Keepers' Convention were appointed as follows:

W. L. PORTER, of Greeley; MRS. LEVI BOOTH, of Denver; MRS. R. H. RHODES, of Arvada.

The Executive Committee were empowered to appoint substitutes, should any of the delegates find it impossible to go.

The question as to whether the linden tree would grow in Colorado was asked, and the testimony of several members, who had grown it, showed that it could be grown successfully here.

A motion was passed that this Association recommend the planting of the linden tree in Colorado.

Among the questions discussed were the following:

How to unite two weak colonies? Place one hive above the other, with only a wire screen between them, allowing them to remain in this position a few days. Then remove the screen, first removing one queen. Many advised not uniting, but superceding the old queens by young and vigorous queens, and thus saving both swarms.

Does it pay to use comb foundation? Decidedly yes.

Which is preferable, natural swarming or dividing? If increase of number of swarms is desired, dividing is advisable. If honey is principal object, natural swarming is most profitable.

How does Colorado compare with California with reference to bee culture? MR. ROBERT JAMES, from his observations in California, thought Colorado the best for bee culture.

How can we best winter bees? The weight of testimony was in favor of wintering on the summer stands, with the upper stories packed with sacks, chaff, etc.

The Association adjourned to meet August 14.

Until the past season no reliable statistics showing the amount of honey produced in Colorado were obtainable. The establishment af a depot for Colorado honey and bee supplies during the past year, has made it possible to arrive at approximate figures. It is estimated that more than thirty tons of honey, which went into the channels of trade, were produced in Colorado during 1887. This amount would have been largely increased if proper appliances had been used for securing the honey in suitable shape for market. The season of 1887 was not as favorable for the production of honey as the year previous, still it was larger in proportion than in the Eastern States or California.

The production of honey can be safely added to the many other resources of Colorado. The industry, like

all the other industries of the State, is yet in its infancy, but it is safe to predict that Colorado will soon take rank among the first of the honey producing States, both in quality and quantity.

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## Secretary's Round-Up.

Under this head will be found such articles as I may have gleaned in my general observations, etc., reading that is germane to horticulture and forestry, believing them of practical utility and worthy of being preserved in book form for ready reference. The future of success in horticulture and forestry in Colorado is in its water supply. No water means no vegetable growth, and no vegetable growth means no comfortable homes. Hapily for Colorado cultivation by natural rain-fall is not a necessity that culture of the soil by irrigation will discount. The history of culture by irrigation, as compared with rain-fall, is an average yield of near 100 per cent. greater, and quality better, and especially so where coupled with an intense cultivation. The experience of the tillers of Colorado soil for the last twenty-five years admits irrigation as a necessity, and adopts it as a blessing in disguise. Hapily the contour of our grounds makes practicable irrigation by choice, rather than the contingencies of natural rain-fall. I think the wish is father to the thought, that the eastern rain-belt is migrating westward. The records of our meteorological stations does not verify this conjecture. As *apropos* to my idea, I herewith give a carefully prepared table which will explain itself. This table of rain-fall for a series of fifteen years, is compiled by MR. J. S. GREEN, State Engineer, from authentic records:

# Comparative Statement of Rain-fall for a Period of Fifteen Years.

| MONTHS. | 1872. | 1873. | 1874. | 1875. | 1876. | 1877. | 1878. | 1879. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | Av. per month. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.55 | 0.13 | 0.84 | 0.38 | 0.21 | 1.90 | 0.10 | 0.40 | 0.38 | 0.50 | 0.57 | 2.35 | 0.22 | 0.41 | 0.62 | 0.67 | 0.64 |
| February | 0.22 | 0.24 | 0.52 | 0.60 | 0.11 | 0.40 | 0.48 | 0.49 | 0.32 | 1.22 | 0.20 | 0.45 | 0.86 | 0.75 | 0.72 | 0.30 | 0.48 |
| March | 1.71 | 0.22 | 0.49 | 0.39 | 1.80 | 1.40 | 1.82 | 1.00 | 0.21 | 0.87 | 0.20 | 0.21 | 0.93 | 0.97 | 2.36 | 0.23 | 0.92 |
| April | 2.09 | 2.43 | 1.70 | 2.74 | 1.22 | 2.77 | 0.05 | 2.62 | 0.31 | 0.50 | 1.47 | 3.10 | 3.33 | 4.94 | 2.79 | 2.16 | 2.11 |
| May | 3.74 | 0.75 | 2.43 | 1.94 | 8.57 | 2.30 | 2.90 | 3.36 | 1.11 | 2.21 | 2.98 | 4.30 | 4.61 | 2.13 | 0.09 | 1.13 | 2.78 |
| June | 2.07 | 2.24 | 1.21 | 0.43 | 1.10 | 1.93 | 2.78 | 0.32 | 1.22 | 0.09 | 4.96 | 0.85 | 1.47 | 0.66 | 2.26 | 0.53 | 1.57 |
| July | 2.69 | 2.00 | 3.35 | 4.12 | 1.16 | 0.33 | 1.38 | 0.64 | 1.38 | 2.50 | 0.66 | 2.27 | 0.65 | 1.33 | 0.50 | 2.49 | 1.72 |
| August | 1.65 | 1.41 | 0.68 | 1.97 | 2.03 | 1.30 | 2.25 | 1.38 | 1.46 | 2.33 | 1.20 | 0.75 | 1.71 | 1.18 | 1.62 | 2.68 | 1.60 |
| September | 1.57 | 0.89 | 1.34 | 2.89 | 0.60 | 0.08 | 1.23 | 0.02 | 0.89 | 0.57 | 0.06 | 1.08 | 0.13 | 1.22 | 0.98 | 0.97 | 0.93 |
| October | 0.68 | 0.73 | 0.64 | 0.22 | 0.12 | 2.15 | 0.80 | 0.19 | 1.37 | 0.32 | 0.75 | 1.49 | 0.21 | 0.73 | 0.33 | 0.97 | 0.73 |
| November | 0.69 | 0.16 | 0.08 | 1.28 | 1.50 | 0.73 | 0.67 | 0.21 | 0.83 | 1.68 | 0.71 | 0.32 | 0.19 | 0.55 | 1.93 | 0.22 | 0.73 |
| December | 0.29 | 0.53 | 0.17 | 0.59 | 1.70 | 0.79 | 1.05 | 0.33 | 0.10 | 0.00 | 0.73 | 2.32 | 0.76 | 1.08 | 0.87 | 0.14 | 0.71 |
| Average per year | 17.95 | 11.73 | 13.45 | 17.05 | 20.12 | 16.38 | 15.51 | 10.86 | 9.58 | 12.79 | 14.49 | 19.49 | 15.07 | 15.95 | 15.07 | 12.49 | 14.88 |

[Extract from U. S. Signal Service Monthly Weather Review, February, 1888.]

## AVERAGE DATE OF LAST KILLING FROST AT SIGNAL SERVICE STATIONS.

This table shows (1) the number of years of observation from which data is drawn; (2) the average date of last killing frost; (3) the earliest date on which the last killing frost occurred; (4) the last date on which the last killing frost has occurred; (5) the extreme period of time between which the earliest and last frosts have been noted; (6) the precentage of times where the last killing frost has not been more than ten days earlier or later than the average date:

| STATIONS. | Number of years. | Average date of last killing frost. | Earliest occurrence of last killing frost. | Latest occurrence of last killing frost. | Extreme departure, days. | Departures of ten days or less, %. |
|---|---|---|---|---|---|---|
| Eastport, Me | 14 | Apr. 30 | Apr. 3, 1877 | June 19, 1875 | 50 | 64 |
| Portland, Me | 14 | Apr. 13 | Mar. 24, 1883 | Apr. 30, 1874 | 17 | 71 |
| Boston, Mass. | 14 | Apr. 20 | Mar. 26, 1878 | May 3, 1874 / 1882 | 13 | 64 |
| Rock Island, R. I. | 7 | Mar. 31 | Mar. 8, 1877 | Apr. 7, 1881 | 7 | 71 |
| New Haven, Conn. | 14 | Apr. 28 | Mar. 3, 1880 | May 30, 1884 | 32 | 43 |
| New London, Conn. | 14 | Apr. 19 | Mar. 10, 1878 | May 24, 1879 | 35 | 21 |
| Albany, N. Y. | 14 | Apr. 23 | Apr. 1, 1884 | May 14, 1878 | 21 | 36 |
| New York City | 14 | Apr. 12 | Mar. 24, 1886 | May 20, 1874 | 38 | 57 |
| Philadelphia, Pa. | 14 | Apr. 5 | Mar. 2, 1887 | Apr. 29, 1874 | 24 | 64 |
| Atlantic City, N. J. | 14 | Apr. 10 | Feb. 27, 1882 | Apr. 29, 1874 | 19 | 36 |
| Barnegat, N. J. | 12 | Apr. 13 | Jan. 15, 1882 | May 14, 1878 | 31 | 50 |
| Cape May, N. J. | 12 | Apr. 8 | Mar. 9, 1883 | May 3, 1882 | 25 | 58 |
| Sandy Hook, N. J. | 13 | Apr. 7 | Feb. 27, 1882 | Apr. 30, 1874 | 23 | 69 |
| Delaware Breakwater, Del. | 5 | Apr. 8 | Mar. 31, 1884 | Apr. 12, 1880 / 1882 | 4 | 100 |
| Baltimore, Md. | 14 | Apr. 9 | Mar. 16, 1885 | May 3, 1882 | 24 | 36 |
| Washington City | 14 | Apr. 6 | Mar. 1, 1883 | Apr. 29, 1874 | 23 | 43 |
| Cape Henry, Va. | 13 | Mar. 19 | Feb. 5, 1880-2 | Apr. 19, 1875 | 31 | 46 |
| Chincoteague, Va. | 8 | Apr. 9 | Mar. 18, 1886 | Apr. 20, 1887 | 11 | 62 |
| Lynchburg, Va. | 14 | Apr. 11 | Mar. 10, 1884 | May 3, 1882 | 22 | 64 |
| Norfolk, Va. | 14 | Mar. 28 | Feb. 26, 1882 | Apr. 20, 1887 | 23 | 29 |
| Charlotte, N. C. | 9 | Apr. 5 | Mar. 10, 1884 | May 3, 1879 | 28 | 33 |
| Hatteras, N. C. | 7 | Feb. 27 | Jan. 4, 1882 | Apr. 5, 1881 | 37 | 29 |
| Kitty Hawk, N. C. | 12 | Mar. 16 | Jan. 18, 1878 | Apr. 19, 1875 | 34 | 25 |
| Fort Macon, N. C. | 6 | Mar. 20 | Feb. 25, 1882 | Apr. 6, 1881 | 17 | 50 |
| Smithville, N. C. | 11 | Mar. 10 | Feb. 1, 1882 | Apr. 6, 1881 | 25 | 27 |
| Wilmington, N. C. | 14 | Mar. 13 | Jan. 23, 1882 | Apr. 19, 1875 | 37 | 43 |
| Charleston, S. C. | 14 | Feb. 23 | Jan. 4, 1882 | Apr. 2, 1881 / 1887 | 38 | 7 |
| Augusta, Ga. | 14 | Mar. 16 | Feb. 6, 1882 | Apr. 14, 1885 | 29 | 21 |
| Savannah, Ga. | 13 | Feb. 26 | Jan. 4, 1882 | Apr. 13, 1885 | 46 | 8 |
| Jacksonville, Fla. | 13 | Feb. 17 | Dec. 18, 1880 | Mar. 23, 1883 | 34 | 8 |
| Cedar Keys, Fla. | 7 | Jan. 18 | Dec. 7, 1887 | Feb. 11, 1885 | 24 | 29 |
| Sanford, Fla. | 3 | Jan. 30 | Jan. 2, 1887 | Feb. 6, 1886 | 7 | 67 |

*Average date of last killing Frost, etc.*—Continued.

| STATIONS. | Number of years. | Average date of last killing frost. | Earliest occurrence of last killing frost. | Latest occurrence of last killing frost. | Extreme departure, days. | Departures of ten days or less, %. |
|---|---|---|---|---|---|---|
| Atlanta, Ga. | 9 | Mar. 22 | Feb. 2, 1882 | Apr. 8, 1886 | 17 | 33 |
| Pensacola, Fla. | 8 | Mar. 3 | Dec. 27, 1880 | Apr. 6, 1886 | 34 | 25 |
| Mobile, Ala. | 14 | Feb. 22 | Dec. 27, 1880 | Apr. 2, 1881 | 39 | 14 |
| Montgomery, Ala. | 14 | Mar. 6 | Feb. 2, 1882 | Apr. 5, 1881 | 30 | 36 |
| Vicksburg, Miss. | 14 | Feb. 23 | Jan. 16, 1874 | Apr. 2, 1881 | 38 | 36 |
| New Orleans, La. | 12 | Jan. 17 | Nov. 26, 1881 | Feb. 12, 1878 | 26 | 58 |
| Shreveport, La. | 14 | Feb. 25 | Jan. 12, 1887 | Mar. 31, 1886 | 34 | 29 |
| Fort Smith, Ark. | 5 | Mar. 27 | Mar. 9, 1884 | Apr. 5, 1887 | 9 | 80 |
| Little Rock, Ark. | 8 | Mar. 27 | Feb. 22, 1882 | Apr. 14, 1881 | 18 | 50 |
| Galveston, Tex. | 11 | Jan. 30 | Dec. 26, 1879 | Feb. 22, 1881 | 23 | 9 |
| Indianola, Tex. | 11 | Feb. 14 | Nov. 30, 1877 | Apr. 14, 1881 | 59 | 27 |
| Palestine, Tex. | 5 | Mar. 25 | Mar. 9, 1884 | Mar. 30, 1886 | 5 | 80 |
| San Antonio, Tex. | 8 | Feb. 22 | Dec. 7, 1878 | Apr. 14, 1881 | 51 | 25 |
| Brownsville, Tex. | 9 | Jan. 21 | Dec. 26, 1879 | Feb. 18, 1883 | 28 | 11 |
| Rio Grande City, Tex. | 8 | Jan. 27 | Dec. 16, 1881 | Mar. 1, 1884 | 33 | 0 |
| Chattanooga, Tenn. | 9 | Mar. 24 | Jan. 25, 1880 | Apr. 8, 1886 | 15 | 33 |
| Knoxville, Tenn. | 14 | Apr. 11 | Mar. 25, 1874 / 1882 | Apr. 25, 1883 | 14 | 64 |
| Memphis, Tenn. | 14 | Mar. 26 | Feb. 26, 1884 | Apr. 16, 1882 | 21 | 50 |
| Nashville, Tenn. | 14 | Apr. 1 | Feb. 2, 1882 | Apr. 17, 1875 | 16 | 57 |
| Louisville, Ky. | 14 | Apr. 7 | Mar. 10, 1884 | Apr. 24, 1887 | 17 | 57 |
| Greencastle, Ind. | 2 | Apr. 6 | Apr. 4, 1885 | Apr. 8, 1886 | 2 | 100 |
| Indianapolis, Ind. | 14 | Apr. 19 | Apr. 1, 1876 | May 13, 1878 | 24 | 36 |
| Cincinnati, Ohio | 14 | Apr. 21 | Mar. 10, 1884 | May 22, 1883 | 31 | 64 |
| Columbus, Ohio | 9 | Apr. 18 | Apr. 7, 1881 | May 1, 1882 | 13 | 56 |
| Pittsburg, Pa. | 14 | Apr. 26 | Mar. 30, 1887 | May 17, 1883 | 21 | 50 |
| Buffalo, N. Y. | 14 | Apr. 25 | Mar. 30, 1878 | May 8, 1879 | 13 | 50 |
| Oswego, N. Y. | 14 | Apr. 21 | Mar. 26, 1878 | May 16, 1885 | 25 | 43 |
| Rochester, N. Y. | 14 | May 3 | Apr. 11, 1886 | May 17, 1883 | 14 | 71 |
| Erie, Pa. | 14 | Apr. 24 | Mar. 26, 1878 | May 7, 1874 | 13 | 57 |
| Cleveland, Ohio | 14 | Apr. 23 | Mar. 26, 1878 | May 17, 1875 / 1883 | 24 | 43 |
| Sandusky, Ohio | 9 | Apr. 15 | Mar. 26, 1878 | May 23, 1879 | 38 | 56 |
| Toledo, Ohio | 14 | Apr. 19 | Feb. 24, 1886 | May 24, 1882 | 35 | 29 |
| Detroit, Mich. | 14 | Apr. 30 | Apr. 1, 1887 | May 14, 1880 | 14 | 64 |
| Alpena, Mich. | 14 | May 10 | Apr. 5, 1886 | June 29, 1885 | 50 | 64 |
| Escanaba, Mich. | 14 | May 14 | Apr. 24, 1883 | June 29, 1885 | 46 | 57 |
| Grand Haven, Mich. | 14 | Apr. 29 | Mar. 2, 1882 | June 10, 1885 | 42 | 57 |
| Mackinaw City, Mich. | 5 | May 13 | Apr. 29, 1884 | June 8, 1886 | 26 | 40 |
| Marquette, Mich. | 14 | May 21 | Apr. 30, 1880 | June 11, 1882 | 21 | 43 |
| Port Huron, Mich. | 13 | May 4 | Apr. 9, 1886 | May 29, 1884 | 25 | 62 |
| Chicago, Ill. | 14 | Apr. 26 | Apr. 2, 1884 | May 25, 1882 | 29 | 43 |
| Milwaukee, Wis. | 14 | Apr. 29 | Mar. 29, 1878 | May 21, 1883 | 82 | 57 |
| Duluth, Minn. | 14 | May 7 | Apr. 7, 1886-7 | June 8, 1885 | 32 | 64 |
| Saint Paul, Minn. | 14 | Apr. 28 | Apr. 6, 1878 | May 23, 1882 | 25 | 57 |
| La Crosse, Wis. | 14 | May 1 | Apr. 7, 1886 | May 23, 1882 | 22 | 30 |
| Davenport, Iowa | 14 | Apr. 27 | Mar. 28, 1878 | May 22, 1882-3 | 25 | 43 |
| Des Moines, Iowa | 9 | Apr. 14 | Mar. 15, 1882 | May 9, 1885 | 25 | 44 |
| Dubuque, Iowa | 13 | May 1 | Mar. 20, 1878 | May 23, 1882 | 22 | 62 |
| Keokuk, Iowa | 14 | Apr. 11 | Mar. 4, 1878 | May 2, 1875 | 21 | 64 |
| Cairo, Ill. | 14 | Apr. 5 | Feb. 28, 1878 | May 8, 1885 | 33 | 27 |
| Springfield, Ill. | 8 | Apr. 20 | Mar. 23, 1886 | May 22, 1883 | 32 | 25 |
| Saint Louis, Mo. | 14 | Apr. 3 | Feb. 27, 1878 | May 2, 1875 | 29 | 36 |
| Lamar, Mo. | 3 | May 1 | Apr. 6, 1886 | May 8, 1885 | 7 | 33 |
| Leavenworth, Kans. | 14 | Apr. 6 | Mar. 16, 1882 | May 1, 1875 | 25 | 64 |
| Omaha, Nebr. | 14 | Apr. 15 | Mar. 28, 1878 | May 7, 1885 | 22 | 50 |
| Valentine, Nebr. | 2 | May 1 | Apr. 29, 1886 | May 3, 1886 | 2 | 100 |
| Fort Bennett, Dak. | 5 | May 7 | Apr. 1, 1881 | May 22, 1882 | 15 | 40 |
| Huron, Dak. | 6 | May 17 | Apr. 25, 1887 | June 22, 1885 | 36 | 17 |
| Yankton, Dak. | 14 | May 3 | Apr. 5, 1881 | May 23, 1882 | 20 | 57 |

*Average date of last killing Frost, etc.*—Continued.

| STATIONS. | Number of years. | Average date of last killing frost. | Earliest occurrence of last killing frost. | Latest occurrence of last killing frost. | Extreme departure, days. | Departures of ten days or less, %. |
|---|---|---|---|---|---|---|
| Moorhead, Minn. | 7 | May 24 | May 2, 1881-4 | June 8, 1885 | 15 | 29 |
| Saint Vincent, Minn. | 7 | June 1 | Apr. 29, 1881 | June 8, 1885 | 7 | 71 |
| Bismark, Dak. | 13 | May 11 | Apr. 29, 1880 | June 3, 1875 | 23 | 69 |
| Fort Buford, Dak. | 9 | May 15 | Apr. 28, 1881 | June 2, 1883 | 18 | 56 |
| Fort Totten, Dak. | 3 | May 26 | May 15, 1886 | June 4, 1887 | 9 | 67 |
| Fort Assinaboine, Mont. | 7 | May 17 | May 4, 1884 | June 1, 1883 | 15 | 71 |
| Fort Benton, Mont. | 9 | May 14 | Apr. 4, 1885 | June 22, 1881 | 39 | 22 |
| Fort Custer, Mont. | 8 | May 10 | Apr. 13, 1881 | May 23, 1882 | 13 | 38 |
| Helena, Mont. | 8 | May 17 | Apr. 13, 1881 | June 9, 1880 | 23 | 50 |
| Fort Maginnis, Mont. | 3 | May 12 | Apr. 23, 1887 | May 14, 1886 | 2 | 67 |
| Poplar River, Mont. | 5 | May 12 | May 2, 1886 | May 16, 1887 | 4 | 80 |
| Fort Shaw, Mont. | 7 | May 13 | May 4, 1886 | May 21, 1884 | 8 | 100 |
| Deadwood, Dak. | 10 | May 17 | Apr. 17, 1879 | June 16, 1885 | 30 | 40 |
| Cheyenne, Wyo. | 14 | May 23 | Apr. 26, 1887 | June 19, 1876 | 27 | 50 |
| North Platte, Nebr. | 13 | Apr. 29 | Mar. 6, 1886 | May 12, 1885 | 13 | 62 |
| Denver, Colo. | 14 | May 5 | Mar. 29, 1881 | May 26, 1883 | 21 | 71 |
| Las Animas, Colo. | 6 | Apr. 30 | Apr. 23, 1882 | May 6, 1884 | 6 | 100 |
| Concordia, Kans. | 2 | Apr. 15 | Apr. 7, 1886 | Apr. 23, 1887 | 8 | 100 |
| Dodge City, Kans. | 13 | Apr. 21 | Apr. 4, 1878 | May 2, 1884 | 11 | 69 |
| Fort Elliott, Tex. | 8 | Apr. 18 | Mar. 10, 1882 | Apr. 30, 1880 | 12 | 50 |
| Fort Sill, Ind. T. | 10 | Mar. 22 | Feb. 5, 1882 | Apr. 6, 1886 | 15 | 40 |
| Abilene, Tex. | 2 | Mar. 16 | Feb. 24, 1887 | Apr. 5, 1886 | 20 | . . |
| Fort Concho, Tex. | 8 | Mar. 21 | Mar. 4, 1878 | Apr. 9, 1880 | 19 | 62 |
| Fort Davis, Tex. | 10 | Apr. 7 | Mar. 21, 1881 | Apr. 22, 1884 | 15 | 70 |
| Fort Stockton, Tex. | 9 | Mar. 25 | Feb. 11, 1885 | Apr. 21, 1884 | 27 | 22 |
| Fort Stanton, N. Mex. | 2 | Apr. 26 | Apr. 17, 1886 | May 5, 1887 | 9 | 100 |

# Meteorological Monthly Record

AND YEARLY AVERAGES.

By Sergeant J. J. Gilligan. Compiled from sixteen years' signal service observations.

| MONTH. | Mean temperature. | Highest temperature and year. | | Lowest temperature and year. | | Mean daily range of temperature. | Mean per cent. rel. humidity. | Av. vel. of wind in miles per hr. | Av. cloudiness, scale 0 to 10. | Av. precipitation (in inches and hundredths) | Av. No. of clear days. | Av. No. of fair days. | Av. No. cloud. days. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January . . . | 28 | 67 | 1882 | —29 | 1875 | 24 | 52 | 6 | 3 | 0.66 | 16 | 11 | 4 |
| February . . . | 32 | 72 | 1879 | —22 | 1883 | 21 | 52 | 7 | 3 | 0.46 | 13 | 12 | 3 |
| March . . . . | 40 | 81 | 1879 | —10 | 1880 | 21 | 46 | 7 | 4 | 0.87 | 13 | 12 | 6 |
| April . . . . . | 46 | 85 | 1874 | 4 | 1876 | 21 | 49 | 7 | 5 | 1.83 | 10 | 13 | 7 |
| May . . . . . | 56 | 92 | 1874 | 27 | 1872 | 22 | 45 | 6 | 5 | 3.17 | 9 | 15 | 7 |
| June . . . . . | 67 | 99 | 1873 | 37 | 1883 | 24 | 40 | 6 | 4 | 1.59 | 13 | 13 | 4 |
| July . . . . . | 72 | 102 | 1874 | 42 | 1873 | 28 | 44 | 6 | 4 | 1.79 | 12 | 15 | 4 |
| August . . . . | 70 | 105 | 1878 | 44 | 1876 | 24 | 45 | 6 | 3 | 1.56 | 12 | 14 | 5 |
| September . . | 61 | 93 | 1878 | 28 | 1873 | 27 | 44 | 6 | 3 | 0.90 | 17 | 9 | 4 |
| October . . . . | 50 | 86 | 1873 | 1 | 1873 | 27 | 41 | 6 | 3 | 0.74 | 16 | 10 | 5 |
| November . . | 37 | 76 | 1876 | —18 | 1877 | 26 | 47 | 6 | 3 | 0.70 | 16 | 10 | 4 |
| December . . | 31 | 71 | 1884 | —25 | 1876 | 24 | 53 | 6 | 4 | 0.71 | 14 | 14 | 3 |
| Yearly . . . | 49 | 86 | | 7 | | 24 | 46 | 6 | 4 | 14.98 | 161 | 148 | 56 |

Prevailing direction of the wind, south.

Dash (—) in minimum temperature column denotes below zero.

The average number of days in which the sun shines in Denver is twenty-nine each month.

# Time of Ripening Small Fruits near Denver

| YEAR | STRAWBERRIES. | RASPBERRIES. | BLACKBERRIES. |
|---|---|---|---|
| 1886 | June 5 to July 10. | June 26 to Aug. 28. | July 16 to Sept. 18. |
| 1887 | June 1 to July 9. | June 25 to Sept. 7. | July 16 to Sept. 16. |

# States that Aid Horticulture

BY ANNUAL APPROPRIATION.

| | |
|---|---|
| CALIFORNIA.—Viticultural | $15,000 00 |
| Horticultural | 10,000 00 |
| Forestry | 2,500 00 |
| Experimental and analytical work | 5,000 00 |
| Total | $32,500 00 |
| COLORADO.—Reports published. | |
| DAKOTA.—Agricultural and Horticultural College. | |
| ILLINOIS | 2,000 00 |
| INDIANA | 500 00 |
| IOWA.—5,000 reports published and | 1,000 00 |
| KANSAS.—8,000 reports published. | |
| MAINE | 500 00 |
| MICHIGAN.—8,400 copies annual report published and | 1,000 00 |
| MINNESOTA.—Horticulture | 1,750 00 |
| Horticultural Experimental Station | 1,000 00 |
| Publishes 3,500 copies—500 page report. | |
| MISSOURI.—Reports printed and | 1,250 00 |
| NEBRASKA.—Reports published and | 1,000 00 |
| NEW HAMPSHIRE | 100 00 |
| NORTH CAROLINA | 500 00 |
| OHIO.—Reports published | 1,000 00 |
| PENNSYLVANIA.—Reports published. | |
| WISCONSIN.—Reports published and | 1,000 00 |
| CANADA:—NOVA SCOTIA.—Reports printed and | 300 00 |
| QUEBEC | 2,000 00 |
| ONTARIO | 1,000 00 |

NOTE.—The above information from pamphlet by Chas. W. Garfield, Esq., Secretary Michigan State Horticultural Society.

# Number of Seeds to Pound, by Actual Count

## FOREST TREES.

| COMMON NAME. | BOTANICAL NAME. | NO. IN POUND. |
|---|---|---|
| White Birch | Betula Alba | 500,000 |
| American Mountain Ash | Pyrus Americana | 108,327 |
| American White Elm | Ulmus Americana | 92,352 |
| Red Elm | Ulmus Fulva | 54,359 |
| Black Locust | Robinia Pseudacacia | 28,992 |
| Green Ash | Fraxinus Viridus | 22,656 |
| Scarlet Maple | Acer Rubra | 22,464 |
| White Pine | Pinus Strobus | 20,540 |
| Ailanthus | Ailanthus Glandulosa | 20,161 |
| Hardy Catalpa | Catalpa Speciosa | 19,776 |
| Box Elder | Acer Negundo | 14,784 |
| Silver Fir | Abies Pectinala | 12,000 |
| Osage Orange | Maculara Aurantiaca | 10,656 |
| American White Ash | Fraxinus Americana | 9,858 |
| Rock Elm | Ulmus Racemosa | 8,352 |
| Red Cedar | Juniperus Virginiana | 8,321 |
| Berberry | Berberis Canadensis | 8,183 |
| Sugar Maple | Acer Saccharinum | 7,488 |
| Norway Maple | Acer Platanoides | 7,232 |
| American Baswood | Tilia Americana | 6,337 |
| Black Ash | Fraxinus Sambucifolia | 5,629 |
| Black Cherry | Prunus Serotina | 4,311 |
| Honey Locust | Gledilschia Friacanthos | 2,496 |
| Silver Leaf Maple | Acer Dascycarpum | 2,421 |
| American Sweet Chestnut | Castanea Vesca | 90 |
| Hickory (Shell Bark) | Carya Alba | 73 |
| American Horse Chestnut | Æsculus Glabra | 36 |
| Black Walnut | Juglaus Nigra | 25 |
| Butternut | Juglaus Cinerea | 15 |

## FRUIT TREES.

| | ABOUT |
|---|---|
| Apple | 12,000 |
| Cherry Pits | 1,000 |
| Peach | 200 |
| Pear | 15,000 |
| Plum | 600 |
| Quince | 15,000 |
| Mulberry (fruit bearing) | 200,000 |

# Vegetable and Grass Seed Table.

(From Henry Lee's Catalogue.)

## AVERAGE QUANTITY OF SEED SOWN TO AN ACRE.

IN DRILLS.

| | |
|---|---|
| Dwarf Beans | 75 to 90 lbs |
| Early Peas | 75 to 90 lbs |
| Marrowfat Peas | 70 to 80 lbs |
| Beets | 4 to 5 lbs |
| Mangel-Wurzel | 6 to 8 lbs |
| Carrots | 2 to 3 lbs |
| Onions | 4 to 5 lbs |
| Onions for sets | 20 to 30 lbs |
| Onion sets | 300 to 350 lbs |
| Parsnip | 4 to 5 lbs |
| Radish | 6 to 8 lbs |
| Rutabaga | 1 to 1½ lbs |
| Spinach | 10 to 12 lbs |
| Salsify | 10 to 12 lbs |
| Turnips | 1 to 1½ lbs |
| Tomatoes to transplant | ¼ lb |

IN HILLS.

| | |
|---|---|
| Corn | 8 to 10 lbs |
| Cucumbers | 1 to 1½ lbs |
| Musk-Melon | 2 to 3 lbs |
| Water-Melon | 3 to 4 lbs |
| Pumpkins | 2 to 3 lbs |
| Squash | 2 to 3 lbs |

## QUANTITY OF SEEDS REQUIRED FOR A GIVEN NUMBER OF PLANTS.

| | |
|---|---|
| Asparagus | 1 oz to 500 plants |
| Cabbage | 1 oz to 2,000 plants |
| Cauliflower | 1 oz to 2,000 plants |
| Celery | 1 oz to 3,000 plants |
| Leek | 1 oz to 1,500 plants |
| Endive | 1 oz to 3,000 plants |
| Egg Plant | 1 oz to 1,000 plants |
| Lettuce | 1 oz to 3,000 plants |
| Pepper | 1 oz to 1,000 plants |
| Tomato | 1 oz to 1,500 plants |
| Thyme | 1 oz to 5,000 plants |
| Tobacco | 1 oz to 5,000 plants |
| Sage | 1 oz to 1,500 plants |
| Savory | 1 oz to 2,000 plants |
| Marjoram | 1 oz to 1,500 plants |
| Rhubarb | 1 oz to 500 plants |

# Distances from Denver to

| | Miles. |
|---|---|
| Golden | 17 |
| Black Hawk | 38 |
| Central | 40 |
| Idaho Springs | 36 |
| Georgetown | 50 |
| Boulder | 30 |
| Greeley | 52 |
| Fairplay | 90 |
| Webster | 69 |
| Leadville | 135 |
| Kokomo | 150 |
| Colorado Springs | 75 |
| Pueblo | 120 |
| Cañon City | 160 |
| Cheyenne | 106 |
| Omaha | 622 |
| San Francisco | 1004 |
| Kansas City | 639 |
| St. Louis | 902 |
| Chicago | 1100 |
| Philadelphia | 1885 |
| New York | 1960 |
| Silver Cliff | 195 |
| Rosita | 195 |
| Alamosa | 280 |
| Pittsburg | 1530 |
| Salt Lake | 662 |
| Estes Park | 76 |
| Hot Sulphur Springs | 98 |
| Manitou | 80 |
| Ouray | 425 |
| Santa Fé | 421 |
| Silverton | 406 |
| Trinidad | 211 |
| Veta Pass | 206 |
| White River Agency | 233 |

# Altitudes of Important Places.

| | |
|---|---|
| **PEAKS.** | |
| Blanca | 14,464 |
| Harvard | 14,383 |
| Gray | 14,341 |
| Rosalie | 14,340 |
| Elbert | 14,326 |
| Lincoln | 14,297 |
| Long | 14,271 |
| Pike | 14,216 |
| Holy Cross | 14,176 |
| Baldy | 14,176 |
| Yale | 14,101 |
| Ouray | 14,043 |
| Cameron | 14,000 |
| Horseshoe | 13,988 |
| Spanish | 13,600 |
| Kenosha Hill | 10,130 |
| **PASSES.** | |
| Argentine | 13,100 |
| Bear Creek | 12,600 |
| Breckenridge | 12,170 |
| Boulder | 11,600 |
| Ute | 11,200 |
| Veta | 9,338 |
| **PARKS.** | |
| South Park | 9,842 |
| Estes Park | 8,000 |
| Middle Park | 8,000 |
| **LAKES.** | |
| Chicago | 11,500 |
| Moraine | 10,179 |
| Green | 10,000 |
| San Miguel | 9,720 |
| Twin | 9,357 |
| Santa Maria | 9,324 |
| San Cristoval | 9,000 |
| Grand | 8,153 |
| **CITIES.** | |
| Alamosa | 7,600 |
| Animas City | 6,850 |
| Alma | 11,044 |
| Black Hawk | 7,975 |
| Breckenridge | 9,674 |
| Central | 8,300 |
| Denver | 5,224 |
| Divide | 7,210 |
| Fairplay | 9,064 |
| Granite | 8,883 |
| Gold Hill | 8,463 |
| Georgetown | 8,400 |
| Garland | 8,146 |
| Hot Sulphur Springs | 7,715 |
| Idaho Springs | 7,500 |
| Kokomo | 7,800 |
| Leadville | 10,247 |
| Montezuma | 10,295 |
| Ouray | 7,640 |
| Pagosa Springs | 6,800 |
| Rosita | 8,500 |
| Silverton | 9,405 |
| Silver Cliff | 7,800 |
| Uncompahgre Agency | 6,400 |
| White River Agency | 6,491 |
| Manitou | 6,297 |
| Cheyenne | 6,041 |
| Colorado Springs | 6,020 |
| Trinidad | 6,005 |
| Golden | 5,729 |
| Boulder | 5,536 |
| Cañon City | 5,260 |
| Longmont | 5,030 |
| Fort Collins | 4,975 |
| Greeley | 4,776 |
| Pueblo | 4,679 |

Average elevation of Foot-Hills, 8,000 feet; Summit of the Range, 11,500 feet; Timber Line, 11,500 to 12,000 feet.

# Arbor Day Proclamation.

STATE OF COLORADO, GOVERNOR'S OFFICE,
DENVER, COLO., April 2.

The balmy mildness of the morning breeze, which comes to us burdened with the breath of spring, reminds us that the time for planting trees has come again. And in obedience to the law, and in accord with the sentiments of our people, I thereby designate the birthday anniversary of General U. S. Grant, Friday, the twenty-seventh day of April, as Arbor Day.

Nature has placed us amid kindly surroundings. Nowhere is nature more indulgent. Nowhere does the soil respond with a more lavish generosity or does the sun shine with a more genial warmth. Nowhere does the Great Artist paint the bloom of health with such an indelible pencil as under the fair skies of Colorado.

Let us utilize all the resources of art and industry to embellish and beautify these rich gifts of Nature by the planting of orchards, forests and gardens. Let us, with tree and vine, shrub and flower, make beautiful and attractive this land in which we live. Pleasure, profit, gratitude and affection should all impel us to plant trees and care for them.

The children in our schools, the dwellers upon the farm or in the town should all give hand to this good work, which will bring a rich reward to those who live to-day, and an inheritance of beauty, fragrance, fruit and flower to those who come after us.

ALVA ADAMS,
*Governor.*

ATTEST:

JAMES RICE, *Secretary of State.*

# Distances for Planting.

| | |
|---|---|
| Standard Apples, according to size and habit of tree | 24 to 32 feet apart each way |
| Standard Pears and strong growing cherries | 15 to 20 feet apart each way |
| Duke and Morello Cherries, medium growers | 10 to 15 feet apart each way |
| Standard Plums, Peaches, Apricots, Nectarines, Quinces | 10 to 15 feet apart each way |
| Dwarf Pears | 8 to 10 feet apart each way |
| Dwarf Apples | 6 to 8 feet apart each way |
| Grapes | 8 to 10 feet apart each way |
| Currants and Gooseberries | 3 to 4 feet apart each way |
| Raspberries and Blackberries | 3 to 5 by 5 to 7 feet apart |
| Asparagas | 1 to 1½ by 5 to 8 feet apart |
| Strawberries, for field culture, to cover all the ground | 1 to 1½ by 3 to 4 feet apart |
| Strawberries, for garden culture, to keep in hills | 1 by 2 feet apart. |

# Number of Trees on an Acre.

| | | | |
|---|---|---|---|
| 35 feet apart each way | 35 | 8 feet apart each way | 680 |
| 30 feet apart each way | 50 | 6 feet apart each way | 1,210 |
| 25 feet apart each way | 69 | 5 feet apart each way | 1,745 |
| 20 feet apart each way | 110 | 4 feet apart each way | 2,725 |
| 18 feet apart each way | 135 | 3 feet apart each way | 4,840 |
| 15 feet apart each way | 195 | 2 feet apart each way | 10,890 |
| 12 feet apart each way | 300 | 1 foot apart each way | 43,560 |
| 10 feet apart each way | 455 | | |

*Rule to ascertain the number of trees or plants required to plant an acre.*—Multiply together the distances each way the plants are to be set, and divide 43,560 (the number of square feet per acre), by the amount.

# Grape Culture.

C. S. FAUROT, Boulder, Colorado.

There has been so much said and written on the subject of the grape, I hardly know what to say or where to begin. There have been a great many books published on the subject of grape culture, but they have all been written by men far removed from Colorado, and for a very different climate, and we cannot rely upon their writings as a guide for us. We have a great many things to take into consideration in growing fruit in Colorado that they have in no other country, and in this paper I shall endeavor to give you some idea of grape culture as I understand it.

There are very few of us that are particular enough about our vines when buying to enquire about them. We are apt to take other men's words for the varieties that may or may not do for us to plant, and those men, as a rule, come from the East, and know very little about the practical part of grape culture, and nothing about it in Colorado. As the raising of grapes from the seed is more a labor of love than of actual profit, we will not enter into a detailed description of it, although we are indebted largely to it for some of the finest varieties that we have.

The easiest way to propagate the grape is by cuttings. Cut them as early as you can in the fall and bury them in the open ground with the butt end up, and in the spring in planting them, reverse them. If you will do this you will have no trouble in making your cuttings grow. If you prefer to layer to get vines, you can do it by preparing the ground in the spring, using a spading fork so as to thoroughly pulverize the ground; make a

trench four inches deep, laying the vine in and fastening it down by the use of small pegs, and leave it until the vine has started shoots four to six inches long, then fill the trench with fine mellow dirt and it will take root at every joint. In the fall, in taking the vines out, commence at the outer end, cutting the vine between every joint, and you will have some fine vines. Vines grown either from cuttings or layering should be taken up in the fall and healed in, not planting them in the open ground until spring. If you should have old vines or vines that do not do well, you can graft them, although the grape does not graft as easily as the apple or pear. Wait until the sap has started, say in May, select a smooth place in the stem and cut it off smoothly and insert one or two scions as in common cleft grafting, taking care to cut the lower part of the scion to a very thin wedge, leaving two eyes on the scion. To insure success, take great care in inserting the scion properly, as the inner bark or fiber of the vine is very thin, and the success of the operation depends upon a perfect junction of the stock and scion; use good grafting wax to hold the scion in place. Examine the stock often, and remove all suckers that may appear, as they will rob the graft of its nourishment. Do not be discouraged if the scion does not start at once, for some times they will lay dormant for a month and then start and grow with greater vigor. There are several other ways to graft, but I will not stop to discuss them at this time.

It is very essential that we should know from what stock our vines come from. Experience has shown that the varieties of a species, however widely they may differ one from the other in some respects, agree in other points, and however far the varieties may be removed from the native type, they retain certain characteristics which indicate a common parentage. On the other hand, if we know from which species a variety

is derived, we can with a fair degree predict its general behavior in cultivation, and in a great degree its value. It is not in the character of the fruit alone that our vines differ, as they are derived from one or the other of our native species, but the foliage, the wood, the tendrils, the roots and other parts of the vine retain their peculiarities and hardiness, not only as regards ability to endure cold and our severe winds, such as we had last June, but the ability to resist the attacks of both parasitic plants and insects, or whatever else affects the health of our plants, is now known to be transmitted with as much certainty, if not, indeed, more surely than are the form and quality of the fruit.

I shall not, in this paper, attempt to give you a full list of the different varieties that may do well here, but only a few which we know will succeed. I would advise you never to buy a plant because it does well in some other country, for there are a great many things to take into consideration—difference of soil and climate, etc. First comes the old stand-by, the Concord, one of the best black grapes; Hartford, a little earlier than the Concord, Moore's Early, Worden's, Early Victoria and Champion. For red, first comes Delaware, Salem, Brighton, Virginia. For white, although I should not advise setting many white grapes, but there are a few which do well—Lady Pocklington and Martha. The distance at which the vines may be set will differ somewhat with the varieties. The rows may be set six feet apart, as that is a very convenient distance for cultivation, and the vines six to eight feet in the rows.

The next question is, shall we plant cuttings or rooted plants? I should recommend the latter, as you will be more sure of success. Choose, therefore, good strong, one-year old plants, either from cuttings or layers. Good plants should have plenty of good, well

ripened roots, which should be smooth and fine; also, well ripened, short-jointed wood. Be sure and get first-class plants; the best are the cheapest, even if they do cost a little more; better pay double price for them and get good plants, as they will make healthier vines and bear sooner. But I do caution you against those that would sell you extra large vines for immediate bearing, and whose plants are a little better than any one elses, and they will even tell you that they have vines that are impervious to climatical influences of Colorado, and that their vines have been inoculated with a fluid that will cause them to produce fruit that will cure all the ills that the human body is heir to. It is time that this humbug should cease, as the public in general should know that they cannot, in reason, expect fruit from vines transplanted the first year, and those that have the gall to tell you such nonsense, know well enough that it cannot be done without vital injury to the plants. You may get one or two sickly bunches the first year, but if you do your vine will make a feeble growth and not ripen its wood, and very likely be winter-killed the next winter; therefore, in looking around for vines, do not go to those who advertise layers for immediate bearing, but go to some good, reliable nurseryman, who is not afraid to show you how he grows his plants, or will send you samples of them. Choose good, strong, one-year old plants, and be content to wait two years and you will have a crop worth gathering. You cannot, in nature, expect it sooner.

But I presume there are some in this audience who will say: "I have seen fruit growing on vines the first year after setting." That may be true, and is true I know, for I sold several thousand vines last spring, and almost every man came to me to ask what he should do with the fruit that was on his vines. I told them to

pick it all off if they wanted their vines to make a good growth (but I did not recommend them to bear the first year after planting). The first year after planting there is nothing necessary to do but to keep the ground clean and well cultivated. Allow but two shoots to grow the first year, rubbing off all others, but allowing all the laterals to grow on those shoots, as it will make the shoots more stockey and short-jointed. In the fall, prune the vines back to three buds, if they have grown well, but if they have made a feeble growth, cut them back to one or two buds. A fair growth for the first year will be from three to four feet.

As we expect a good growth the next season, we will put up trellises, as this is the cheapest method of training. I should recommend good pitch-pine posts, seven to eight feet long, as they will not rot like other wood. The posts should be set so that there would be three vines between each post, and with a good stake or two between the posts; using No. 12 galvanized wire with common fence staples to fasten the wire to the posts, stretch the first wire about two and one-half feet from the ground and the second about five feet from the ground. As soon as the vine has grown to the first wire tie it there with good, stout twine for there is danger of tying too tight with small twine, and in so doing cut the vine so it will break in the fall. After the vine has grown a few inches above the first wire, pinch it off, causing it to make larger and better laterals and it will ripen its wood in good condition for winter. Fill all vacancies, if any occur, with extra strong vines in the spring. We find the young vines at the commencement of the second year pruned to three buds, from these we may expect two or three strong shoots to ripen into bearing canes for next year. The first thing to be done is to give the ground a good thorough cultivation, the same as we would cultivate corn, being careful not to go too deep

so as to injure the vine or its roots, giving the ground around the vine a good thorough hoeing; unless it should be a very dry spring the vines will not need any water before the first or fifteenth of June, and once or twice after that, using your own judgment as to the amount of water your vines may need. This year we will let another cane grow, making three in all, allowing the two outside canes to grow to the second wire, pruning them back as soon as they have grown out long enough to tie to the wire, pinch off the middle cane at the first wire, allowing all laterals to grow so as to make the wood as short-jointed as possible, for on these we expect to have our fruit the coming season, as the shoots from buds on these laterals will produce more and finer fruit than those on the main canes if left unchecked.

The grape-grower should be, of all others, a close observer of nature and a thinking and a reasoning being. He ought to experiment and try new methods all the time, and should he find a better one, should be willing to throw aside his old methods and adopt one more suited to his vines. Only in this manner can he expect to attain to success.

Pruning may be done as soon as the leaves fall, but be sure to get through before it freezes up for winter, as it will not do to handle the vine when frozen.

At the beginning of the third year, we find our vines pruned to three spurs and the laterals pruned to two or three buds each, these are tied firmly to the trellis, using some good, strong twine. I prefer wool twine, as there is not so much danger of cutting the vine. The ground should receive a good cultivation as before, being careful not to go too deep so as to break or tear the roots of the vine. We find our vines by this time pushing young shoots quite vigorously.

Now we come to one of the most important and delicate operations to be performed on the vine, one of as great or even greater importance than pruning, this is summer pruning or pinching back the young growth. Fall pruning or cutting back is but the first step in the discipline to which the vine is to be subjected. Summer pruning is the second, and one cannot be systematically followed without the other. Look at the vine well before you commence your work. Begin at the ground at the time the young shoots are eight to ten inches long, or as soon as you can see all of the young bunches or buds, the embryo fruit. We commence on the lower spurs having two shoots, rubbing off at the same time, all suckers or wild shoots that have started from the crown of the vine below. From the two buds we find two shoots have started, one we leave for a bearing cane for next year, and let it grow unchecked for the present; the other we pinch off with thumb and finger, just beyond the last good bunch of fruit. Now go over all the other shoots on the lateral canes, shortening each one at the last good bunch of fruit. Leave nothing but the strongest buds, and if any bud has not started vigorously, rub it off altogether. Go over all the other canes in the same manner, and if you still think there is too much fruit left on the vine, take out some of the smallest bunches, for a vine in its third year, however strong it may be, should not be allowed to bear over fifteen pounds of fruit, and now is the time to thin it before it has abstracted any strength from the vine. If any shoots are not sufficiently developed to show their condition, pass them by and go over the vine again in a few days. The early pinching of the young shoots, has the tendency to throw all the vigor into the development of the young bunches, and the leaves remaining on the shoots, now develop with astonishing rapidity. It is a gentle checking and leading the sap

into other channels, not the violent process which is sometimes followed after they bloom or at any time when the shoots have so hardened that the knife must be used, and by which the plant is robbed of a great part of its leaves, to the injury of both vine and fruit. Let any one who wishes to satisfy himself as to the benefit of summer pruning, prune one vine as I have directed, and let one go unpruned, and he will soon satisfy himself that by summer pruning he can add at least one third to quality and quantity.

When the vine has bloomed, the laterals will have started from the axils of the leaves on the bearing shoots. Go over again and pinch these back to one or two leaves. This will have a tendency to develop the remaining leaves very rapidly, enabling them to serve as a conductor of the sap to the young bunches, and shading them when they are fully developed. The canes we left at first may be pinched back as soon as they get out long enough to tie to the wire, as this will start out good, strong laterals. Pinch off all tendrils, unless they serve as a support to the young growth, as this will save lots of trouble in the fall, for when they get ripe they are like wire to cut. This is a busy time for the vine-dresser, for upon his close attention depends the value of his crop. A vast amount of labor can be saved by doing everything in its proper time.

You will see that fall pruning and summer pruning have one and the same object in view, namely, to keep the vine within proper bounds, and to concentrate all of its energies for a two-fold object—the producing and ripening of its fruit, and producing strong, healthy wood for the next year. Both operations are only different parts of the same system, of which summer pruning is the preparatory to the fall pruning or finishing part. If we think the vine has set more fruit than it is able to bear, we have it in our power to thin it, but

we are a little selfish sometimes to the detriment of our vines. We are apt to think the vine is able to carry its load, and we are anxious to get all the fruit we can—a little on the principle the man went on when he could get all the slabs he could draw for twenty-five cents, he put on so many that his wagon broke down—and we must look out that we do not break down our vines by letting them overbear when young. After a vine gets older, if properly pruned, I don't think that there is any danger of its overbearing.

We should allow no more canes to grow for next season than we need. If we allow three to grow where we only need two, we waste the energies of our vine, which should be concentrated upon the ripening of the fruit and producing wood for next season. If we prune the vine too long, we overtax its energies; if we prune it too short we have a rank and excessive growth of wood only. Practice and experience will teach you what that true medium is better than a volume of advice. Different varieties will, of course, require different treatment, and it would be folly to prune all alike. The Delaware is a slow grower, and requires different treatment from a rank grower, like the Concord. The Delaware fruits well on single canes, while the Concord fruits better on laterals. It is because so few men engaged in the cultivation of fruit will take the pains to study the habits and nature of their vines, and do a little thinking for themselves, that we find but very few vine dressers.

This brings us to the fourth year, and now we consider the vine established and able to bear a full crop. The operations to be performed are the same as in last year, only modifying the pruning according to the strength of the vine. Should your vineyard have any vacancies fill them by layering, or with good strong plants, but I should recommend layering to fill all vacancies, as the young plants do not do well after the second year.

Pruning should be done in the fall as soon as the leaves fall. Do not prune in the spring, or at least not before the leaves have started, as the vine will bleed and reduce the vitality. After the leaves are out there is no danger of bleeding. Prune your vines according to the country and wants of your vines. You will find men insisting that we must prune as they do in countries where they have to guard against mildew and rot, and things that we know nothing of in Colorado. We must have the fruit protected from the direct rays of the sun or else spoil our fruit. I have had men tell me that unless I cut the leaves off the vines and expose the fruit it would not get ripe. They say that is the way they do in California, but we must bear in mind that we are not growing grapes in California but in Colorado. But let me say to you, be a close observer of the vine and its wants, and use good judgment, and you will learn more in one or two years than you could learn by reading all the works on grape culture you could find.

One word on training the vine for arbor or walls. Arbor culture has for its object the covering of as much space as possible, fruit being a secondary consideration, although large quantities and of fair quality can be produced if the vine is judiciously treated. Let but one shoot grow the first year, pruning back to three buds in the fall. Each of these buds will produce a good strong shoot the next spring, which should be tied to the arbor and let grow unchecked. In the fall, prune back to three buds each, as we must get a good basis for our vine. These will give us nine canes the next summer, and as the vine is good and strong we can expect it to do some good growing and produce a crop of fruit. In the fall prune according to the surface you wish to cover.

In speaking of the diseases of the grape and the insects that work on them, I will mention only those that

trouble our vines. The common gray cut-worm will often eat the tender shoots of the young plants and draw them into the ground below. It can be readily detected as soon as its works are seen by stirring the ground about the vine. There are several beetles that are very destructive to the vines; one is a steel-blue and very active. After they have worked on the vine, it will have the appearance of being burnt. The first I saw of this was three years ago, and I tried almost everything without any success, until I tried the common insect powder. They will drop to the ground as soon as the vine is moved, then you can sprinkle them with the powder. One or two applications will drive them off.

The grape vine Fidia is a small ashy-gray beetle; they sometimes come in great swarms preying on the foliage, riddling it completely, and even attacking the young fruit. The same treatment as for the other will drive them off. The thrip is a small, three-cornered, whitish insect, which sometimes become very troublesome as they eat the underside off the leaves of some varieties. The Clinton is the only vine that they have troubled in my vineyard, and I have not tried any remedy for them as yet.

The grape vine Sphinx is a large green worm with black dots; it is very voracious, doing more damage to young vines than to the older ones, but does a great deal of mischief, and should be destroyed; fortunately they are not very numerous, the best remedy is to hand-pick them.

Wasps and bees are very troublesome some times to the fruit when full ripe, especially to the sweeter grapes; but while there is a good many injurious insects, we may also count some of them among our best friends, and will greatly assist in destroying the others, and which we should hold in grateful remembrance. Among

these is the little lady-bug, the small red or yellow and black beetle, the mantis or devil horse, as it is sometimes called, but the correct name is Camel Cricket, which is the friend of the vine grower; it destroys countless numbers of injurious insects, especially the native grass-hopper and katy-dids—they and their eggs, which are often found on the vine glued together in a mass like a square cocoon, should be carefully preserved. We place our common toad among our friends, as they are a great destroyer of noxious insects and are always on the look out for bugs of all kinds. Our common active little lizard should be treated with kindness and not killed, as they are by many unthinking people, who have a mistaken idea that they are poisonous. Generally speaking birds are our friends and should be protected, but there are a few that never make us a call but to get a feast of fruit, these should be shot at first sight.

Our winters are not so severe as to kill our vines, but I think it will pay to cover them. It protects the vitality of the vines, and they will produce more and better fruit. After pruning the vines, lay them down and throw enough dirt on to hold them on the ground. Then take the horse and plow and throw the dirt toward the vines. In this way you can do the most of the work with the plow. I should advise taking them up very early—before the buds have started—or wait until all danger of frost is past. I have tried both ways and I prefer the first, but it is quite hard to profit by past experience in Colorado, as the seasons are so unlike.

One word about irrigation. I should not advise the use of very much water. Give the vines a good wetting when they are in the bloom, and another as the fruit begins to turn. This will have a tendency to force the fruit along, making it fill out and be plumper and of better flavor. If you should find it necessary to give the

vine more water than this, you can tell by close attention when the vine needs water, as well as you can tell when your wheat or corn or any other crop you are growing needs it. All that is necessary for any of us to become successful grape growers is that we give it proper attention and care, and you must do this if you wish to succeed, and the day is not for distant when the profits from the cultivation of fruits and our Agricultural pursuits in Colorado will be of more value than our mines. Let these societies do all they can to help the fruit interests along. Let us join hands in this noble cause and we shall be crowned with success. We will make Colorado a State worth living in, and keep the thousands of dollars that go annually to foreign places for the fruit that is consumed in our markets.

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# Fruit Culture in Fremont County.

BY W. B. FELTON.

The culture of fruit in Fremont county, Colorado, as in all new countries, was at first fraught with many mishaps from various causes.

The first fruit stock was brought across the plains from the Missouri river in wagons, and the only wonder is that any of it lived.

In truth most of it died, and much of the little that had sufficient life to make a struggle for existence came to an untimely end through ignorance of the climate, and of the best methods of irrigation, or from some one of many other causes always incident to a trial of raising fruit under conditions radically different from those familiar to the persons engaged in the experiment.

The first fruit trees set out in Fremont county was in 1867.

MR. W. C. CATLIN went to Pueblo for an invoice of trees which had been ordered by himself and by GOV. ANSON RUDD, MR. W. A. HELM and MR. JESSE FRAZIER. They had been brought across the plains in a wagon to Pueblo, and MR. CATLIN brought them to Cañon; something over five hundred dollars worth of trees occupying a small space in his wagon.

A few of these trees, and only a few, are still living. MR. CATLIN has a cherry tree, a Red June apple, and two or three other trees from that consignment near his house in South Cañon, and they are very large now. The four gentlemen named above persevered in their efforts and in time succeeded in raising very fine fruit.

After his first attempt, which was almost a total failure, JESSIE FRAZIER procured several thousand root grafts and set them out in nursery rows. When they became large enough, he transplanted them into his orchard. By that means success crowned his efforts, and by 1879, when the writer first saw his orchard, he had about fifteen acres in trees, mostly apple. He has, from time to time, extended the area of his orchard, having at the present about thirty acres set to trees, about ten acres of which are just coming into bearing.

He has about one hundred and thirty varieties of apples, and the range of the varieties which do well here is so large it may safely be said almost any variety can be successfully grown in this vicinity, although there are certain varieties that bear better and are more sure than others.

The following is the yield of Jesse Frazier's orchard from 1879 to 1887 inclusive, in bushels, as near as he can estimate his crops. In 1879, 3,000 bushels; 1880, 2,500 bushels; 1881, 3,000 bushels; 1882, 4,000 bushels;

1883, 4,500 bushels; 1884, 6,000 bushels; 1885, 4,000 bushels; 1886, 10,000 bushels, and in 1887, 800 bushels.

In 1879-80 and '81, the area of this bearing orchard did not exceed fifteen acres; since that time it has been twenty, and the coming season will be thirty acres. It will be noticed that in nine years, while some seasons were better than others, there was nothing like a failure till 1887. The failure that year was partly owing to the enormous crop of the preceding year, and partly to late frosts during April and the early part of May, 1887, when the trees were in bloom.

The total yield of his orchard for nine years was 40,000 bushels, the average annual yield per acre being 225 bushels. During most of those years his apples sold at an average of four cents per pound, which would be $450 per acre. At three cents per pound it would be $337.50 per acre.

MR. FRAZIER'S is the only large orchard in the county that has been in bearing any number of years. His orchard is situated near Florence, eight miles east of Cañon City. GOV. RUDD'S and MR. HELM'S orchards consist of a few trees—from twenty-five to fifty, on their residence lots in Cañon City. MR. W. C. CATLIN'S orchard is in South Cañon, consisting of about one hundred trees. Each of these orchards have yielded about the same in proportion as MR. FRAZIER'S, except in 1885 and 1886 there was but a very small crop at Cañon and South Cañon, while FRAZIER had good crops, and in 1887 the case was reversed; FRAZIER having but few apples, when the trees were loaded in Cañon and South Cañon.

The writer has about five acres in apple trees, located in South Cañon. They were set out in the spring of 1881 and bore in 1887 for the first time. There were 1,300 bushels of apples, which sold at an average of $1.75 per bushel.

There are fine young orchards on Beaver Creek that had fine crops in 1886 and 1887.

GRAPES.

MR. GEO. F. MCRAY, South Cañon, has the largest vineyard in the county that has fruited for a number of years. Others have vineyards that have fruited a year or two, or that are just coming into bearing, that are from five to twenty times as large, but as an illustration of how grapes will do for a series of years, his is the only one of any considerable size that can be used. He has three-fourths of an acre in grapes. He set out the vineyard first in 1876, but most of his first setting died and he reset, to fill up, in 1878. In 1881 he had his first crop that amounted to anything, and the product was 1,500 pounds; 1882, 3,000; 1883, 8,000; 1884, 12,000; 1885, 8,000; 1886, 8,500; and in 1887, 10,000, giving a total of 51,000 pounds from three-fourths of an acre in seven years, or an average of 7,287 pounds per annum, or at the rate of 9,716 pounds per acre, per annum. The grapes sold at an average of eight cents per pound, which would be $775 per acre for a period of seven years.

MR. J. H. BONN has a young vineyard just coming into bearing; 1,700 vines yielded him 20,000 pounds last year.

Having shown how successfully apples and grapes are grown here, it is unnecessary to occupy much space with other varieties, for where apples and grapes do well, every person familiar with fruit-growing will readily understand that most other fruits will do well. Pears, cherries and plums have not yet been fruited on a large enough scale to present figures, but many are now coming into bearing.

HON. JAMES A. MCCANDLESS, at Florence, has three pear trees about twenty years old, that annually bear

enormous crops. In 1886 the yield from these three trees was about seventy-five bushels.

In the way of small fruits, it is not uncommon to have a yield of from 3,000 to 6,000 quarts of strawberries per acre, and small patches often produce at the rate of from 10,000 to 15,000 quarts per acre. Black raspberries, blackberries, currants and gooseberries do proportionately well. Peaches cannot be relied on. There is now fully six hundred acres of all kinds of fruit, of various ages, in Fremont county. Probably half of that area will be in bearing this year, and if the season be favorable, the crop of fruit in Fremont county will be very large in comparison with the crop of any preceding year.

The mildness of the climate here is such that all kinds of fruit trees, bushes and vines make an unusually vigorous growth, and when not cut short by late frosts, or by damage to fruit buds by unusually warm weather in late fall or winter, the crop is beyond the carrying capacity of tree, bush or vine.

Were there not some mishaps to fruit buds, the trees would bear themselves to death in a short time.

The quality of all kinds of fruit is excellent. The high price of fruit in Colorado will always make fruit-raising, in the favored localities where it can be successfully grown, a very profitable industry.

While it may be possible to over-do the matter, in the way of the most perishable of small fruits, so as to cut the price, there will never be enough tree-fruit raised in Colorado to supply the home demand, consequently the price for such will always be high as compared to prices in other States.

# General Summary.

By GEN. F. HALL, Secretary Denver Chamber of Commerce.

The achievements of horticulture in Fremont County, which is confessedly one of the most favored localities in the State, great as they have been shown to be in the foregoing article by JUDGE FELTON, have been approached, and, in some sections, equalled, both in the northern and southern divisions, but more particularly in the growth of apples and small fruits. DR. ALEX. SHAW, some years since President of the State Horticultural Society, and unequalled in ability for producing splendid exhibits for general inspection and admiration, at the annual Exposition given by the Manufacturers' Exchange of the Chamber of Commerce in this city in October, 1886, and again at the General Exposition of Colorado Products, held at the River Front Park in the fall of 1887, presented a very large collection from all the fruit-growing districts of the State, north and south. It was simply magnificent, both in its variety and extent, and deservedly excited universal admiration. Indeed, it was a source of measureless interest to the thousands of Eastern visitors present on the latter occasion, because of their preconceived ideas of "the Colorado desert."

Though Fremont County is admittedly the fruit garden of the State, El Paso, Huerfano, Bent, Las Animas, parts of Chaffee, Rio Grande, Pueblo, Jefferson, Arapahoe, Boulder, Larimer and Weld counties have made great progress in that direction, all being especially productive to small fruits and apples, and becoming each year more and more extensively planted with orchard fruits, many of which are now in fine growth and bearing. Again, in Delta and Messa counties, in

western Colorado, along the valleys of the Gunnison and the Grande, lying on the western slopes of the Rocky Mountains, at alitudes ranging from 6,000 down to 4,500 feet, the soils are as well adapted to fruit culture as those of Utah, and in time, when the orchards, planted a few years ago, come into bearing, will become equally productive. In my report for 1887, this subject was treated at some length, and will be forwarded to such as may desire to be more fully enlightened on this important topic.

Of one thing the reader may rest fully assured, viz: that the climate and the soil of our State are unsurpassed by any north of Mason & Dixon's line in all the elements essential to the development of agriculture and horticulture. This has been abundantly demonstrated with all fruits except peaches and certain varieties of grapes. But we are each year advancing and constantly producing new surprises in even these directions.

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# Fruiting the Native Plums.

BY D. B. WIER, Lacon, Ill.

Mr. Henry Lutts, in your September issue, writes of the Wild Goose plum: "It is perfectly hardy here, blossoms freely, but fails to fruit heavy through not fertilizing well. I have it from good authority that by planting other varieties of the same *species* (near it) this defect may be remedied."

The italics and parenthesis are mine. Mr. Lutts has been wrongly informed according to my twenty-five years' experience with this plum.

The Wild Goose belongs to the southern type or so called species of native plums known as the Chickasaw (*Prunus Chicasa*) and is not fertilized or pollenized by other varieties of that species here, or at least by none of the many varieties I have tried it with, namely, Newman, (a typical variety of the race) Golden beauty, Peach Leaf, etc. But its flowers in twenty-three years have never failed of being fully fertilized by the pollen of the Miner in bloom quite near it. The well-known Miner shows a complete cross or hybrid between the Chickasaw and the northern wild plum (*P. Americana*,) and so far as tried here it is fertile with and fertilizes all the native plums that are infertile with their own pollen. The Miner is generally barren with its own pollen, but enormously productive when growing quite near the Wild Goose and (so far as tried) all other races, species and families. Therefore, when I am asked how to fruit the native plums abundantly, my direct answer is: Plant them in rows running with the direction of the prevalent winds of spring, with the trees not over six feet apart in the row, and *every third tree a Miner*. The rows may be fifteen to twenty feet apart. This places trees of all the varieties we wish to plant within six feet of a Miner. Proper fertilization is *the one* and *only* secret or necessity in fruiting the native plums.

I have here trees of Miner and Wild Goose growing so that their branches intermingle that this past summer matured their twenty-third crop in succession without a failure, and also other trees that have done the same thing where both were top-grafted on the same tree. Therefore, all barren, isolated native plum trees can be rendered fruitful by budding or grafting the right varieties into their uppermost branches.

Which would be the right varieties? Time and a vast amount of experimentation alone can determine.

I have fruited thousands of varieties of them here, and the best rule I can give, and it is good enough for the present, is to plant with the Miner as above, also bud and graft with it.

The native plums, such as we have now, are a fruit of the greatest value, especially for the north-west, and are destined to be the parentage of the finest and most valuable of all our fruits. Therefore, we should all endeavor to learn their absolute requirements for fruiting.

Last winter, at the request of Prof. C. V. Riley, Chief of the Entomological Division of the United States Department of Agriculture, I prepared a paper giving my studies up to that time on "The Native Plums and the Plum Curculio."

This paper shows that the Plum Curculio has practically nothing whatever to do with the very general barrenness of these plums, and gives proofs and reasons in detail. The present season's observations have conclusively proven my position in every particular. The article is published in Bulletin No. 14, and is now ready for free distribution, and can be had by addressing the Department. Or what is very much better, I will mail the Bulletin from here on receipt of twenty-five cents, with my answer to Prof. Riley's criticisms on my paper, with proofs and new valuable facts.

The facts now seem conclusively to show:

*First*—That the Curculio does not to any injurious extent breed in the Native plums.

*Second*—That eggs laid in these plums do not prevent their reaching maturity.

*Third*—That she lays her eggs in them in preference to most other (perhaps all) fruits.

*Fourth*—Where these plums are fruiting in great numbers in masses near together, they bear great regular crops and protect other fruits from the Plum Curculio, and practically exterminate that insect.

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# Fruit Culture in Colorado.

BY DR. ALEX. SHAW.

The test of fruit culture as a success, by twenty-five years' trial, under the influence of irrigation, is fully demonstrated by the exhibits of fruits at our last three exhibits held under the auspices of the Chamber of Commerce.

The members of the State Horticultural Society have made a careful and personal inspection of the State as to the adaptation of Colorado for fruit culture, either as to tree or small fruits. As a condition precedent to success, no one is assured of success whose water for irrigating purposes is not at command. With water at command, the climate of Colorado is admirably well-suited. The meteorological record of our Signal Station shows less extremes of heat and cold, and that Colorado is on the direct mien line of temperature of the North American continent. The extremes of cold in many of the States north and east of Colorado for the last five winters, have well-nigh ruined their orchards; varieties hitherto supposed to be iron-clads have yielded to the rigor of their winters. In Colorado the same varieties flourish and do well. The experience of orchardists justify planting many kinds now abandoned by many of the older States. Many diseases incident

specially to the culture of apples and pears, such as blight and fungus growth, are not known in Colorado. Colorado is not under the the necessity to hunt Russian iron-clads, but can, with impunity, plant many of the old sorts with assurance of success. Actual inspection of varieties now growing in a healthy condition, is about two hundred in number. The oldest orchards in the State range from eighteen to twenty-five years. The largest orchard consists of about 3,000 in bearing. This orchard in 1886 produced 10,000 bushels of apples. Apple trees bear as prolific when of ordinary age as any country, and the crop is equally as sure. Casualties from late spring frosts is no more common than any other country where the apple is grown. No plantation of any extent of pears has been made, but where pears have been properly cared for, and of proper age, they are equally as prolific as apples. Apples and pears grow well in all parts of Colorado, from the extreme north to the south. Cherries and plums are found to grow in all parts of the State. The more tender varieties only flourish in the south and western slope of the Rocky Mountain range.

As yet peaches, nectarines, apricots, hard-shelled almonds, are only successfully grown in the extreme south, and in the valleys of the Gunnison and Grande rivers. The Grande valley bids as fair for peach culture as Salt Lake. The altitude, 4,500 feet, being the same, and the conditions for peach culture all right. Quite extensive orchards have been made; one venture numbers 12,000 trees. Small fruits, such as grapes in variety, raspberries and strawberries, gooseberries and currants, are exceptionally fine in all parts of the State. The system of cultivation by irrigation is particularly well adapted to small fruits. Water at command will discount the contingencies of countries dependent upon natural rain-fall. The fruit-growers of Colorado prefer

to accept the conditions of culture by irrigation rather than the contingencies of natural rain-fall, calculating with more certainty upon a crop. The fruit grower of Colorado thus sums up the advantages of fruit raising by irrigation. Crops thus cultivated are not subject to the uncertainty and vicissitudes pertaining to other regions. To specify some of the advantages of irrigation, we have:

"*First*—Immunity from drought.

"*Second*—Freedom from excessive moisture and flood.

"*Third*—The ability to cultivate any kind of plant permitted by the climate, from the aquatic or semi-aquatic to that needing the minimum amount of moisture.

"*Fourth*—The ability to control, in a large measure, the growth of the plant, making it early or late as desired, and sometimes growing two crops of the same kind on the same land during the season.

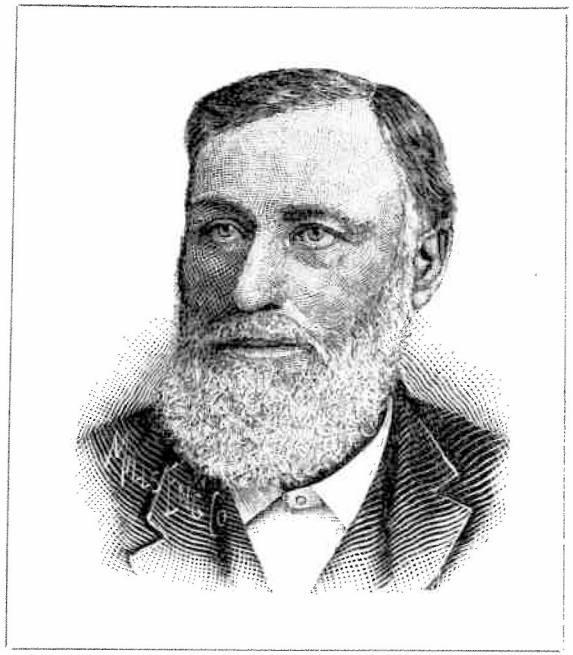
"*Fifth*—To control the condition of the soil, making it suitable for the plow or seed.

"*Sixth*—To supply certain elements to the soil, needed for plant food, namely: Phosphates, sulphate and carbonate of lime, potash and soda salts, nitrogen, magnesia, ammonia, etc., abundantly carried by the water of the ordinary mountain stream.

"*Seventh*—To dissolve and wash out certain baneful ingredients of the soil that frequently exist in such excessive quantities as to destroy plant life.

"*Eighth*—The most important advantage is the fertilizing deposit left by the waters, supplying a nutriment to the crop and adding to and enriching the soil.

"The very means of reclaiming the arid land is a constant source of its fertilization. By irrigation the pores of the most sterile soil can be filled and compacted by the infilteration of the impalpable silt, and converted into a loam of prodigious fertility. Hence, as a general statement, all lands that can be reached and supplied with water for irrigation, are susceptible of cultivation."



MARTIN NEAL EVERITT.



IN MEMORY

OF

MARTIN NEAL EVERITT.

*BORN APRIL, 1829.*

A CHARTER MEMBER OF COLORADO STATE HORTICULTURAL AND FORESTRY ASSOCIATION.

*DIED JUNE 20, 1887.*

## MARTIN N. EVERITT.

MARTIN N. EVERITT, the subject of this memoir, was born in Erie county, Ohio, April, 1829, and lived in said county for thirty years. In 1859 he moved to Cass county, Iowa, and in 1863 changed his residence to Colorado, settling in Jefferson county, and was among the first pioneers of Wheat Ridge. He was a farmer by choice and practice. He was an ardent lover of horticultural pursuits, and planted among the first apple orchards in the State. He was a man of strong will power and unconquerable energy, and was especially persistent in the general culture of tree and small fruits. He had unbounded confidence in Colorado's future as a fruit growing State, and vigilantly guarded his fruit plantations from the depredations of the cattle barons, standing guard over his horticultural pets by day and night. Fought the grass-hopper raid and planned to get water for his trees, when men of less will-power failed. He lived to see his fondest hopes railized by the materialization of a well grown orchard, laden with fruit of the most approved varieties. He was a man of more than ordinary physical developments. Upon his broad shoulders he carried a level head, and an ardent advocate of all industrial pursuits, thoroughly imbued with a high sense of equity and justice. He was the ardent advocate of the doctrine that the "laborer was worthy of his hire." He was in the full sense of the word, "a man whose mission in life seemed to live in this world to make it better for having lived in it." He was a man of courage, to do whatever his judgment dictated was right.

As a pioneer he was a representative man in all progressive enterprises. He recognized his obligations to a just God; he lived as he died, an acceptable member of Wheat Ridge M. E. Church. He was seized with

paralysis two years before he died, which gradually increased until death came to his relief on ———, 1887.

I cannot say, and I will not say
That he is dead. He is just away!

With a cheery smile and a wave of the hand
He has wandered into an unknown land.

And left us dreaming how very fair
It needs must be, since he lingers there.

And you—O you, who the wildest yearn
For the old-time step and the glad return.

Think of him faring on, as dear
In the love of there as the love of here.

Mild and gentle as he was brave—
When the sweetest love of his life he gave

To simple things. Where the violets grew,
Pure as the eyes they were likened to,

The touches of his hands have stayed,
As reverently as his lips have prayed,

When the little brown thrush that harshly chirred
Was dear to him as the mocking-bird;

And he pitied as much as a man in pain
A writhing honey-bee wet with rain.

Think of him still as the same, I say—
He is not dead—he is just away!

As a pioneer horticulturist, the State Society recognize the loss of one of its best practical members and ordered this memoir and resolution to be duly recorded.

*Resolved*, That in MARTIN NEAL EVERITT we recognize the personification of "an honest man is the noblest work of God." We feel the irreparable loss of an acknowledged pioneer of horticulture in Colorado. He has at all times cherished the work of our Association and all kindred societies. He was kind and obliging as a neighbor and practiced the warmest sympathies for the general brotherhood of his race.

*Resolved*, That we tender to his relatives and neighbors, our sympathy in their bereavement, and commend his unselfish labors and many virtues to the practice of all.

SECRETARY.

# Irrigation and Agricultural Engineering.

BY WALTER H. GRAVES, C. E.

The arid region of the United States embraces nearly one-half of its entire area, or in round numbers, about nine hundred million acres. Of this area about two hundred and eighty millions of acres are considered as arable land—that is, land capable of being redeemed and utilized.

Of the arable lands, nearly thirty-two millions of acres have been redeemed and converted into farming land by means of the *art of irrigation*. This area is equivalent to four hundred thousand eighty-acre farms, each of which is capable of supporting a family of five persons. Thus we could have an agricultural population in the arid region of two millions, which would imply a total population of from four to five millions. The present population is something less than two and one-half millions.

The redemption of the remaining two hundred and fifty millions of acres of arable land is only a question of time, the factors being capital and engineering skill.

The engineering problems involved are of such magnitude and scope that the subject presents an interesting and inviting field to the ablest of the *profession*, and one so ample as to call for the exercise of every department of engineering science.

Two hundred and fifty millions of acres of arid land rescued from its present worthless state means three million one hundred and twenty-five thousand eighty-acre farms, or the happy, prosperous homes of fifteen millions of farming people. It means millions upon millions of additional national resource and wealth.

As a question of political economy this must sooner or later assume an importance second to none other in the affairs of the Nation. It will become a practical and commercial necessity, and as an economical problem millions of money may profitably be invested by the Government to attain this end.

IRRIGATION.

The art of irrigation is so old that it antedates history, and is so extensively practiced in nearly all countries of the world that to attempt any extended definition or explanation of it here is entirely superfluous. It might be briefly defined as the transferring of water by artificial means from the source of its production or precipitation to other localities, and converting it into the life blood and wealth of the country.

The influence it has had in the civilization of the world can hardly be estimated, nor can any idea of its relation to the welfare and prosperity of the older nations be conveyed without recurring extensively to history. Its relation, however, to the future development and prosperity of so large a proportion of our country as the arid region, can hardly fail to attract the attention of students and thinkers.

Some facts relative to the history and practice of irrigation as it has grown into existence in Colorado, from an engineering standpoint, may be of interest to the fraternity.

It first came in vogue about twenty-five years ago, when some of the early pioneers abandoned gold digging for the more profitable industry of agriculture; and after repeated failure, and a painful realization that the rainfall was deficient for crop raising, they were forced to irrigation as a necessary last resort. However, the practice thus forced upon them practically brought home a blessing in disguise, and instead of contending with

drought and failure, and spending much time in alternately supplicating and imprecating Divine Providence, they planted and garnered without fear and without failure, and to-day these same pioneers are known all over Colorado, on account of their great wealth, as "farmer kings."

The beginning of the practice of irrigation was of course on a very moderate scale. At first the waters were taken from the smaller streams as they were more easily controlled, and carried in small ditches by individual farmers to land of easy access adjacent the stream.

This was followed by operations on a somewhat larger scale, in which the farmers united on the co-operative plan, and larger ditches carried the water to the upland or mesa farther away from the rivers.

This in turn has been succeeded by a system of canal construction on a still larger scale.

Corporations invested with large capital have entered the field, and great canals, some of them costing hundreds of thousands of dollars, and from fifty to eighty miles in length, have been built to irrigate areas nearly as large as the State of Rhode Island.

There is yet another stage in this line of progression which must be relegated to the future more or less remote, wherein the irrigation plants will be on such a scale and of such magnitude as to be out of the reach of individual or corporate enterprise, in which the leading features will be great storage reservoirs in the mountains and distributing reservoirs in the valleys and on the plains, connected by long lines of aqueducts and conduits, supplying water to large areas of land through intricate and extensive systems of distributing canals and laterals.

Such plants will necessitate plans so comprehensive and extensive that their execution must involve the aid

and patronage of the government, and therefore must be delayed until all of the available lands outside of the arid region have been exhausted, and until the press of the tide of immigration and settlement shall force it to a condition of public necessity and welfare.

Assuming that all arable land is suitable for agricultural purposes that can be supplied with water, and experience teaches that it is not only suitable but abundantly productive, it becomes simply a question of water supply to determine the extent of the area of irrigable land.

The precipitation in the mountain region occurs mostly during the winter season in the form of snow, and the rapid melting of the snow during the late spring and early summer months causes the great volume of the water to flow off to the sea in a comparatively short period.

Many of the mountain streams that are torrents during the spring season, are almost entirely dry during the remaining portion of the year.

To utilize the entire annual discharge of water from the mountains, it would be necessary to collect it and store it in reservoirs during the flood season, to be distributed throughout the remainder of the year.

The topography of the mountain region is peculiarly favorable for the construction of reservoirs. In many instances, by blocking the passage of the water through some narrow gorge or defile, at a comparatively small cost, lakes of incredible size and capacity can be secured.

In India, where irrigation is carried on on a scale so grand as to render our largest enterprises insignificant in comparison, where many of the canals are in reality artificial rivers (as an example, the Ganges canal,

which is some nine hundred miles in length, carries seven thousand cubic feet of water per second, supplies nearly two millions of acres, and cost a sum equivalent to one hundred millions of dollars,) the impounding and storage of water is a conspicuous feature. Indeed, the extent and magnitude of the reservoir system is astonishing.

In one province alone, the "Madras Presidency," there are fifty-three thousand reservoirs, estimated to have over thirty thousand miles of embankment and three hundred thousand separate masonry gates, sluices, wasteweir, etc. One reservoir, the "Veevanum Tank," has an embankment twelve miles in length, and covers an area of thirty-four square miles. British India, with an area scarcely more than half as great as the arid region, by reason of irrigation, supports a population of two hundred millions.

When the irrigating resources of the arid region of the United States shall have been developed to the same extent that they are in other countries, especially in India, there will not be an acre of land left unutalized.

### THE ADVANTAGES OF IRRIGATION.

To a stranger the necessity of irrigation seems an expensive and an unprofitable burden to the land and to the cultivator, but experience has proven it to be quite the reverse, and the history of other countries for centuries past also teaches that by it alone is immunity from drought and famine assured.

Crops thus cultivated are not subject to the uncertainty and vicissitudes pertaining to other regions.

To specify some of the advantages of irrigation, we have:

*First*—Immunity from drought.

*Second*—Freedom from excessive moisture and flood.

*Third*—The ability to cultivate any kind of plant permitted by the climate, from the aquatic or semi-aquatic to that needing the minimum amount of moisture.

*Fourth*—The ability to control, in a large measure, the growth of the plant, making it early or late as desired, and sometimes growing two crops of the same kind on the same land during the season.

*Fifth*—To control the condition of the soil, making it suitable for the plow or seed.

*Sixth*—To supply certain elements to the soil, needed for plant food, namely: phosphates, sulphate and carbonate of lime, potash and soda salts, nitrogen, magnesia, ammonia, etc., abundantly carried by the water of the ordinary mountain stream.

*Seventh*—To disolve and wash out certain baneful ingredients of the soil that frequently exist in such excessive quantities as to destroy plant life.

*Eighth*—The most important advantage is the fertiling deposit left by the waters, supplying a nutriment to the crop and adding to and enriching the soil.

The very means of reclaiming the arid land is a constant source of its fertilization. By irrigation the pores of the most sterile soil can be filled and compacted by the infiltration of the impalpable silt, and convetred into a loam of prodigious fertility. Hence, as a general statement, all lands that can be reached and supplied with water for irrigation are susceptible of cultivation.

## IRRIGATION ENGINEERING.

Limited space precludes the elaboration of this subject, and only the salient features of a few of its problems will be considered. An investigation of this subject reveals a literature that, while it may be extensive enough, avails practically nothing, as it pertains to a

time and to localities so far removed that little or no information can be gained to supply to the modern phases of the subject, or to the existing conditions and circumstances. Hence, the engineer is forced to rely mainly upon his own resources, and is compelled many times to glean his information from researches and experiments in the field; he thus arrives at results largely empirical.

The slowness with which these large irrigating enterprises develop—requiring from five to ten years to reach a remunerative basis—renders capital extremely restive and impatient, and the engineering involved has largely the aspect of temporary expedient, and the exigencies of the case often force the engineer to make-shifts contrary to his inclination and judgment.

Many of these ideas, methods and customs that have come in vogue concerning irrigation, are founded in error, as would be natural with any practice having come into existence as this has, and being so directly connected with the material and vital interests of the people, any precedent, however obviously wrong it may be, has a strong support in deep-seated prejudice, and the engineer is not only compelled to countenance them but in many instances to adopt them.

### THE DUTY OF WATER.

To extend the duty and service of the water carried by a canal, to the greatest possible number of acres, that is, to secure the largest return and benefit for the least outlay in the cost of construction, is obviously the purpose desirable in an irrigating enterprise. But all practice so far effected, has been characteristically without system and with a lavish waste of water, that could not exist in a well planned and executed system of irrigation where the minimum of water is made to serve the maximum area of land. This may be partly accounted for from the fact that water has been abundant and

cheap and labor scarce and dear, and the extra cost of additional canal capacity less than the cost of the proper preparation of the land, and the necessary care and labor required in an economic distribution of the water. The duty of water is probably the most important question connected with irrigation. It depends on so many conditions, to-wit: Soil, climate, rainfall, altitude, crop, character of water, configuration of the land, method of distribution, intelligence of distributor, length of time the land has been irrigated, and yet others, that to determine anything like a fixed duty of water is plainly an impossibility. It is entirely relative to the controlling conditions of each individual case, and can never be more than approximately fixed for each locality. It can, however, be determined for each consumer, and the sale of water should be on such a plan as to allow him to profit by his intelligence and economy in the use of it, and to force him to pay a premium on an extravagant waste of it.

The baneful influences of this excessive use of water are manifested on all sides, not the least of which is the establishing of a custom that is wrong and expensive alike to the community, the consumer and the soil. It has led to a peculiar and an anomolous state of affairs in some localities; for example, farmers have secured to their lands, by purchase or otherwise, certain Water Rights, as they are called; that is, certain allotments of water for each eighty-acre tract, and according to the laws of the State, had decreed to them a certain proportion, or a certain number of cubic feet per second, of the stream from which they take their supply. Within a few years, they find that, notwithstanding they have abundance of water, they are using only a portion of the amount decreed to them. The remainder is allowed to flow on down the stream, and in turn is appropriated and decreed to new claimants. The result is that much

more water is claimed and allotted by law from a stream than it has the capacity to carry, and yet there is an abundance of water.

According to the Constitution of the State, the waters of the rivers and streams are the property of the public, and while every man has a right, within certain statutory limitations and requirements, to all of the water he can consume without interfering with the previously acquired rights of others, yet no man has a right to, nor can he claim, any more water than he can consume. The laws of the State relating to irrigation are, in many respects, very admirable; but in others, where they have been made to conform to wrong, but prevailing customs and ideas, and where they have been framed to suit prejudice rather than wisdom, they are quite defective.

In the older irrigating ditches, the standard duty of water is a continuous flow of one cubic foot per second during the irrigating season of one hundred days for about fifty acres. In other districts, under the *régime* of the large canal companies, this standard has been raised somewhat—in some cases to sixty acres per cubic foot. This is equivalent to an annual rain-fall of about twelve feet.

Judging from the history of other countries, when better methods in the distribution and application of water shall have been adopted, and experience shall have taught the value of an economic and discriminate use of it, its duty no doubt will be increased to from one hundred to one hundred and twenty acres per cubic foot.

## CANAL CONSTRUCTION.

To determine the proper form of channel, the proper grades, slopes, etc., requires the utmost skill and intelligence on the part of the engineer. Mistakes made in the construction of a canal may not appear at first, but

subsequently develop themselves by spreading disaster and ruin on all sides.

A thousand farmers depending on a canal for their water supply. At a critical period, when the canal is taxed to its utmost to supply the demands, some fatal defect suddenly appears, and the canal, for the time being, is rendered useless, and before repairs are completed the crops are ruined. A catastrophe of this kind would be almost irreparable, and through such disaster financial ruin might overtake an entire community. The responsibility of the enginneer is often too lightly assumed by him, and too carelessly and cheaply placed by the company.

The form of channel is determined largely by the object or purpose of its construction; that is, if to be used to deliver water at a certain point some distance from its head, a trapazoidal form is generally adopted, set rather deeply into the ground, and with a bottom width of from two and a half to three times its depth, this character of channel giving the greatest carrying capacity and least liable to destruction and casualty. This form of channel is also used on steep hillsides, with but one bank, the lower one.

If, however, it is the purpose to distribute water to the adjacent land along the course of the canal, the channel should be shallower, to have the water at all times accessible, the depth usually one-eighth or one-tenth the width. When the channel crosses an open, comparatively level plain, it is made partly in excavation and partly in embankment, and has the appearance of parallel railroad grades with a burrow pit intervening.

In this form a comparatively small amount of excavation gives a large cross-section, and can be cheaply constructed, although it is a channel that is peculiarly liable to destruction.

In loose, sandy or gravelly soils, the side slopes are usually two and one-half or three to one; in firm, stiff soils, one and one-half or two to one, and in rock from a fourth to one to one to one. In the large canals it is customary to slope the bottom towards the center, which is from one to three feet deeper than the sides.

The matter of slope or grade is always a perplexing question. If the water is to be carried some distance before it is to be used, a general rule might apply, viz: To give the channel all the fall the soil will stand, as the greater the slope the more rapid the current, and the greater the velocity the greater the delivering capacity. This would, of course, lessen the size of the canal required, therefore the cost of construction. But on the other hand it would lengthen the canal, cause it to run lower and cover less land. To correctly determine the dividing line between an excessive cost of construction in order to embrace more territory on one hand, and too great a sacrifice of territory to the cost of construction on the other, is a matter that will call for the exercise of the engineer's best judgment.

However, these matters, as well as most others in canal construction, are determined by financial considerations rather than by other conditions; that is, the financial factor is the controlling one of the problem, and stringent finances may often be more responsible than poor engineering for bad results.

Grades and slopes generally range between 1 in 6,600, or .000151, and 1 in 1,760, or .000568.

The Citizens canal, in southern Colorado, has a fall of 1 in 10,560, or .0000947 along a portion of its course —six inches per mile. This is probably the least slope given to any of the large canals, and the greatest may probably be found in the rock cuts of the Del Norte canal, which has a fall of about thirty feet per mile.

Of course, nothing but rock could stand such a current as this.

The larger the volume of water the less the slope necessary to give it a required velocity, so that when the nature of the soil is known, and the velocity of current that it can stand, then, with the volume of water fixed, the grade-slope can easily be determined.

With too sluggish a current the canal soon chokes up with water-grass and weeds.

The velocity of current generally sought is from three feet to five feet per second.

In the alignment, while it is necessary to follow the grade-line contour in a general way, to adhere to it exactly would give a degree sinuosity and in many instances such sharp, angular bends that the flow would be greatly impeded. It is often better to shorten the course and make it more direct, even at an additional cost in cuttings and embankments. Of course, the direct line is the shortest, the delivering capacity of a straight channal is greater, and the wear and tear is less.

LOSS FROM SEEPAGE AND EVAPORATION.

The loss of water from these causes is much greater then is generally supposed, especially in new canals. Between the head of the canal at the river and the land upon which the water is used it is often as high as forty per cent.

The land to be irrigated generally lies back and away from the river and at a greater elevation. To gain this elevation and reach the land it is often necessary to transport the water some distance across the intervening useless territory, therefore increasing the seepage and evaporation surface. In construction, advantage is often taken of a depression or draw to build but the lower bank, allowing the water to spread out into a lake or

pond. From these the loss of water is large and the capacity of the canal below, to that extent, must be impaired. While this is resorted to to save in the cost of construction, it is always of doubtful propriety. Badly planned and poorly constructed laterals and distributing ditches are responsible for a large share of this loss, as they are generally built by consumers and each conforming to his own ideas in the matter.

The larger share occurs from seepage and percolation and the lesser share from evaporation.

The factor of seepage is a variable one, depending mostly upon the nature of the soil, and gradually grows less through a long term of years. Evaporation is very nearly a consant quantity, depending on the altitude of the locality and the prevailing meteorologic conditions. In calculating for the loss from these sources in the older canals about twelve per cent. should be deducted from the carrying capacity. Observation and experiment by the writer, in various parts of Colorado, tend to show that evaporation ranges from .088 to .16 of an inch per day during the irrigating season. This is an important item in planning for reservoirs, but in the mountains the almost daily percipitation during the summer months may be relied upon to replenish the loss.

## MEASUREMENT OF WATER.

Probably no question in connection with the subject of irrigation has given more trouble and is farther from a satisfactory solution than that of securing a uniform and correct standard or unit of measurement of water. In no other respect has the development and improvement of the art of irrigation been so retarded, nor has ignorance and prejudice been so manifest as in this.

The difficulties attending the measurement and allotment of water by reason of the constantly varying con-

ditions and fluctuating head, has given rise to a great variety of methods and customs, and, and in this respect, where system is all-important and most needed, the absence of it is conspicuous, and all efforts for the establishment of a correct and universal system have thus far been defeated. The most common practice in Colorado is by a sort of nondescript "inch" unit taken from a method of measuring common among miners in placer diggings, called "*the miners' inch.*" This in turn is taken from a module, or unit of measure, called *the oncia magistrale*, in vogue in the irrigating provinces of Italy, that was devised some three or four centuries ago by one Soldati. However correct this unit or method may have been in its original form, the essential and prescribed dimensions and conditions have been so largely modified and changed in the modern imitation that it can scarcely be accredited with a remote approximation to correct measurement. It is rather a method of subdivision than one of measurement. It is called the "statute inch" from an attempt to prescribe it by State statute; the very provisions of which, however, making the incongruity manifest. In practice it is impossible for the consumer to know how much water he is using. He must remain satisfied with believing that from the apparently similar conditions, he is getting as much as his neighbor, but who, in reality, is perhaps getting more by twice or three times the quantity.

There is a great need throughout the entire irrigating region of a simple, practical, trustworthy apparatus for the measurement of water. The water meter employed in the water works of cities is too complicated to apply to the open ditches, where it may be choked with mud and weeds. The ingenuity of some engineer will be amply repaid for the invention of a hydrometic sluice that will meet the requirements of this demand.

It certainly seems to be a more reasonable proposition that water should be transferred and consumed by the measure, as all other articles of commerce are, as by the pound, or gallon, or cubic foot, which are all determinate and convertible quantities.

This method would be at once a premium on the intelligent and economic use of water, and serve to abolish the long trains of evils arising from the present customs in respect to its use, sale and measurement.

With engineers the *cubic foot per second* is the standard unit, and the quantity is determined in large volumes by the rate of flow into the sectional area of the channel, and in the smaller volumes by the flow over a measuring weir.

The theoretical capacity of a channel, as determined by formulæ, is almost always in excess of the actual capacity, as determined by experiment, by a varying percentage dependent on the following conditions:

*First*—Sinuosity, or aggregate degree of curvature.

*Second*—Sharpness of bends or degree of curvature.

*Third*—The uniformity and symmetry of cross-section.

*Fourth*—The character of the frictional perimeter of the sides and bottom.

Formulæ are of service, and their results more nearly approximate the truth when they are intelligently and properly used, and a correct knowledge and understanding of the nature and range of the factors and conditions of a formula are essential to a practical application of it. Ignorant and improper use often leads to serious errors.

The simple theory of flowing water in channels is not a difficult matter of understanding, but it is the modifications of this theory by the various co-efficients of friction that gives to the formula its intricacy.

Probably in no branch of physics are the theoretical and observed results wider apart than in hydraulics. Rigid accuracy is impossible. Numerous disturbing elements and factors render the conclusions of the engineer tentative until long experience and observation establish their truth or demonstrate their falsity.

For large canals the Fanning formula, with values for some of the co-efficients determined by experiment, has given results closely corresponding with the observed. In other cases the Kutter formula has been found equally good.

The Fanning formula is :

$$V=\left(\frac{2q}{m}\, r\, s\right)^{\frac{1}{2}} \text{ in which}$$

V= mean velocity of current in feet per second.

2q= twice the acceleration from gravity per second, or 64.4 for ordinary purposes.

m= a variable frictional co-efficient, having a range for ordinary canals of from .035 to .060.

r= hydraulic mean depth, in feet.

s= inclination or sine of slope.

The Kutter formula :

$$V=c\sqrt{r\, s} \text{ in which}$$

V= mean velocity.

c= a variable frictional co-efficient.

$$\frac{41.6+\frac{1.811}{n}+\frac{.00281}{s}}{1+\left\{(41.6+\frac{.00281}{s})\cdot\frac{n}{\sqrt{r}}\right\}}$$

with a range of n from .038 to .070.

r= hydraulic mean depth.

s= sine of slope.

The following is probably the best formula for computing the discharge of water over a weir. (See Francis and Fanning.)

$$q = 3.33\ (1 - 0.1\ n\ H')\ H'^{\frac{3}{2}} \text{ or}$$

$$q = \tfrac{2}{3}\ m\ \sqrt{2g}\ (1 - 0.1\ n\ H')\ H'^{\frac{3}{2}} \text{ in which}$$

q= quantity discharged, in cubic feet per second.

m= a co-efficient of crest construction, determined by experiment.

2 q= 64.4.

l= length of weir, in feet.

n= the number of end contractions.

H'= head of water on weir when corrected for initial velocity and $=(H' \times h)^{\frac{3}{2}} - h^{\frac{3}{2}})^{\frac{2}{3}}$ in which H= observed depth on weir, and h= head, due to the initial or approaching velocity in feet.

## DRAINAGE.

Little attention has yet been given the subject of drainage, although it is a necessary adjunct of the subject of irrigation. After the land has been irrigated a number of years the soil in many places appears to become surcharged with water. Especially is this case where there exists a substratum of impervious clay or adobe, and consequently there appears, generally in the country lying lower than the irrigated lands, ponds, sloughs and swamps, which become the breeding place of malaria and disease.

Large areas of land, otherwise valuable, are frequently rendered useless from seepage from an adjoining canal or irrigating tract, the water percolating sometimes long distances. The remedy lies in drainage. It must therefore appear that any system of irrigation must sooner or later involve a system of drainage.

COST OF CONSTRUCTION.

A perpetual water supply for irrigation has an almost uniform value of ten dollars per acre throughout Colorado. In some localities twice or three times this amount could profitably be paid for it. For instance, in the neighborhood of Denver from fifty to one hundred dollars per acre can be netted from garden produce, and in the neighborhood of Cañon City from three hundred to eight hundred dollars per acre is often cleared from the orchards and fruit lands. There is scarcely a locality in Colorado where, after the first year, ten dollars per acre per year can not be made from cultivating any sort of a crop. It is customary to rate the value of a water right at ten dollars per acre, abstractly. Now, if a canal be constructed to furnish water at any cost less than ten dollars per acre, the difference represents the profit to the construction company. In some cases this profit margin has proven a chimerical one, while in others it has been such as to make investments in canal enterprise alluring in the extreme.

The Del Norte Canal, in the southern part of the State, which is a very large and expensive one, probably costing, at a time when it shall have reached a paying basis, three-quarters of a million of dollars, covers and supplies over two hundred thousand acres of ground. On a valuation of ten dollars per acre for a water supply or right, this enterprise would be worth over two millions of dollars, giving over a million dollars for net profit, and allowing a quarter of a million for contingencies.

MAINTENANCE AND SUPERINTENDENCE.

These are matters of considerable importance in the management and success of any enterprise, but especially important in irrigation plants, for obvious reasons. The road-bed and rolling stock of a railroad might be

allowed to deteriorate for some length of time without seriously impairing the operation of the road, but deterioration in the head works and channel of a canal means speedy paralysis. The sources of impairment of canal property are:

*First*—As to the channel. The water itself, carried by the canal, by the erosion of the banks and channel, and the filling of the channel by the deposition of sediment. This is a process of self-destruction.

*Second*—From the storm or flood water. The denuding of the banks by the erosive action of the elements is a constant source of destruction, although it is a comparatively small item. From the very nature of the alignment or location of the canal, it must intercept to a greater or less extent, the slope and consequently the drainage of the country it traverses. If ample provision is made to transfer the flood or drainage water across the canal by means of flumes, canals, etc., destruction from this source is largely prevented. But as a rule, provisions of this character are woefully neglected. In many cases where the slope of the country is sufficient, there is no upper bank to the canal, and the drainage channels are allowed to empty directly into it. Thus the surface water of the entire country above the canal, is gathered into it, and the result is, in such cases, a constant rebuilding and repairing of banks.

*Third*—The destruction of the channel, and especially the banks, by the range cattle, which can only be prevented by fencing the canal.

The deterioration in the structure of a canal are:

*First*—The head works. If these are of such a character as to be proof against the strain and force of the annual floods, and to meet the requirements of the wide range of the fluctuations of the average mountain

stream, they must be very complete and expensive structures, and quite out of the reach of the average canal company. The class of work usually adopted, however, is such as to make the liability of destruction and the cost of repair important items in the subject of maintenance.

*Second*—Applying to all structures is *decay*. Timber intervening between water and earth, and alternately soaked and dried, is particularly subject to decay, and the life of wooden canal structures can scarcely be prolonged beyond six or eight years.

*Third*—Incendiarism. Strange as it may appear, this has proven in the experience of the large canal companies, an item of considerable importance.

The subject of maintenance directly involves that of superintendence. An ignorant or an indifferent superintendent can increase the cost of maintenance many fold.

Where incipient disaster might easely and cheaply be curtailed by intelligent vigilance on the part of the superintendent, serious calamities often occur by reason of his carelessness and ignorance. As a case in point, a leak of apparently insignificant proportions was allowed to exist for some time through the embankment adjoining the head-gate of one of the largest canals in Colorado, when it suddenly assumed a magnitude beyond control, until it had almost completed the destruction of the head-gate, a structure costing several thousand dollars. In this case, as in many others similar, bad superintendence was credited to bad engineering. It seems to be quite the custom in Colorado to select superintendents from among any class of men except engineers, the very men best fitted by experience and training for such work.

HEAD-WORKS.

These include dams, sluices, flood-weirs, sand-chutes and head-gates. They are, as a rule, a class of structures that do not reflect great credit on the engineer, and generally the most deficient part of the entire plant.

In comparison with similar works of other countries they are of the most temporary and transient character, and are almost, without an exception, wooden structures entirely. There are a great variety of plans, scarcely any two being of the same pattern. It is unfortunate that in these structures, which are such an important part of an irrigation plant, iron and stone are not employed instead of timber, or at least stone foundations, and it is to be hoped, that in the replacing which will be necessary within the next six or eight years, the frame structure will give place to one more substantial of iron and stone.

The entire channel system of Colorado embraces something over eight hundred miles of large size canal completed, and about one hundred and fifty miles projected and in contemplation, and about three thousand five hundred miles of canal of secondary size. Of the extent of the tertiary or distributing system it is impossible to form an idea, but it may be within reason to estimate it at forty thousand miles.

The large canals have cost in construction about five millions of dollars. The smaller canals about three millions, and the entire system from ten to twelve millions. The total area of land that can be supplied by these canals is about two million two hundred thousand acres.

The total area of arable land is about twenty-six millions of acres. The present population is about two hundred and twenty-five thousand. Thus it is readily

seen that Colorado has ample facilities for four or five times her present population, and everybody is invited to come and try their luck.

A cursory description of some of the larger canals with which the writer has been connected, as engineer, illustrating the salient features of canal construction, is herewith appended:

THE DEL NORTE CANAL

Is probably the largest irrigating canal in the United States. It is sixty-five feet wide on the bottom at the head-gate, carrying water five and one-half feet deep, with side slopes three to one; making the top width at water line ninety-eight feet. Four miles from the head it is bifurcated; the larger branch being forty-two feet wide on the bottom and the smaller branch thirty-eight feet wide. There are about fifty miles of main channel. It carries something over two thousand four hundred cubic feet of water per second, and is calculated to irrigate over two hundred thousand acres. It is located in the San Luis Valley in southern Colorado; takes its supply from the Rio Grande river and covers the lands in the northern end of the valley. It cost over three hundred thousand dollars. The peculiar feature in the construction of this canal was the rapidity of its completion, the entire work being accomplished within a period of four months.

The preliminary surveys were begun on the tenth of December, 1883, and the canal was completed by the first of the following April. Something over one million four hundred thousand cubic yards of material was excavated to form the channel, requiring between four and five thousand laborers and twelve hundred teams. Two hundred and twenty thousand feet of timber used in the structures of the canal was cut from the mountain side, sawed, framed and placed between the first of January

and the first of March. The haste in construction was occasioned by the necessity to complete it in time to preserve the legal rights and the franchise of the enterprise. The canal was projected by the citizens of the town of Del Norte, and local pride prevailed over good sense in the location of the head-works adjoining the town, when they should have been located some ten miles down the river. As time elapsed, the franchises of the scheme became valuable, and were purchased by the present company at a very large cost. This, of course, precluded a relocation of the head of the canal. To have adopted a grade dictated by good judgment for such a canal would have rendered its construction impracticable, as it would have climbed to the tops of the adjoining mountains before reaching the lands it was designed to irrigate, so great is the fall of the country to the north and east. Hence, a line skirting the base of the foot-hills for the first twelve miles was selected, and giving the canal a fall corresponding with the natural slope of the country. It is excessive for so large a canal, averaging about eight feet to the mile until it emerges from the foot-hills, where it is reduced to about one in two thousand one hundred and twelve. As the channel is excavated almost entirely from coarse gravel, drift and rock, no damage is anticipated from the erosive force of the current. In time it will probably have to be revetted with rock, but as it exists in abundance in close proximity to the canal, this can be cheaply done.

### THE CITIZENS' CANAL

Is in the same neighborhood, taking its supply from the Rio Grande river, eight miles below the Del Norte, and on the opposite side of the river. It is designed to irrigate the lands in the south-western part of the San Luis Valley. It is forty feet wide on the bottom; depth of water, five and one-half feet; slope varying from one

in one thousand seven hundred and sixty, to one in ten thousand five hundred and sixty; side slopes three to one; capacity about one thousand cubic feet of water per second. It covers one hundred and twenty thousand acres. When completed will be forty-two miles in length. It has cost to date about one hundred and twenty thousand dollars.

### THE UNCOMPAHGRE CANAL.

It is in the western-central part of the State, and covers about sixty-five thousand acres of the lands of of the Uncompahgre Valley. It is twenty-four feet wide at the head-gate, and appropriates about seven hundred and twenty-five cubic feet per second. Has an average slope of one in one thousand five hundred and sixty. Length of main channel thirty-two miles, and length of latteral channel nineteen miles. The entire valley has an exceeding fall to the north, about sixty feet to the mile, which gives the canal the appearance of having an ascending grade and necessitating the frequent use of drops or over-falls. Fourteen miles from the head the canal reaches the culminating edge of an inclined mesa, and the water drops two hundred and thirty feet over a precipitous rocky cliff into the bed of a dry wash, and following the channel of this dry wash some six miles, it is again taken out and carried to the top of a second mesa. There are about six and a half miles of rock excavation. Eighteen flumes or aqueducts are required, most of them long and high, aggregating more than one mile in length; the longest five hundred and twelve feet, and the highest nearly fifty feet. There was used in the construction of these flumes nearly eight hundred and fifty thousand feet of lumber. The entire cost of the canal has been two hundred and ten thousand dollars. And in point of fine construction is unexcelled by any similar work in the country.

### THE GRAND RIVER CANAL SYSTEM.

In the extreme western part of the State is a combination of three canals, projected and largely built by the farmers of the Grand River Valley, but purchased and united by the present owners. Since the combination one head-gate has been abandoned, the remaining two being sufficient to supply the entire system. The combined appropriating capacity is six hundred and eighty cubic feet per second. There are about sixty-five miles of main channel covering about forty thousand acres. The average slope is one in two thousand nine hundred. A striking feature is the numerous over-falls or "drops," ranging from four feet to thirty-six feet in height. The soil of this locality is peculiar, a sort of argillacious adobe, that when dry resembles ashes and when thoroughly wet becoming a slimy mud that is almost impossible to control or maintain in a fixed position. In the canal banks it has a tendency, when soaked with water, to melt and flatten out, and to preserve in good form and for good service the channel has proven a very difficult and expensive matter. However it is a soil of wonderful fertility and in connection with the extremely favorable climate there is a luxuriance of vegetation found nowhere else in the State.

### THE FORT MORGAN CANAL.

It is in the north-eastern part of the State and takes its supply from the Platte river, about ninety miles below Denver. It is twenty-eight miles long and thirty feet wide on the bottom. Carries water three and a half feet deep, and has a slope of one in three thousand three hundred, capacity something over three hundred and forty cubic feet per second, and it irrigates twenty thousand acres. It cost about ninety-five thousand dollars. The only engineering feature is the flume across the Bijou creek, which is nearly two thousand seven

hundred feet in length, averaging about thirty feet in height, and cost about twenty-two thousand dollars. The canal covers as fine a body of land as can be found anywhere. The enterprise is just entering upon its third year of operation and promises a speedy success. The Fort Morgan community has a population of about five hundred, they have between four thousand and five thousand acres under cultivation this season, and competent judges estimate the income from this area, for this season, to be not less than eighty thousand dollars.

# Remarks on the Flow of Water in Ditches.

BY J. S. GREENE, STATE ENGINEER.

OFFICE OF THE STATE ENGINEER,
DENVER, COLO., February 1, 1888.

In order to meet readily the many applications made to me by Superintendents of Irrigation, Water Commissioners and others, for formulas and directions that will enable them to determine the carrying capacity of ditches in *cubic feet per second*, I have prepared for publication and distribution the following

REMARKS ON THE FLOW OF WATER IN DITCHES.

A *cubic foot per second* is the *unit of measurement* adopted in the distribution of water from the natural streams of Colorado into the ditches. The greatest number of these *units of measurement* that a ditch can be *safely* made to carry, is termed the capacity of the ditch.

A *cubic foot of water* is that quantity of water which a vessel one foot in length, depth and width will contain

when filled. It is equivalent to about seven and one-half gallons.

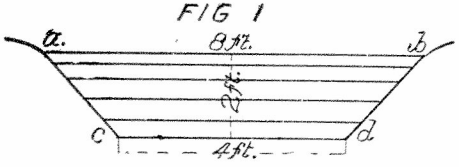
One *cubic foot per second* is the capacity of a ditch that can exactly fill such a vessel each second of time.

Ten *cubic feet per second* is the capacity of a ditch which can exactly fill such a vessel ten times in each second of time.

The quantity of water which a ditch carries, expressed in cubic feet per second, may be obtained by multiplying the area of the wet cross-section of the ditch, expressed in square feet, by the mean velocity of the water at the cross-section selected, expressed in feet per second.

This would be algebraically stated by the equation $Q=Fv$, in which $Q$ represents the quantity of water carried, $F$ the area of the wet cross-section, and $v$ the mean velocity of the water.

Figure 1 represents the cross-section of a ditch, which means a vertical section at right angles to the course of the ditch.




That part of the cross-section below the high water line, *a–b*, is the wet cross-section.

The area of the wet cross-section in square feet may be obtained by multiplying the average width thereof, in feet, by the depth, in feet.

Thus, the average width of the wet cross-section of ditch shown in figure 1, is $\frac{8 \text{ feet} + 4 \text{ feet}}{2} = 6$ feet, and the depth is 2 feet, so that the area becomes 6 feet $\times$ 2 feet = 12 square feet.*

If the mean velocity of the water in this ditch were 2 feet per second, the quantity of water carried would be 12 square feet $\times$ 2 feet per second = 24 cubic feet per second. If the mean velocity were 2.5 feet per second, the quantity carried would be 30 cubic feet per second. This difference of 6 cubic feet per second, which is sufficient water to irrigate some 350 acres as water is now used by us, is occasioned by a small difference in the mean velocity of the water, and indicates that great care should be used in determining that mean velocity.

The mean velocity of the water carried by a ditch may be determined, either by actual measurement of the velocity of the water flowing in the ditch, or by the use of formulas. Formulas are simply rules expressed algebraically. They are based upon the results of many observations and experiments, and give the equivalent of the mean velocity in some algebraic form, involving among other functions, the area and shape of the wet cross-section, and the grade of the ditch.

In connection with the actual measurement of the velocity of the water, let it be borne in mind that the water does not move with equal velocities at all points of the cross-section, but that, as a rule, the velocity increases from the sides towards the center of the channel, and from the bottom upwards to a point a little below the surface of the water.

By the *mean velocity* is meant that certain velocity which, if common to all the threads of water, would

* Let it be remembered that the product of *feet* multiplied by *feet* is *square feet*, and that the product of *square feet* multiplied by *feet* is *cubic feet*.

produce the same discharge as that occasioned by the varying velocities which actually exist; or, in other words, it is the average of the velocities of all of the threads of water passing through the cross-section.

There are many methods, more or less convenient, of measuring the mean velocity of water flowing in a ditch. The best, and the one adopted by this department in rating measuring flumes, is that in which a current meter is used. The current meter is a machine which registers the number of revolutions which a vaned wheel, when submerged in running water, makes in any observed number of seconds. The number of revolutions divided by the observed number of seconds, gives the number of revolutions of the vaned wheel per second. As the meter, before being used, has been rated, so that the velocity corresponding to any number of revolutions per second of the vaned wheel is known, it follows that by its use the velocity of the water at any point of the cross-section can become known. The average of the velocities obtained by a number of observations at the proper points, will give the mean velocity of the water through the entire cross-section. Other devices, such as Pitot's Tube, the Hydrometric Pendulum, and the Rheometer—found described on works on Hydraulics—are used in the same general way. But these devices are expensive, and not always attainable.

A method of ascertaining the amount of water flowing in a ditch, which consists in determining by floats the *maximum surface velocity* of the water, taking a certain per centum thereof for the mean velocity of the water, and multiplying the mean velocity so obtained by the area of the wet cross-section, is of very easy application. It is, perhaps, on the whole, the most suitable method for the use of those to whom these remarks are especially addressed, namely, the Water Commissioners of the State, who, by reason of the negligence of ditch

owners to construct rating flumes in their ditches, in compliance with the law, are compelled to make hasty estimates of the amount of water carried by these ditches, when engaged in distributing the water of the natural streams in conformity with the decrees of the District courts.

To obtain the maximum surface velocity, select a portion of the ditch, near its head, which is free from weeds, and from eddies, still water, and other irregularities, and which is as nearly straight and of uniform cross-section as can be obtained for, say a distance of one hundred and twenty-five feet, then lay off a line, one hundred feet in length, parallel and adjacent to this part of the ditch, mark the ends of the one hundred foot line by stakes; use for a float a chip, or small block of wood, of such form as not to catch the wind or project far below the surface; cause the float to remain in the swiftest current throughout its course; place it in the current some distance above the upper end of the one hundred foot line, so that it will have acquired the velocity of the water by the time it reaches that point; start the stop-watch, or note the time, when the float passes the upper end of the one hundred foot line, and stop the stop-watch, or again note the time when the float passes the lower end of the one hundred foot line; one hundred feet, divided by the number of seconds it took the float to run that distance will give the velocity of the float in *feet per second*. (Illustration: If it took 25 seconds for the float to run 100 feet, the float would run $\frac{100}{25}=4$ feet per second; if forty seconds were required for it to run 100 feet, its velocity would be $\frac{100}{40}=2.5$ feet per second). Repeat this operation several times in order to be positive that the *maximum surface velocity* has been obtained.

In order to determine what per centum of the *maximum surface velocity* to take as the mean velocity of the

entire cross-section, considerable judgment is required, for no universal rule can be laid down. European engineers seem to take 83 per cent. of the maximum surface velocity for the mean velocity, while many American engineers regard 80 per cent. as sufficiently large. Speaking in a general way in this connection, and with reference to our ditches as constructed in Colorado, I should say make the mean velocity 80 per cent. of the maximum surface velocity, where the ditches are shallow and narrow, and 83 per cent. where they are deep and broad.

EXAMPLE.—The wet cross-sections of a ditch is 8 feet wide on the bottom, 10 feet wide on top, and 1 foot deep, and the maximum surface velocity is 2.2 feet per second. What is the capacity, $Q$?

Formula, $Q = F \times v$.

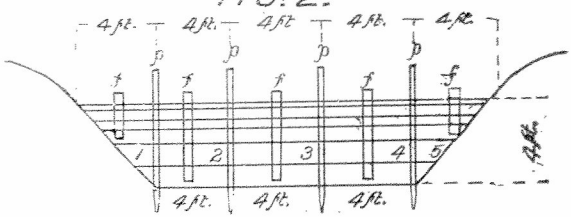
$F = \frac{8 \text{ feet} + 10 \text{ feet}}{2} \times 1 \text{ foot} = 9 \text{ square feet.}$

$v = 80\,\%$ of 2.2 feet per second = 1.76 feet per second.

$F \times v = 9$ square feet $\times$ 1.76 feet per second = 15.84 cubic feet per second = $Q$.

Another method of determining the capacity of a ditch, by running floats, is indicated in Figure 2:

FIG. 2.




Select a portion of the ditch similar to that described above, and stake out the 100-foot line parallel and adjacent thereto, a cross-section about the center of the 100-

foot line is subdivided into sections by means of poles set as those designated *p. p. p. p.* in Figure 2. The floats used in this methods designated *f. f. f. f. f.*, in Figure 2, are of tin or wood. If of wood, they are of different lengths, and if of tin, they have screw joints so as to be lengthened or shortened at pleasure. Select a float of such a length and so weighted that the lower end will just miss the bottom and the upper end just project above the surface, when it is caused to run down the center line of the section, the mean velocity of the water through which it is proposed to determine.

The observed velocity of the float, obtained in the same way as indicated for surface floats, is considered the *mean velocity* of the water in that section down the center line of which the float traveled. The mean velocity of the water in each section of the cross-section is thus determined: In place of taking the average of the *mean velocities* thus obtained as the *mean* velocity of the entire cross-section, and multiplying the area of the cross-sections thereby to obtain the discharge of the ditch, it has been found better to calculate the discharge through each section of the cross-section, and add them together for the total discharge. The discharge through each section is the product of the area of that section by the mean velocity of the water through it.

EXAMPLE:

What quantity of water is carried by a ditch with a wet cross-section 12 feet wide on the bottom, 20 feet wide on top, and 4 feet deep, when, if divided into five sections, as shown by figure 2, the mean velocity in sections 1 and 5 is 1.6 feet per second; in sections 2 and 4, is 2.0 feet per second; and in section 3, is 2.4 feet per second?

In a flume, when the depth of water is three-fourths or more of the width, the mean velocity will quite equal the maximum surface velocity, or may even exceed it.

SOLUTION:

The discharge through section 1=8 square ft. × 1.6 ft. per sec.=12.8 cu. ft. per sec.
The discharge through section 2=16 square ft. × 2 ft. per sec.=32.0 cu. ft. per sec.
The discharge through section 3=16 square ft. × 2.4 ft. per sec.=38.4 cu. ft. per sec.
The discharge through section 4=16 square ft. × 2 ft. per sec.=32.0 cu. ft. per sec.
The discharge through section 5=8 square ft. × 1.6 ft. per sec.=12.8 cu. ft. per sec.

Total quantity of water carried by ditch . . . . . 128.0 cu. ft. per sec.

Of the many formulæ, submitted by engineers, for determining the discharge of ditches without actually measuring the velocity of the water, Kutter's is the best, and is recommended to engineers. It is, however, intricate and lengthy, and is not considered as suitable for this article as the one herein following, which has long ranked among the few good ones, though when applied to small ditches the results are apt to be too large.

But neither this nor any other formula, it may be observed, takes into direct consideration great irregularities in the bed of the ditch or very sudden changes in its course. These conditions need not, however, be neglected. Experience will enable one to allow for them with considerable accuracy by increasing correspondingly the co-efficient of resistance that would otherwise have been used.

Without discussing the theory of the flow of water in ditches, which, though it might tend to an appreciation of the formula, would not materially aid in explaining its use, attention is at once directed to the consideration of the following equations and the accompanying table of co-officients of resistence, taken from Weisbach's Mechanics:

Equation 1. $v=92.26\sqrt{\frac{Fh}{pl}}$

Equation 2. $v=\sqrt{\frac{F}{z.lp}.2gh}$

Equation 3. $Q=Fv.$

TABLE OF CO-EFFICIENTS OF RESISTANCE.

| Mean velocity in feet per second. | Corresponding co-efficient of resistance. |
|---|---|
| $v=0.3$ | $x=0.01215$ |
| $v=0.4$ | $x=0.01097$ |
| $v=0.5$ | $x=0.01025$ |
| $v=0.6$ | $x=0.00978$ |
| $v=0.7$ | $x=0.00944$ |
| $v=0.8$ | $x=0.00918$ |
| $v=0.9$ | $x=0.00899$ |
| $v=1.$ | $x=0.00883$ |
| $v=1.5$ | $x=0.00836$ |
| $v=2.$ | $x=0.00812$ |
| $v=3.$ | $x=0.00788$ |
| $v=5.$ | $x=0.00769$ |
| $v=7.$ | $x=0.00761$ |
| $v=10.$ | $x=0.00755$ |
| $v=15.$ | $x=0.007504$ |

In these equations:

$F$=the area of the wet cross-section in square feet.

$p$=the length of the wet perimeter of the cross-section in feet. By the wet perimeter is meant that part of the perimeter of the cross-section which is covered by water, as *a. c. d. b.* in figure 1.

$h$=the fall of the ditch, corresponding to any given portion of the length thereof, which portion of the length is designated by $l$. Thus, if the fall of the ditch is three feet in a mile, $h$=3 feet, and $l$=5280 feet.

$z$=the co-efficient of resistance. The co-efficient of resistance changes with the velocity. The co-efficient of resistance corresponding to any velocity will be found immediately opposite that velocity in the table above given. Thus, the co-efficient of resistance corresponding to a velocity of three feet per second, is found from the table to be 0.00788.

$g$=32.2.

$v$=the mean velocity of the water in feet per second.

$Q$=the quantity of water carried in cubic feet per second.

It will be noticed from the table, that as the velocity increases, the co-efficient of resistance decreases. The velocity must be quite approximately known before the co-efficient of resistance can be determined. A solution of equation 1 gives us the mean velocity, $v$, of the ditch quite accurately, and knowing this approximate value of $v$, the corresponding value of $z$, the co-efficient of resistance, is obtained from the table as explained. Substituting this value of $z$ and the values of the other functions, $F$. $h$. $l$. $p$. and $g$. in equation 2, and solving the equation, we obtain the true value of the mean velocity $v$; multiplying this value of $v$ by the value of $F$, we get, as indicated by equation 3, the quantity of water $Q$ carried by the ditch.

EXAMPLE:

What quantity of water is carried by a ditch, having a wet cross-section 10 feet wide on the bottom, 14 feet wide on top, and 2 feet deep; the fall of the ditch being 4 feet to the mile?

outlay of $25,000,000 or $50,000,000, one million acres worth $100,000,000 or $200,000,000 can be redeemed, with all that American enterprise has successfully accomplished on every hand about us, is it doubtful that the requisite capital can be summoned for such an achievement?

### THE COLONIAL DAYS.

The Pilgrim fathers located upon the border of the largest forest on earth, and three thousand miles of sea bounded the eastern side of their small territory. Within four years from the time they landed at Plymouth Rock they observed a day of fasting and prayer on account of a terrible drouth; and repeated that solemn observation twenty-three times during the first century of their settlement.

If crops can be raised profitably in Colorado now without irrigation, they could have been raised as successfully at any other time in centeries past. The rain-fall we have, and have had, may now and then grow a crop; but nowhere else on earth has the effort to produce general agriculture succeeded with an average annual rain-fall of less than fourteen inches. I have elaborated upon this branch of my topic, because the way to immediate adoption of irrigation and the utilization of the surplus water in our national streams, through the agency of canals and reservoirs, must be obstructed if our territory be occupied, and years are consumed in the fruitless effort to establish the rain-belt idea. No country which half earnestly adopts and practices irrigation will succeed. The absolute necessity of relying upon it for agricultural success must animate the people who are to occupy our plains and valleys. They must be thoroughly impressed with the fact that irrigation promises positive advantages and brings increased net results to the husbandman. Kansas could well have afforded

to purchase perpetual water rights for all its fertile fields, if its corn crop last year would thereby have been saved.

### ANTI-ROYALTY LEGISLATION.

The beneficial effects of last year's anti-royalty legislation, supplemented by the recent decision of the Supreme court, are already apparent. The proposition that the actual application of water determines priority must and should ever be the elementary feature of all our laws bearing upon this great interest. Canals built by corporate capital should be simply common carriers of water, and in no sense owners of it. Now that this principle is established, intelligently directed canal companies are exerting themselves to dispose of the water they carry by actual application to the land covered, so that no idle or surplus water can be discovered. The actual application of water serves the purpose which the State desires to accomplish. As the law now is, no canals will be built for the purpose of renting water. The owners of canals already built and having water undisposed of will, as fast as possible, sell permanent water rights and thus evade the rental plan and avoid control by shifting local, political party administration. The holders of the rights, the farmers themselves, will own and operate the canals.

### BUILDING CANALS.

I experience no difficulty in conforming to the law, as now interpreted, in undertaking the construction. Canals will, and should be hereafter, built of such size as the contracts made with the land owners under the proposed line, in advance of construction, aggregate and call for. If, for instance, they subscribe to contracts in all for two hundred and fifty rights of eighty acres each, the aggregate twenty thousand acres should determine the capacity and size of the canal, and the parent company would practically be only a construc-

tion company. If the company owned and controlled the land wholly or in part, then in order to secure priority it would be as necessary for them actually to apply their water as for the private owners contracting of them. Hereafter, the plan for the application and disposal of all the water in a canal proposed to be built will be adopted before construction is even begun. It may be well here to suggest that the statutes of our State should be cleared of all laws which are based upon the idea of ownership of water, and to be confined to the common carrier principle. To this end, it is hoped, the next Legislature will codify our laws and sweep away the confusion which the present statutes exhibit respecting this matter.

### IRRIGATION NECESSARY.

Having asserted the absolute dependence of agriculture in Colorado upon irrigation, which is a factor of positive value and one desirable almost everywhere for the farmer to secure, I shall devote the remaining moments of my time this evening to the future of the great interest under discussion. There are not less than thirty millions of agricultural lands in this State which only need the application of irrigation to be made as valuable and productive as any already cultivated. Of the fifty thousand square miles of territory in this State which lie east of the mountain foot-hills, less than three thousand square miles are actually and systematically farmed. It is my deliberate conviction that were all the water of all the streams covering these plains absolutely preserved for domestic and irrigating purposes, and applied with the skill and economy displayed even in India or Egypt, we could irrigate and make fruitful every acre of this immense area, an area capable of supporting an agricultural population, urban and rural, of three millions, and yet it would be less than one-half

as densely populated as Belgium or the agricultural sections of France. Were it not for lack of time, I should gladly elaborate this proposition and justify what I think will eventually be determined if our "government of the people" continues.

MOUNTAINS AND DESERTS.

Long and lofty mountain ranges always create deserts. If an everlasting mountain, then a hopeless desert. Arid and semi-arid plains are created by the vicinage of ranges so located that they but partially interfere or intercept the trade-winds. If the mountains on our west ranged toward the Atlantic, an implacable desert would be found on the one side, and on the other a periodical rain-fall similar to that of central California. As no two mountain ranges and accompanying arid sections are dominated by precisely parallel conditions, so the corresponding meteorological and climatic differences vary.

If, then, the necessity for continued irrigation prevails, and no appreciable climatic change can be discerned in whole countries less arid and with more rain-fall than Colorado, after centuries of experimental irrigation (as in Spain and northern Italy) equivalent of itself to twice our average annual rain-fall—where skillful agriculture supports dense populations; where trees, field, farm and gardens are universal and innumerable—what shall we say for that "rain-belt theory" which Charles Francis Adams and his land grant subsidy have provided for the blessings of eastern Colorado? Were the plains of Lombardy traversed by American railways, equipped by "home industry," or electrified by Western Union telegraph lines, a rain-belt might possibly be summoned there which should rival and possibly surpass that which is racing across our plains "at the rate of twenty miles a year."

THE RAIN-BELT.

But, nevertheless, says our Akron friends, and sometimes, too, the *Republican*, the fact is that the rain-belt *has* increased, and general agriculture can be safely ventured upon in eastern Colorado. Furthermore they point to the fact that twenty-five years ago eastern Kansas was droughty and uncertain; that since then the cultivation of the soil, planting of trees, to say nothing of the railroads and telegraph poles, have produced changes which cannot be controverted. They may concede that at the most they are but a little premature in their claims to such progress for the advancing rain-belt, and that it is only a question of time when agriculture, relying upon rain-fall, will be as safe and remunerative on the eastern border of our State as anywhere else in the Missouri Valley. Now, the main difficulty, with this position is that there is nothing whatever to base such claims upon. Carefully kept records by Mr. Hagaman, at Concordia, in Kansas, a point only 175 miles west of the Missouri river, since the year 1860, show there has been no average increased rain-fall there. The records from Fort Leavenworth, Fort Riley, Fort Wallace, and all other Government posts in the arid and mountainous districts, some of these records reaching as far back as the year 1840, absolutely show no increased rain-fall. My own observations for more than forty years in central Kansas, in connection with somewhat extensive agricultural operations, long before my removal from the State, forced unwilling conclusionsa gainst the increased rain-fall theory. Some years there were abundant rains; other years the rains were few and quite insufficient.

With a gradually lessoned rain-fall advancing from the Missouri river toward the mountains, as all the military post records show, my own rather close attention and observation coincide.

### DROUGHT IN KANSAS.

A drought more relentless than any in Kansas since 1860 has, for the past two years, distressed its agriculture. This fact, and the liability to repeated droughts, have stimulated the construction of irrigating canals in the Arkansas valley, one hundred miles east of the Colorado line, and in addition to several already completed, I was recently interviewed by the projector of one at Garden City. Work on this canal has commenced, and it will be one hundred feet in width, larger than any canal in this State. But the timber culture act and tree planting are claimed remedies. Henry Garnet, in the January number of the *Science*, says over one thousand square miles of almost treeless prairie in northern Missouri, southern Minnesota and parts of Illinois and Indiana have been reforested since the settlement, and furnish an example of reforesting unequaled elsewhere upon the face of the globe, and yet the rain-fall has not increased. On the other hand, there has been more acres of land denuded of forest in the United States within a century than anywhere else in the world, yet there is no evidence of a diminished rain-fall. Writes, recently, Prof. Sargent, of Harvard University, a recognized authority on this subject: "The removal of a forest from any region will not diminish the amount of rain falling upon it; nor can the increase of forest in a slightly wooded or treeless country increase its rain-fall. The gradual drying up of countries once fertile within the history of the human race, but now barren and almost uninhabitable, must be traced to gradual geological changes, of course entirely beyond the reach of human control, and not to the mere destruction of the forest.

### DUTY OF THE GOVERNMENT.

But as the General Government owns and controls the public lands, valueless without water, it is but right

and proper, as I have stated before to this chamber, that it should undertake the measurement of the capacity of the public streams, make elaborate surveys, levels, and contour lines, and locate reservoir sites, and estimate the widest possible utilization of the land and water yet unoccupied and unappropriated for the benefit of the general public. The interests of the people here, and of the people who are to come here, are objects of quite as much consideration as are the ague-stricken, benighted denizens bordering a "New Jersey harbor." Upon repayment of the cost by the State, the non-mineral agricultural lands should be granted to our State conditional upon their occupancy and improvement. But should the General Government undertake the actual construction and operation of the enterprises so contemplated? I think not. I am unalterably opposed to the introduction into our State of a National direction and interference with interests so local and domestic as such enterprises would be. If the tendency which our State laws are taking looking to the local direction by interests directly affected, be wise, then what shall be said of a policy which contemplates the transfer of such control to the seat of the General Government, thousands of miles distant? The purturbation displayed by the "home contingent," at the spectacle of Federal positions filled by Confederate scions imported into this State, should serve as a perpetual warning against the introduction of a practice so hostile to the American nature as such a policy proposes. But, it may be said, the Government has a surplus which is sure to be squandered, and Colorado might as well have a portion of it expended here, as local and special interests in the East to absorb it all. There is a specious plausibility in this proposition which touches very closely human nature; but, for my part, I hope the time is not far off when the principle which undertakes this game of vicious "grab"

—sure to undermine public and private morality—shall be eliminated from National legislation.

STATE OWNERSHIP.

Time forbids discussion of State ownership. I will mearly observe that very nearly all the objections to natural jurisdiction apply to State control, and I should almost strenuously oppose it. I believe that private or corporate capital should undertake the enterprises upon which depend the glorious future of our agricultural interests. I have shown that the common carrier principle now established, practically confines and limits the scope of such enterprises to constructive objects. The bane of monopoly can never hereafter be fastened upon this interest. Eventually and inevitably the ownership and control of the great future irrigating enterprises of our State must pass into the hands of those who own and occupy the lands which they redeem, and there forever remain.

The area of Colorado lying east of the first range of mountains has nearly forty thousand quare miles, practically all agricultural land, and if peopled as densely as in Belgium would contain a population of more than eight million people. Or, if provided with water for irrigation, skillfully applied, each forty acres would support a family of five persons aggregating a population of more than three million, not including the directly dependent urban populace. On the same basis, the great San Luis valley would sustain a popoulation of one million of people; the San Juan country, in the south-west, nearly one million; the Gunnison and the lower Grand, three-quarters of a million; the White, the Yampah and the almost unknown north-west, one million more. Before the close of another century there will have been elaborated a system of agriculture surpassing that wonderful civilization which Moorish power planted in the irrigated

valleys of Spain ten centuries ago—maintaining the millions then peopling our grand commonwealth.

MAY BE CRITICIZED.

I apprehend in conclusion that some, possibly many, of the propositions I have here advanced will subject me to criticism. Not that they are particularly new, not that the underlying facts are unknown, but because they militate against certain theories cherished by some, and if widely proclaimed, make impossible the purposes of others. But I am as hostile to any opinion or theory, however plausible, or *per se* attractive, if it subtract from the sum of human happiness, as I am opposed to any law, condition or practice which prevents the largest individual liberty, the highest public conscience or the broadest general welfare.

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# Shall we Build Reservoirs?

BY MR. F. M. CLARKE.

The large tract of country known as the "arid region," lying immediately east of the Rocky Mountains, owes its arid character to the operation of well-known meteorological laws.

Over that portion of the northern hemisphere lying between the parallels of 30° and 45° north latitude, embracing the arid region, the general movement of the atmosphere is from the west and south-west to the east and north-east. It is not necessary here to go into long explanatory details of the physical causes producing this prevailing direction of movement. The fact is well established. Any other motion is due to local disturbances and affects but a small area at any time.

The atmosphere, in its relation to the moisture it contains, may be likened to a sponge, and if we liken cold to pressure and warmth to relaxation of pressure, the simile is completed. Cold compresses the atmosphere, so to speak, squeezing out of it the moisture it contains. Warmth expands the atmosphere and increases its capacity for drinking up and holding moisture.

Now, the current of air blowing from the south-west as it passes over the Pacific Ocean drinks up a great deal of moisture and it arrives upon our western shores as a warm, moisture-laden wind. Were the topography of the country such as to admit of this air passing over our territory without changing its horizontal level, the moisture borne by the breezes would be deposited uniformly and with fair division over the land.

It, however, encounters the mountains, and striking their western slope is forced upwards. Temperature diminishes with altitude, and the current of air as it ascends meets with the "cold of elevation," condensation rapidly takes place, the air is "squeezed," and it parts with nearly all its moisture upon the summits of the ranges. After passing the crest the air descends the eastern slopes, a dry current. It is, moreover, falling into warmer regions, and with the increase of temperature its thirst for moisture increases and it will drink up all that is available and retain it until some region eastward is reached where the temperature is lower than that of the region lying immediately at the base of the eastern foot-hills.

It is simply folly to indulge in any hope that the "rain-belt" will ever visit the "arid regions" so long as the Rockies rear their tall crests. So long as these mountains stand, so long will the moisture-laden currents from the broad Pacific discharge their precious freight upon these mountain summits.

During the colder half of the year the moisture so deposited accumulates as snow and ice. The warmth of spring releases the bonds and ten thousand channels are suddenly called upon to convey the accumulated precipitation of six or seven months, with the inevitable results of floods more or less destructive in the lower and larger rivers.

There is no reason why the undesirable ills attendant upon these annual floods should not increase with the years. The flow of water in a channel is modified by the directness or tortuous character of its course.

It is a well known law of terrestial dynamics that a body on the earth's surface moving to the north or south has a strong inclination to deflect to the right hand of its course, but when moving east or west there is but slight tendency to such deviation; hence the sinuosities and bends of longitudinal rivers like the Mississippi. But in the case of the streams deriving their supply from the melted snows and rain-falls of the Rockies, their courses are mainly eastward, and the tendency is to a straightening of their channels, involving more rapid discharge of their waters and consequently more sudden floods.

The construction of mountain reservoirs would therefore be of vast benefit to other regions than those known as "arid." They would lessen the danger of "lower river floods" in proportion to their number and magnitude.

Besides, the waters taken from such reservoirs and applied to the arid regions for the purposes of irrigation, would be drank up by the thirsty air, and thus adding to its moisture render it more amenable to changing temperature, and cause a rain-fall very many miles nearer the Rockies than is now possible. The westward march of the much-prayed-for rain-belt can only be expected by such means.

Meteorology and other kindred branches of physical science are now so well understood that it is difficult to conceive how national law-makers can remain impassive to the importance of the subject presented in this paper.

The construction and maintenance of a comprehensive system of reservoirs at the foot of the eastern slope of the Rockies is of more value to the Mississippi states than to Colorado.

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# Adopt Pratical Methods.

BY HON. HENRY LEE.

The prosperity of Colorado and adjacent Territories depends on the future supply of water that can be used for irrigation. The question of the hour is not only how we can save and store water that is going to waste during the winter months, but how can we increase the supply streams, what can we do to keep a more steady flow during the summer months. The question of building reservoirs is perfectly practical and is within the knowledge of civil engineers as plain and simple, but to restore a stream that once flowed a large and abundant amount of water is a more difficult problem. Can this be done?

I think on many streams, where the ground and situation is favorable, it is not only feasable but can be accomplished at a small outlay of capital. Our largest streams head in the main range; the land on the headwaters of these streams should be vested in the State, the timber protected and when destroyed replanted.

Ditches could be taken out on each side of the stream as near the source or head as possible, and conducted as

high on the side of the mountain as grade will permit, the ground throughly saturated and filled with water. This being done during the winter months would form large bodies of ice on the surface; the flat land in the valley would be transferred into marsh or bog land.

This is simply nature's process, which we have obstructed by destroying the timber that formerly did this service for us.

When I settled in Jefferson county, twenty-three years ago, the annual rise in Clear creek commenced about July 1 and continued in August, and was about the same length of time in decreasing, making a full stream during the irrigation season. At the present time the annual rise occurs early in May and lasts but a few days, and is gone at the time it is needed the most.

By diverting the water at head of the streams during the winter months, as suggested above, we will partially restore nature's process; the ice and water thus stored will melt gradually and come down to the valley and plains in a steady flow, and will not diminish materially in supply until August. Such a flow as this would be an improvement over nature in a season like the present where the snow-fall is light. Evidence is everywhere attainable that this system could be readily practiced in connection with the building of artificial reservoirs.

### WHAT CAN BE SEEN.

Any resident on Clear creek, the Platte river, the Big Thompson and the Cache la Poudre can tell you that he has seen all the water taken from these streams at certain points, but going down the stream a few miles could again find flowing water. What is the reason? Why, simply stored water; seepage, if you choose to call it so, from the irrigation farms above. MR. NETTLETON, in his reports as State Engineer, calls attention to

this fact in regard to the Cache la Poudre river, and finds that it makes quite an increase in the lower part of the river.

I claim the same principle would apply in a greatly increased ratio in the head-waters of the streams from the amount of living springs it would create, many of them miles below the place of operations.

The ideas here suggested would not interfere with building a system of reservoirs in the mountains and plains, but would rather be an aid, for the reason that it would maintain a supply of running water in many streams that fail early in the season.

In building reservoirs many persons advocate building on the plains. In my opinion the idea is erroneous. On the plains the loss from evaporation is fully equal to one-half the water stored. The loss from seepage is a total loss, for the reason that being on the lowest ground it sinks, and if it ever appears again it must be so far to the eastward that it is forever lost to us.

On the other hand reservoirs in the mountains, being at an elevation much higher than the plains, the seepage will invariably find its way back to the mountain streams and be again available for our use; the evaporation even will not be lost, for being in the rain-belt will again condense and be of some benefit to the surrounding country.

These ideas are crude, but are the observations of twenty-three years in Colorado, and are here given with hesitation, but may perhaps lead to a more scientific investigation of the subject and in future to good results. If so, I shall have accomplished a little towards the solution of a very difficult problem.

# Reservoir Sites.

BY MR. THOMAS WITHERS.

Colorado, our own Colorado, has the mountains, has the plains, has the water, has the land. We have all the necessaries for a high state of civilization of our land, and for a high state of civilization of our people.

Productiveness of the soil and a healthy climate make a rich, progressive people. A kind Creator has especially blessed us by putting such ample means within our reach. Within the Platte water district some four times the average amount of water in the streams is appropriated or claimed already, but a small proportion of that claimed is actually used. The amount used could do five times the good it now does if judiciously used, and the question is to save all our water and to make it do the most good.

## HOW TO SAVE WATER.

First, we can make use of the means available to store water cheaply, and then gradually develop our facilities as we get more knowledge and more money.

A cheap means of retarding the flow of the mountain streams and of bringing the water down more gradually and later in the season is to commence in the fall and spread the water over smooth areas to freeze solid, at the greatest available altitudes, and on the slopes most protected from the sun, coming lower with our storage as the winter advances.

These bodies of ice will store quantities of water which otherwise would run off in the fall and winter to be more or less wasted.

The ice will melt gradually in spring and early summer and make our water come later, helping to prevent

the streams from flowing full for a short time and then suddenly lowering.

Not only do our parks offer us large areas for such storage, but also our more hilly country. Few streams are there which have not places at which the water could be easily diverted and turned over some smooth place to freeze, especially near their heads, where too, it will do the most good and not melt so soon. This kind of ice storage will also help the collecting of the waters below for natural or artificial reservoirs, as it will make the waters come slower and give more time, high water will last longer, and ditches need not be so large to carry the water to places for storing it.

After seeing what we can do in this way we can carefully commence at the heads of the streams and look for places where water can be stored economically.

At one place perhaps a small lake at a small expense can be made to hold several times its present capacity and be let off as desired, or a larger lake can be made, a larger reservoir at a larger expense. Many lakes are near the heads of our streams. Yes, hundreds of them in our State. Again, a dam may be built along a stream, which will hold considerable water, and be emptied at intervals. I know one being built now at the expense of a thousand dollars, to hold the waters of a dry gulch which the owner claims will be filled by floods several times a year, which several times full will irrigate his hundred acres; this is all he claims for it. He says that if he can water one hundred acres for one thousand dollars he is making a large return on his outlay. This man is the present County Surveyor of Douglas County, Mr. W. T. Lambert.

At places water may be cheaply led over some low sag to many a side gulch to hold it until needed; away from the main current with its sudden rises and with its

wash of sand and debris to fill up any hole in its course. Every reservoir must be drained, for unless it can be drained the water will gradually fill with sand and silt until a simple stream runs through it on solid ground.

A careful survey will tell how much water can be stored, at how much expense approximately enough to do for a beginning; but our larger works will develop themselves after we have once made a good start. These reservoirs can be let off as needed, commencing with the lower ones first and working up stream. Evaporation will be greater lower down, consequently water will keep longer higher up, so the higher reservoirs of water can be kept for the last of the season.

On the plains at places natural reservoirs occur, at other places artificial ones can be constructed; many have been so constructed which are only an earnest of what can be done in this way. There are depressions, however, which can be filled, but not emptied. It is one thing to run water into a hole in the ground, but another to empty that hole and use the water. Some natural depressions can be drained and some cannot, except at too great expense.

We can estimate the amount of water which flows in a stream per year, also estimate how much available reservoir capacity we find, subtract evaporation and infiltration from this amount of reservoir capacity and find approximately what proportion of the stream's flow we can store. If still there is waste, we can calculate the value of this waste, look for more reservoir capacity and see if it will pay to store more or all of the stream's water. Years will be required to arrive at an intelligent conclusion, for as time advances water and land will become more valuable and greater development of our reservoir system warranted.

### HOW TO DIVIDE WATER.

To divide this stored water fairly it seems plain to me that ditches must be common carriers. The supply must be furnished to the demand by intelligent officers of the State; for, suppose that private ditches have the right to take their appropriations whenever they choose, and that some reservoir is turned loose in the mountains, these private ditches may take all the water before it gets to the dry district for which it was intended. In short, there must be a general system for storing and delivering water.

After the earth or the soil has been irrigated it becomes a storage reservoir of itself, holding water for a longer or shorter period, according to the nature of the soil, letting the water seep out gradually, which in many instances may be used again and again.

We know that in a district which has been irrigated regularly for some time springs appear, gulches formerly dry run streams, beds of dry streams run water, and that less and less water is needed year by year to raise a crop. The earth absorbs this water and lets it out slowly, so that in or below an irrigated district the streams will show more regular water than if the water above had not been used for irrigation.

### PIG-IRON KELLEY'S OPINION.

The Hon. William Kelley, formerly Speaker of the House of National Representatives (Pig-iron Kelley, commonly called), said in the admirable address which he delivered at our Mining Exposition, that land required less water year by year until the fourth year, on which fourth year it required only one-quarter of the water needed for the first year. If he is correct our acreage of irrigation land will be extended continually by the saturation of the ground irrigated. This will be a means of adding a per cent. to our irrigated land.

BEYOND ANTICIPATION.

Mr. F. L. Dana got a letter from a Mr. Cole in which he says that we Colorado people have a country easily capable of supporting 100,000,000 people; that our wildest dreams of success in irrigation are mild compared with what can be accomplished. Surely, for he says that he knows, because he has tried it; has tried an irrigation which cost him $350 an acre, and it pays him beyond his brightest anticipation. He put in five acres of such and is calling himself foolish and weak-hearted for not putting in forty acres at first. He uses sub-irrigation, and writes to urge it on this convention. Sub-irrigation means irrigating below the soil from two to three feet, he says, in ditches solid on bottom, porous on top and sides, water seeping between stones laid along streams. Mr. Cole says that when this is rightly done it keeps frost out of the ground in winter, keeps ground cool in summer, and if water is warmer, ground will produce tropical vegetation, and crop after crop, as fast as it matures. He says that he got three crops of timothy, potatoes, etc., a year. Stored water must be worth more than the cost of storing it, else it is not worth the storing. If it is worth more than it cost to store it, then there is a profit in it. Hence if the State or the United States will advance money, or lend its credit to a judicious system of storing water, all the money so advanced or loaned will be returned, leaving no permanent investment of fixed capital to State or General Government.

IN OUR SWADDLING CLOTHES.

We consider ourselves an advanced people, especially we Westerners think ourselves a little ahead of any people up to this date developed by the Creator upon our planet, but as regards development of irrigation we are merely in our swaddling clothes. For instance, Babylonia, Susiana (in which province was Shushan, the pal-

ace of King Ahasuerus), the country around Nineveh; in fact, almost all of Mesopotamia (Messos, middle, and Potamos river,) that is the beautiful, fertile plain lying between the rivers Tigris and Euphrates, which rivers flowed by Babylon the Great Queen, with its hanging gardens, exquisitely lovely; by Bagdad, the Beautiful; by Nineveh, the Great, the Magnificent; by the houses of Sargou, Ahasuerus, Benhadad, Lennacherib, Nebuchadnezzar, Belshazzar, Cyrus, Darius,—barbarians, we call them—we, who call ourselves civilized, and whose largest ditches would not make common laterals for their canals. Imagine a ditch, just merely an irrigating ditch, 600 feet wide, 100 feet deep, 1,000 miles long, built by men's hands, at places hewed 300 feet deep and 600 feet wide through solid rock, cut nice and clean and removed, leaving a smooth, dressed channel teaming with the commerce and wealth of millions fed by it.

Great empires, millions of people, rich, prosperous progressive. Beautiful cities, large and grand, all living by irrigating ditches.

Very good for them, some one answers, for they had cheap labor. Cheap labor they had, but cheap products, too. Still it paid, as proven by the richness and numbers of the people. Whatever makes people rich and countries populous, pays.

Can we begin to realize what is before us in our land, more blessed than theirs, but very like it? Shall we, a civilized people, shrink from attempting what barbarians accomplished?

The answer is to come from Colorado through her people, whose representative are you gentlemen of this Storage Reservoir Convention.

# Reservoirs.

BY R. Q. TENNEY.

As the subject of reservoirs is prominently before the people of our State just at this time, it might not be out of place to present a few facts in connection with this subject which obtain in this immediate vicinity.

It is well known that there are, laying within the boundaries of townships 8, 9 and 10 north, and ranges 67, 68 and 69 west, which includes an area of three hundred and twenty-four square miles, numerous natural depressions which may be utilized for storage of water. The area of these several depressions, of which there are about twenty-five, will average about three thousand acres. The amount of water which may be drawn from these depressions will vary from ten to thirty feet. These depressions may all be filled from canals which are now constructed, viz: the North Poudre and Larimer County canals. Without discussing the truthfulness of the theory of how much land a foot in depth of water off an acre will irrigate, we will for the present admit that one foot in depth is equal to two irrigations. Upon this hypothesis we have the following solution: three thousand acres of water surface, when these reservoirs shall be full, would represent one thousand five hundred acres as the mean surface. Now, supposing twenty to be the mean number of feet that can be drawn from these reservoirs, we have thirty thousand acres of water one foot deep, or enough to irrigate thirty thousand acres of crops twice in one season. At the annual rental of $1.50 per acre we should have $45,000. But before we theorize any further, we will say that we are firm in the belief that

the State should be the owner of every canal of any size in it, and that it is only a question of time when this desideratum will be brought about. This $45,000 would pay seven per cent. on an investment of $640,000. State bonds secured on such collateral would be taken by capitalists as readily as Government bonds at three per cent. As a matter of fact the expense of putting this system of reservoirs in proper condition to warrant this revenue of $45,000 would hardly exceed that amount, ($45,000). By a greater expenditure in the matter of tunneling, the amount of water that could be drawn out would be doubled. The water stored could be delivered from these lakes to the Larimer County and Larimer and Weld canals, thus keeping up their supply at such times as they should need it, and putting them practically beyond the need of water from the river at certain seasons of the year. In accordance with the recent decision of our Supreme Court, the water which has been appropriated to these ditches could be run through the one taking its supply farthest up the stream, for at least nine months in the year, to fill these reservoirs. This could be done under State supervision and work no hardship upon those who have already become appropriators under the law as it now exists. Doubtless there are many places in the State where the same opportunity is presented that we see in this distance.

Here is an issue on which three of the largest corporations in this county might join and materially benefit each and all, but an undertaking of this magnitude could better be handled by the State, or better yet by the General Government. Our next Legislature will probably have an opportunity to wrestle with this problem of storage.

One object of this article is to provoke discussion and thus bring out different ideas, from which may be developed some feasible plan of operation.

## Water-Storage.

BY GEORGE W. HARRIMAN.

*Mr. Chairman and Gentlemen of the Convention:*

In response to a request from the chairman of the committee of the Real Estate Exchange, I have the honor to submit some ideas on water-storage.

You all know that I am a plain, blunt farmer, and have not attempted to clothe my paper with the flowery language which adorns the addresses made in the sessions of yesterday and last evening.

My knowledge of water-storage is dearly bought by experience. Some years ago, I located a ranch south of Bear creek in Jefferson county, in a section of country where every inch of water had been previously appropriated. This state of affairs forced me to make provision for storing up water, when it was running to waste, against a time of need.

### MR. HARRIMAN'S RESERVOIRS.

I built a reservoir, or rather an embankment, to hold water in a natural depression. As a matter of course mistakes were made in estimates of strength of earth embankments, but now we are satisfied that this work is strong enough to stand the water pressure. The Harriman lake covers one hundred acres and has an average depth of ten feet. Last year it furnished irrigation water for a thousand acres. Without this provision the land so watered would be only of use for

grazing, and twenty acres would be required to subsist a cow brute. Under this plan the land thus made valuable has an average value of $75 per acre, and supports a large population

On the same general plan, I established the Bergen system of reservoirs, two in number, covering about one hundred acres. All these lakes and reservoirs are filled from streams at times when the water is not needed for irrigation. The water thus stored is exposed to evaporation, when used for irrigation purposes, it seeps back to the streams from which it was taken, forms springs of pure water for domestic use, moisture for shrubbery and trees, and fills an important part in the economy of nature.

This land is now covered with bountiful crops, subsisting thousands of head of live stock, and maintaining hundreds of people, has been reclaimed by the application of the storage idea.

## THE BEST PLAN.

In regard to the construction of reservoirs, I am of the opinion that the best plan is to select depressions on the plains and conduct the water to them by open ditches, or a system of under-ground piping. For the latter purpose the finest water-pipe is manufactured at the Cambria works in Golden, utterly proof against the action of acids or alkali.

Having made a location and found where a water supply may be had, and whether the stored-up water can be used to advantage, plows, scrapers and teams can be used in building earth embankments. If bed-rock can be reached the work will be better done. If there is quicksand, I dig through it and use clay in the place of quicksand. On the land-side, I think the slope should be forty-five degrees, on the water-side a slope of six to

one. Iron head-gates should be provided and set in the bank and cribbed around, so that repairs can be made if needed. If rock can be had without too much expense the bank should be riprapped. Willows planted on the slope have a good effect in strengthening the bank. Straw and brush should be provided to be thrown on the surface during wind-storms, as the waves are reduced.

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# Reservoirs for the Storage of Water.

BY DANIEL E. PARKS, of Leadville.

*Mr. Chairman and Gentlemen of the Convention:*

The commerce of a Nation, internal and external, is the great source of its lasting prosperity, progress and power. Intercommunion of the people, and interchange of products and services, is the sure basis of human society. Subdivision 3, of Section 8, of Article I, of the National Constitution, says: "Congress shall have power to regulate commerce among the several States." This provision confers upon Congress power to regulate internal commerce, and its jurisdiction over our inland waters for that purpose is maintained by the ablest of our statesmen, and authoritatively adjudged and declared by the Supreme Court of the United States in a number of important cases through the greatest of its Judges, Chief Justices Marshall and Story. Says Judge Story: "The power to regulate commerce includes the power to regulate navigation among the States, and it is an exclusive power in Congress."

## THE DUTY OF CONGRESS.

If, then, Congress has exclusive power (as against the States), over the subject, it is its duty to have and con-

tinually exercise an abiding care for it, and all that pertains to it, for good, and not only develop and foster it, but secure to the people the free, sure, safe and unrestricted use of all navigable waters which afford the utilities of natural navigation within the bounds of the Republic, and recognizing such duty Congress has, for a number of years past, annually appropriated large sums of money, amounting in the aggregate, to many millions of dollars, for the improvement of such water-ways. If Congress, in the exercise of its power, may, as has been done, improve our inland waters by confining them to their natural courses with costly embankments, and by widening and deepening them, and removing from them at great cost of money, natural obstacles to their safe navigation, it may also go to the sources of all navigable streams that annually overflow and devastate the country below, and by storing the waters of such by a system of highland and mountain reservoirs, control and regulate the water-flow in the navigable part below; two results would thereby be achieved:

*First*—Safety to the people below from devastation.

*Second*—The aid which such surplus stored waters would afford to navigation in times of drouth.

Such a system of reservoir control of such waters would be as legitimate as the embankment and levee system, and could be constructed at much less expense. When once stored such waters could be had for the irrigation of Government as well as State and private lands, under such reasonable regulations as the General Government might prescribe.

The National Constitution also provides by subdivision of said section that "Congress shall have power to provide for the common defense and general welfare of the United States."

I take it that in providing for the common defense and general welfare of the Nation, Congress not only may, but should, improve by all means the capacity of our navigable inland waters, extending the channel of navigation through them to our great inland lakes by means of ship canals capable of floating our largest vessels of war, so that in times of war we could float our navy through our inland navigable waters from ocean to ocean.

Five hundred millions of dollars is not too much to be devoted to such necessary internal improvements, and at least $300,000,000 more should be appropriated to the building of an efficient navy.

## THE BENEFITS OF RESERVOIRS.

Congress also has power, under the general welfare clause of the Constitution, to conserve the interests of the United States, relative to its public lands, and may, I think, appropriate funds for the building of a reservoir system to that end. A reservoir system here in Colorado at the source of our great Continental streams, once constructed and in operation, would greatly enhance the value of all public lands, rendering lands now desert wastes for the want of water fertile and desirable additions to the general stability, wealth and progress of the Nation. The recent action of Congress relative to arid lands and reservoirs shows its appreciation of its power in the premises and betokens early action in that direction, and we are assembled to-day to stimulate, aid and expedite such action. But in my judgment the authority of Congress to control the surplus water of our navigable streams through the exercise of its power under the Constitution over internal commerce, is paramount to all others, and imposes a corresponding duty upon Congress to develop our internal commerce by assuring to the people, through a wise system of internal

water-way improvements, the cheaper modes of water transit, to protect them against the gigantic monopolies of land transporters, and render more certain the control of the Nation over its navigable waters by confining them within their natural bounds and preventing them from visiting devastation and death upon the people through whose possessions they flow. That obligation of duty is to my mind imperative, and wise statesmanship demands its faithful discharge.

The efficient performance of such duty will promote amity and intercommunion among the people, protect labor and insure a profitable and equitable interchange of all its products among its varied departments; restrict the dictatorial power of capital in fixing the value of such products in public barter and exchange; enable the comparatively poor and weak to compete successfully with the rich and strong, and enable the people generally to affirmatively solve the great question of self-support and self-advancement.

RAILWAYS AS A SUBSTITUTE.

As a substitute for natural navigation we are pointed to the interminable web of iron-ways, spread with magic rapidity and skill from river to lake, from lake to ocean and from sea to sea, and told that they are the genius of commerce; that they are the strong enduring bonds of national harmony.

The past and present alike disprove the audacious fallacy. The example is not extant where railroad facilities have superceded the utilities of a natural channel of intercourse. They are but auxiliary to transportation, while the greater bulk of commerce seeks the cheaper ways of water transit. These came not from the enterprise of man, however daring and praiseworthy. They will flow on with unflagging strength, fostering upon their broad bosoms the growing commerce of the Nation

when the proudest monuments of human genius shall have crumbled and fallen into decay. It will never occur that any systems of railways, however extended and magnificent, will meet the requirements of the Nation's commerce, and if such a system was devised, some tyrant of capital, combining all its power, might seize upon every channel of internal ingress and egress contained in the system, and in the absence of natural water transit mercilessly oppressed and tyranize over the people, holding them in a slavery as abject and grievous as ever despotism inflicted upon mankind.

The idea is repugnant to the obvious designs of Providence, whose omnipotence alone could create the needful instrumentalities for human intercourse and traffic. Commerce is at once the expression and instrument of civilization and human progress. It is man's instinct and man's necessity, and in the pursuit of these he is not left to the perishing agencies of his own invention. Nor must the unity of the States be left to depend for its preservation upon the brittle bands of railway communion. Aside from moral influences this union of States must be perpetuated, if at all, by the sublime combination of natural forces, seeming to express upon this continent a scheme of Divine Providence. It is these which speak divine lessons of fraternity and peace. If the eternal rivers winding their fraternal embrace around and through the proudest possessions, the richest interests, the most cherished hopes and dearest sympathies of the American people, shall not form an indissoluble bond of union, binding them to a common ambition and destiny; if the short but brilliant past, effulgent with the glories of mutual suffering and achievement and shedding upon the future an unequaled grandeur, shall not dispel all discord and domestic strife, this experiment of self-government will

speedily reach the fate of past republics. The unity of the people of this Nation, the consolidation of their business and the perpetuity of brotherhood and peace cannot be secured or aided by substituting artificial communication in the place of God's providence. Let us then place implicit reliance only upon our natural channels of commercial intercourse, develop, improve and protect them as becomes an intelligent and zealous people, and lasting tranquility and happiness shall be the heritage of a Nation of free men.

COLORADO LEADS.

Colorado, the youngest and brightest of the sisterhood of States; careering majestically in her ship of state on the *very crest* of the wave of national progress, is called to-day to inaugurate and lead the movement for the storage by the Nation of the surplus waters of its navigable streams to be utilized in navigation and irrigation. Let her speak on the subject in certain and emphatic tones, and let her actions to-day prove that only

"Westward the course of the empire takes its way,"

but that the genius of patriotism has followed the "*course of empire*" and crowned her with a crown of unfading glory.

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# Irrigation Reservoirs.

BY H. SCOVGALL.

On the practical subject of irrigation a few lines may not come amiss from one who has had ten years' experience in India, eight in Australia and the last three in Egypt, in connection with the irrigation branches of the public works departments of these countries, in ad-

dition to the inspection of many other hydraulic undertakings in other parts of the world.

During the last twenty years I have had, perhaps, more than the ordinary luck of men, in having visited and served in these various countries, and can include the inspection of the Vehar lake and water supply of the city of Bombay, the Bund in Poona, the Ganges irrigating canal, which is nearly one thousand miles in length, capacity from seven thousand to eight thousand feet per second, and irrigates over two millions of acres; the tanks in all parts of India, the largest of which is perhaps the Veeranum tank in the Madras presidency (covering about thirty-five square miles); the tanks of Aden, where it may only rain for a few minutes once in three or four years; the water supplies of Melbourne and Sidney, Ballarat and other cities in Australia and New Zealand; the lake in Kandy, Ceylon; the principal irrigating works and reservoirs in Italy and Spain; and last, though not least, the irrigation system of Egypt, now being so greatly improved and expanded under one of the best hydraulic engineers of the day, Colonel Scott Montcueff, R. E. When we take into consideration that the millions of people, both in India and Egypt, exist and have existed for thousands of years by the conservation of water and its careful use, can it be doubted that these people do not "know a thing or two" from which we (in this country with irrigation only in its infancy) could not learn something?

The laws which govern these matters in both these countries are most strict, and the necessity of such a course can well be understood when it is known that the uncertainty of the rains means not only financial success or ruin, but life or death to several millions of human beings.

In the year 1874, I served in the public works department in Tirhoot, in Lower Bengal, and during ten

months of that year we only had eight days' rain altogether, leaving the tanks, on which the natives were dependent for domestic and irrigation purposes, only half full; result—the great famine of that year during which hundreds of thousands died from starvation.

In Egypt, during the past four years, while assisting to keep the navigation of the Nile open between Assouan and Wadi Halfa, I did not see a drop of rain for two years and seven months. From these two great countries there is much to be learned on the conservation and careful distribution of water.

In India, it must be remembered, that although there are numerous irrigation canals, the great plains of Central India (where the rivers are dry the greatest part of the year) are mostly cultivated by water conserved in tanks caught off the surface during the big rains, which commence about the tenth of June and last only a few days, and although as a rule the small rains usually come later in the year, these tanks may not be replenished until June the following year.

In Egypt proper the system is different, there being little or no rain there, except on the Mediterranean coast line. This fertile land is dependent on the great Nile, which receives its water from the tropical rains of Central Africa, far above Khartoom, the junction of the Blue and White Nile. As the Nile rises the head-gates of the various canals are thrown open, and not closed till the time of high Nile, when at the slightest signs of falling they are closed, and the water thus inclosed in these canals is sufficient to last both for irrigation, navigation, domestic and, in fact, every purpose that fresh water is applied to, for twelve months. But the great secret of success is the control of these great water supplies, both in India and Egypt, in the careful distribution of the supply in accordance with what has been conserved, for

every year the Nile does not rise to the same level, nor is the rain sufficient for the demand in India—and this all important matter appears to me to be totally overlooked in this country. No attempt is made to control the lavish waste of water by the irrigation and ditch companies, and I am convinced that not only these two interested parties, but the State itself is a great looser thereby. However, we cannot expect everything to go right at first, but I am certain that within the next two years it will be found that the present estimate of water required to properly irrigate an acre of land in this State, viz: one cubic foot per second per fifty or sixty acres for one hundred days, or one inch per second per acre, will be reduced to at least one-half. The present allowance is the same that is allowed for the full irrigation of a crop of rice in the hottest part of India.

The question will now be asked, "How is this result to be brought about?" The present system appears to be simply to rush the water on to the land as soon as the irrigation season is supposed to commence. Little or no attention is paid to preparing the land by cutting main and lateral ditches. No judgment is shown in regulating the quantity of water turned on daily. Some days or weeks may be dry, with a scorching sun, while other days or weeks may be moist and humid. Unevenness of irrigation means unevenness of crop, whatever it may be. In irrigation, climate, soil, crop to be grown, rainfall, altitude, etc., must be all taken into consideration, but experience alone can show what amount of water different localities require.

Attention will have to be paid to the fact that the air let into the ground is as good a fertilizer as water, and that after two or three years' deep plowing and a proper rotation of crops (not as at present, potato after potato, and wheat after wheat), the greater part of the land in this State will require little or no irrigation. This has

already been proven around Greeley, where excellent crops of potatoes and wheat have been grown without irrigation, and in many parts of Germany land not nearly as good as we have around here has of late years been brought under cultivation by this careful study of the laws of nature.

Systematic farming is what is required here, and the great benefit of it will be discovered in time, but why not start at once? Alfalfa, with its deep roots, is an excellent crop to loosen the earth to a great depth and let the air in, but why scratch over the surface again and then run on water to fill up the pores so made? It only consolidates the surface of the ground worse than ever. Were this principle carried out I would guarantee that with less than half the present amount of water used, that equally good, if not better, crops will be raised throughout these Western States. These facts have been proven in the adjoining Territory of Utah, where as much as one hundred and fifty acres is being properly irrigated with one cubid foot per second. The same amount we use for fifty acres around here.

### TO DISCOURAGE WASTE.

To encourage the farmers and irrigators generally to study the duty of water, canal companies should supply the consumer with such water as he may require, and for that absolute amount only should he be compelled to pay. Then economy, not waste, would be the order of the day, and a marked increase in the duty of water the result.

Very few irrigators use the full amount of water their water rights entitle them to, and this is partly why ditch companies are, if properly managed, such good paying investments. Many ditch companies are actually selling more water than it is possible for them to

supply, were every water-right along their banks turned to its full extent. I feel certain that with a more careful distribution of the waters of the State, that the supply could be made to last farther into the autumn, and that the reservoir system will not be required to conserve such a large amount of water as some people seem to anticipate.

I cannot help thinking, after a year's residence in these Western States, besides repeated visits during the past twelve years, that in many cases money has been wasted in the first construction of many of the larger canals and ditches.

Too little attention has been paid to evenness of grade, form of cross-section; too much fall is generally given, and above all, in estimating the capacity of ditches, insufficient allowance has been made for friction in curves and different kinds of earth, gravel and rock, and the surface velocity, has in many instances been taken into account instead of the medium velocity, while little of no notice has been taken of seepage or evaporation. These observations were taken from some 100 registered ditches in Wyoming, and the north-eastern part of this State, and I found in nearly every case that each ditch was estimated to carry more than it really could. Substantial head-gates are absolutely necessary, and in many instances I notice that cheapness has been the order of the day—the greatest mistake imaginable, especially when dealing with hydraulics.

As regards the construction of reservoirs, no State possesses greater facilities for the construction of overshot masonary dams than in the Platte and other cañons. All that is required is money, which I have no doubt will be forthcoming, and if properly expended, and the water thus conserved carefully distributed, they cannot but prove a valuable investment for the State.

It is to be hoped that the most practical engineers of the State will have the handling of this matter, and that they will not be above seeking and taking advice from other parts of the world than the State of Colorado.

Should there be any schemes for the conservation of water in tanks on the plains, let these tanks be on the India and other hot country principle; viz: let their capacity be dependent on their depth, not their superficial area. The evaporation in a shallow tank in this country would be enormous. The pumping of water to higher levels has not yet been thought of here, but as an example of what can be done in this way, during the past three years in Egypt, the banks of several of the canals have been raised and water pumped up to several inches above the Nile level, and for every inch the water is thus raised some 10,000 acres of hitherto barren desert have been reached by the rich water of the Nile and are now leased by the "falla-heen," or cultivators of the soil, at rates that are helping to assist the treasury in paying off the great debt with which that unfortunate country is burdened. The absence of a standard unit of measurement of water in the laws of the State make it difficult for a stranger to understand how these matters have got along so far. The miners' inch and the old Italian standard inch are of no use in matters of irrigation. There remains nothing but the cubic foot per second, as used throughout the whole world, to become the unit of measurement here, and the sooner this is made law the better.

I notice in the local papers that the subject of fish culture in tanks and reservoirs has been made a subject for comment.

In India all tanks are leased from one, two and three years, and the revenue derived from this source is very great. In military stations it is estimated that the

repairs to barracks, parade grounds, watering of roads, recreation grounds, etc., can be maintained from this source of revenue. Fish will consume all vegetation, etc., as soon as it grows in water, and the tanks attached to cities and villages are annually re-stocked with spawn and fish for the purpose of keeping the water pure for drinking and bathing purposes, and there seems to be no reason why, in estimating the revenue to be derived from the resources of this State, this matter should not be taken into consideration.

## State Reservoirs.

The State Reservoir Convention, held at Denver Real Estate Exchange, March 15, 1888, passed the following preamble and resolutions:

WHEREAS, It has been conclusively demonstrated, not only in Colorado, but in the States and Territories of the Pacific Slope, if not throughout the world, that the giving to corporations and syndicates the control of the waters of a State, or the ditches, by means of which the waters are carried for public use, is inimical to the happiness and prosperity of a people and the growth and progress of a commonwealth; and,

WHEREAS, The people of Colorado cannot hope to obtain and enjoy the waters of the State as the State Constitution and the fundamental law of the land contemplate the people shall use and enjoy them, so long as the control of the water, or the distribution thereof, shall be given over to corporations and syndicates; therefore,

*Resolved*, That it is the sense of this Convention that all corporate and non-coöperative reservoirs and ditches for irrigation purposes within the State of Colorado should, as speedily as practicable, be reduced to State

ownership and control, and that the distribution of the water therefrom, among the people, should be equitably effected under the immediate supervision of the State at actual cost to the users.

*Resolved*, That the State Legislature, at its next session, be requested to enact such proper and just statutes making operative the law of eminent domain, as will with justice to all parties affected, enable the State of Colorado to resume the franchises, privileges and immunities which have heretofore been unwisely granted and delegated to irrigation companies.

*Resolved*, That it should be the future policy of this State to construct and operate its own ditches and reservoirs, to the end that the people shall have water at actual cost.

# Water.

A CONSIDERATION OF THE QUESTION OF IRRIGATION AND WATER SUPPLY.

My attention has been called to a column of your paper of Saturday last, headed "Farmers Demand Water." Now the question arises, Under what law can the "demand" be made in the hopes of getting a verdict? I enclose you a copy of the Cheyenne *Tribune*, which publishes a decision given by Judge MacGinnis in the District Court of that Territory on the subject of water rights. His decision is that "The riparian rights, as defined by the common law, have never been the law of this Territory; but that the custom of acquiring rights to water by appropriation and beneficial use is the only law we have governing the waters of the Territory." Now, will this ruling apply to Colorado? That the Legislature must take this matter in hand, and that at an early date, is absolutely necessary, and to that end the State Engineer of California has been called upon to

draw up a scheme and rules, from which it is expected the new laws will be framed. The last volume of Eugene Hall's report has lately been published, and is a most interesting volume, although it only contains the laws of Italy (Roman), Spain, Mexico and France, and a few remarks on the same. From these laws it is understood that the new code of laws for these states will be compiled. This volume can be obtained at the Government printing office, Sacramento.

Having been employed during the past fifteen years on hydraulic works in India, China, Burmah, Ceylon, Egypt and Australia, and having inspected most of the chief works of the world for supplying large cities with water, I naturally take note of similar undertakings wherever I go, and if my humble opinion is likely to benefit irrigators of the soil around here, I would draw their attention to the great waste of water going on (unknown or annoticed by most of them), and also the great want of storage room for water for use in the hottest months when the creeks cannot furnish enough.

Now, in my opinion, water is being wasted as follows:

*First*—By seepage.

*Second*—By evaporation.

*Third*—By rushing too much on the ground at the beginning of the irrigating season.

*Fourth*—By uneven distribution.

1. The loss by seepage is the most important, and this is caused by too much fall being given to nine ditches out of ten, the result being that the water is made to flow at too great a velocity. (V should not be less than two nor more than three and three-quarters feet per second, unless the material through which the channel is excavated is very hard.) Too great a velocity causes constant wearing away of the "wet perimeter," *i. e.*, the surface of the channel over which the water

flows; and this, so to speak, keeps open the "pores" of the earth and allows the water to disappear or soak into the ground instead of running smoothly on its course and emitting as much water (or nearly so; an evaparation and seepage to a small degree are always going on) as entered the ditch at its head. This is the great source of waste now going on all over this country, the mistaken idea being that this great velocity is necessary in order to obtain the desired amount of water. Such is not the case. To prove that it is not the fall that is necessary, the standard irrigation ditches used on the plains of India seldom exceed sixteen to eighteen inches fall per mile run. Thus, a ditch four and one-half feet deep, two feet wide at the bottom, with slopes in the sides of one to one, with only sixteen and one-half inches fall per mile, will deliver fifty cubic feet of water (six and one-quarter gallons to the cubic foot, three hundred and twelve and one-half gallons) per second, the velocity in this ditch being only two feet per second, the least velocity permitted. And again the largest size irrigation ditch is made one hundred and fifty feet wide at the bottom, nine and three-quarter feet depth of water, side slopes of one and one-half to one, but a fall of only thirteen and three-quarter inches per mile, and the velocity of water in the ditch will be the highest admissible, viz: three and three-quarter feet per second, and delivers six thousand cubic feet per second, thus proving that it is not the great fall per mile that is required, but the sectional area to be increased. On first ascertaining the number of acres to be irrigated, and having decided what amount of water is necessary, the sectional area of your ditch must be estimated, so as to give you the required amount of water without the velocity exceeding three and three-quarter feet per second. If this velocity is exceeded you will lose valuable water by "soakage," caused by "scour."

2. The loss by evaporation is always going on and is caused by either the heat of the sun or a rarified dry atmosphere, such as we have about here, but evaporation is greater in running water than still, and in calculating for the delivery of a certain quantity of water an allowance must be made for evaporation according to climate and surface area of ditch which will be exposed to the sun and air between the head of the ditch and its other end.

3. Rushing too much water on the land on which crops are to be sown at the early part of the season when water is plentiful. This is not irrigation; and it is a fact that the more water used on a crop at the early stage, the more will be wanted at the last or ripening stage, and this is the very time the creeks run dry and water is not obtainable, as at present is the case around Denver.

4. A ditch is designed to water evenly so many acres of ground; that is, each acre is to receive so many inches or parts of an inch of water per twenty-four hours for so many days. In India, a country dependent entirely on irrigation and conservation of water, the allowance for a rice crop is generally assumed (allowing for waste) one-half inch of water per day or twenty-four hours—1,815 cubic feet per acre, or 130,000 cubic feet per crop, thus allowing about seventy days' irrigation. Ordinary crops require only $\frac{12}{100}$ inches per twenty-four hours, and of course in this county, the heat not being so great, less will be required. These estimates are from ten years' personal practical experience in India and Ceylon, and are from the public water standard as at present adopted in Bengal. As regards the proposed new irrigation laws now under consideration, I am of opinion that the rights of riparian owners will be respected, and that ditch companies and others not riparian owners will be compelled to construct

reservoirs and conserve water, and will only be allowed to run water out of the creeks at such season of the year as water is plentiful, in order not to interfere materially with the natural flow of the creeks or rivers in the summer season, and I feel confident that many of the cañons around Denver and other cities in Colorado will, within the next few years, be dammed up and formed into reservoirs. This means a little expense in the first outlay, but when it is taken into consideration that the crops of grain, fruits, etc., will be insured against drought, this will be found to be money well laid out.

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# How to Plant an Orchard.

BY DR. ALEXANDER SHAW.

For the last four consecutive seasons I have made a tour of inspection of the State of Colorado for about six weeks for the express purpose of being able to respond to this inquiry, not only as to north, but also to the south. The State is a State of magnificent distances, in range of area from north to south about three hundred miles. The area of the State east of the Rocky Mountain range is about forty-seven thousand square miles, aggregating about thirty million and eighty thousand acres. Altitude does not limit the possibility of apple growing. I have found the Ben Davis and Oldenberg apple growing at an altitude of near eight thousand feet, also at four thousand five hundred feet, all seemingly alike matured.

The meteorological influences necessary to grow fruit are not governed by altitude alone, but the contour of the ground and surroundings play an important part.

The era of fruit growing in Colorado dates back to about twenty-four years. William Lee of Jefferson county, near Clear creek, is probably the pioneer fruit culturist of Colorado. He hauled his first stock by mule team in 1863 from Iowa City, Iowa; 1866 was the date of the next fruit growers' venture. George Webster, M. L. McCaslin, and others in the St. Vrain valley, purchased their stock from the Atchison nursery, Kansas, which were hauled by ox teams. About the same time Jesse Frazer, of Florence, Fremont county, hauled his first stock by ox team from Quincy, Ill. Frazer has been pre-eminently the most successful apple grower in the State, having the largest plantation of aged trees in the State, being about three thousand trees, which produced a crop of about ten thousand bushels for the year 1886. Plummer, Garrett and McClelland are the pioneers of the Fort Collins neighborhood. From the several points as above named have radiated fruit planting with a varied success. There is no meteorological cause preventive of fruit culture in Colorado but what is found in any of the States east of us.

The weather records of the Government show less extremes of heat and cold and more bright sunshine days in Colorado than any other State of the Union. The mean line of temperature, as indicated by our signal stations, from north to south, passes through Denver. As to climatic causes preventive of fruit growing, we are favorably situated. At the present date, fruit growing has been tested successfully over an area from north to south of about five hundred miles. Each locality within that area has its off years, with more or less success. Jefferson, Boulder and Fremont have been testing fruit culture, both as to the small and tree fruits, for over twenty years, yet one has had its barren years from climatic causes as often as the other. For instance, one orchard of aged trees for the year 1886, at Cañon City,

failed, while in the Longmont neighborhood they were pre-eminently a success, yet for the current year of 1887 the fruitfulness was reversed. Frazer's orchard in 1886 produced 10,000 bushels, yet in 1887 had not more than fifty bushels. With the conditions precedent to successfull fruit growing, such as water, at command, the right kind of soil, proper cares and culture, I known no reason why fruit growing in northern Colorado cannot be as successfully done as in the southern counties, except some of the stone fruits, such as peaches, apricots, nectarines, and some of the tender varieties of cherries and possibly plums.

The better varieties of plums and cherries in northern Colorado are at present on probation. Pears in all sections of the State, at proper age, are a success, and I know no reason why they should not rank with apples as a success. The home of the stone fruits, as above named, in Colorado, will be in the extreme south and in valleys west of the Rocky Mountain range, on the tributaries of the Gunnison and Grand rivers. The fruit bonanza of the State in prospect is the 12,000 peach tree orchard of Rose Bros. & Hughes, about eight miles below Grand Junction. Coffman, Penistan & Sharpshire, at Whitewater station, have peach trees in bearing amounting to several thousand. It is possible that peach trains, in the near future, will run from western Colorado, as well as Salt Lake. The altitude (4,500 feet) and conditions of peach growing are about the same. Hon. S. Wade is making a success of peach, apricot and nectarine growing, at Paonia, north fork of the Gunnison. The altitude at Paonia is about the same as Denver, but the peculiar surroundings give it an adaptation to the growth of these kinds of stone fruits.

The successful fruit culturist of any country must study and practice the conditions precedent to success

in his own locality. At all points where water is at command and soil appropriate, small fruits succeed, and, as a rule, tree fruits are equally a success where proper selections, as to kinds, are made. The greatest bar to success in Colorado is our May frosts. Early bloomers, as a rule, should be avoided. The crab family of apples are more uncertain than standards, on account of precocious blooming. In my observations in fruit culture in Colorado, I have been most interested in apple and pear culture.

I have noted about two hundred varieties of apples and thirty-one of pears. I here make a note. As a rule I know of no country that will grow and mature good wheat and a Hubbard squash that will not make a good apple country. If this notation be true as applied to Colorado, then has the possibility of apple culture, from the extreme northern to the southern line, been established beyond any doubt.

The apple is the king of fruits and numbers more kinds than any known fruit—probably three thousand. The question of numbers of varieties is not one of interest to us as a society, as the question of what is best to select so as to succeed in kinds that will give a succession of fruits, giving quantity, quality and profit. To get this question in a practical form, apple orchard culture shall be my topic, and I invite your criticisms that I may correct my errors. As a starting point I make a special note of an error practiced throughout the State in orchard planting, and that is too close planting.

In a majority of the orchards of the State that I have seen trees are not more than fifteen feet apart, and some even twelve. I have not met a man whose orchard is ten years old and twelve feet apart but would prefer thirty. In this connection there is another error to be

regretted, and that is to encumber an apple orchard with small fruits, such as currants, gooseberries, blackberries and raspberries. The ground should be dedicated to trees alone and they not closer than thirty by thirty feet, and as a general rule five feet from the ground is about right to form the head, and all limbs below that point should be removed. For best success in getting a young tree in shape, remove a limb entire rather than cut back. Trees set thirty by thirty feet will require fifty to the acre. I can best give you the details of orchard planting by giving you the reasons governing me in making the selections and arrangement of planting my own orchard, guided by the light of what I have seen demonstrated by the success of others in different parts of Colorado. I have made no selections of any kind I have not seen fruited and grown in a healthy condition.

### MODEL ORCHARD PLANTING.

My orchard grounds contain ten acres in a square farm. I have planted as a wind-brake black locust, thirty feet apart, on the outer line of the grounds. On the north and west lines I have set, fifteen feet apart, three varieties of the best native plums I could get. The line of plum trees alternate the space between the locust trees, and are set so as to give fifteen feet to the first row of apple trees. The habits of growth of the locust and plum trees are low-headed, and for this reason I conclude will make a good wind-brake. This arrangement leaves space for setting twenty-one rows, thirty feet apart running east and west, and twenty rows north and south, aggregating four hundred and forty-three apple trees. I have made my selection of trees so as to give me a succession of fruit the year round, of winter, fall and summer varieties. As the most profitable kinds I note them in the following order: Winter long-keepers

first, fall second, and summer third. In locating my trees I have arranged so as to have the hardier varieties north of the more tender, but in no instance have I named a tree I have not seen bear fruit and do well in Colorado.

CHOOSING VARIETIES.

I come to the choice of kinds and give the reasons for my choice. You will note I have said above that I have planted four hundred and forty-three trees, and I note on my plat the first six rows on the north side of my orchard are Ben Davis, aggregating one hundred and twenty-six trees, out of the whole number of winter varieties—two hundred and twenty-one. Why this partiality? Ben Davis has more vigor of constitution, hardy qualities, and comes nearer being a sure-pop apple than any grown in Colorado, keeps longer, looks well, prolific in bearing, and brings more dollars to the tree. The next trees in the iron-clad line are three rows of of the Wealthy, aggregating sixty-three trees. This number of early winter or fall variety would seem to be an excess of other fall varieties, but its vigor of growth, beauty of shape and color, early and prolific bearing, makes it the peer of the Ben Davis for popular favor. The fruit is of good size, will do for cooking when half grown, and in Colorado is the hardiest of the hardy, and may be said to be the tree for the million. This is a tree that has come to stay with us, although in Minnesota, Wisconsin, Iowa, and most States east and north of us, the frosts of the winters has made it lose its standing as an iron-clad, but the pre-eminence of Colorado climate makes the Wealthy at home with us. As yet, we are not under the necessity of going to Russia for iron-clads. In the tenth row on my plat I note ten Wolf River and ten Pewaukee. These hardy sorts of winter apples originated in northern Wisconsin, in Wapaca county, on Wolf river; William Springer grew the Wolf River first,

as a seedling, about thirty-four years ago, and Mr. Pefer, of Pewaukee, grew the Pewaukee at a later date. These two noted iron-clads held their places as iron-clads until the last four or five winters. They are now said to be at a discount in the States above referred to. So far as Colorado is concerned, they show no signs of failure. The trees are good growers, fruit well, and are large and prolific bearers. The Wolf River is especially beautiful in color, bright red, splashed with a bright cream color; quality good, cooks well, and above medium in size; is ranked in the line of succession as an early winter apple. Pewaukee is large in size, as a rule is not a long keeper. On my plat the eleventh row contains three old winter sorts, five Winesaps, eight Wagoners and eight Walbridge. In Colorado I have noted the Winesap is not as vigorous a grower as any one of the sorts above named, but its keeping qualities, and flavor and red color commend it as well worthy of culture. The Wagoner is a beautiful winter kind, a fair grower and a good keeper, a brilliant red, and fair bearer. The Walbridge, for vigor of growth and prolific bearer, is allied to the Ben Davis and long keeping good. Row No. 12 contains two number one winter sorts, Missouri Pippin No. 13 and Baldwin No. 8. Missouri Pippin for a hardy, prolific quality is the peer of Ben Davis. The Baldwin is an old-time sort and is not much on cultivation in our State and is thought by some of weak growth, but its superior quality is its chief merit. Row No. 13 contains two winter-sweet kinds, Bailey Sweet No. 10 and Tallman's Sweet No. 10. Bailey Sweet is a fair keeper, an excellent dessert apple, dark red in color, tree hardy and vigorous, upright grower. Tallman Sweet is a long keeper, sure bearer, and first-class for baking. Row No. 14 contains twenty-one Isham Sweets, a No. 1 winter-sweet, large dull red, fine grower, sure bearer, and among the best of dessert apples. Row

No. 15 contains five Jenets, five Whitney No. 20, and ten Grimes' Golden. Jenet is a winter sort, long keeper, and in its season of fine flavor; tree is hardy and prolific bearer. Whitney No. 20 is an early summer apple, good, upright bearer, fruits at an early age; it is a poor keeper, but is a vigorous grower. Grimes' Golden is a fall variety, golden color, large size; tree a good upright grower, good bearer, and a fine dessert apple. Row No. 16 contains twenty White Bellflowers. This is a hardy fall variety, good bearer, white in color, and a fair dessert apple. Row No. 17, I have twenty Maiden's Blush. The propriety of planting this beautiful fall kind admits of some controversy. It has faded away in most of the States east of us.

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[From the Prairie Farmer.]

# Agricultural Resources.

PRODUCTIVE SOIL IN COLORADO THAT MAY BE IRRIGATED—A SOURCE OF STATE WEALTH THAT IS NOT RIGHTLY APPRECIATED—OPINION OF A COMPETENT EXPERT.

If all the farmers in the entire country east of the Mississippi and Missouri rivers to the seaboard, and in Arkansas, in much of Texas, Kansas and Nebraska, should take a trip to the Pacific coast by one of the railway routes through Colorado, and back by another route, unaccompanied by any one understanding the matter, at least nine out of every ten of them would pronounce Colorado utterly unworthy of any claim to be called a rich agricultural State, either in the present or future. They would think of it as mainly made up of mountains and barren plains and valleys. They would ridicule the idea that there are in Colorado almost as many cultivated acres of highly fertile land as there are in the two great States of New York and Pennsylvania.

Let us see about this. During the last two years the *Prairie Farmer* has shown that the most successful and sure farming is on a soil rich in the needed mineral elements, without much rain-fall, but which can be irrigated at pleasure. On such land the cultivator makes his own weather, so to speak. He fears no soaking rains to rot the seed, or keep back his crops, in spring or summer, or drown them out before, during or after harvest. He is equally independent of dry weather or droughts. When the heavens do not send down moisture enough, he simply opens his irrigating ditches and applies just what water is needed, and just where it will do the most good.

Of the essential mineral elements in the soil, there is seldom any large percentage anywhere. These elements are mainly soluble, and in all regions subject to an average rain-fall, they have been during thousands of years largely washed out by the rains and carried into the streams and thence into the ocean. But in the more arid regions, the soils made by the wearing down and disintegration of rocks (which is the way all soils are made, excepting mucky ones) have not been washed. The original elements—that is, the important alkalies and phosphates, etc., still remain in great abundance for the wants of full crops for hundreds of thousands of years to come.

In the rain-supplied regions these more valuable elements have been so washed out in the long-passed ages that only a small percentage of them remain, even when they are taken for cultivation by the first settlers, and this small portion is exhausted by a few years of cropping, when they must be renewed by artifical fertilizers, except in a very few localities subject to the annual overflow of waters bringing in new materials, or the crops will soon deteriorate. This does not happen in the arid regions. The water supplied by irrigation is all that is needed to make these virgin mineral-rich

soils yield great crops of almost all kinds that the climate will allow to grow. The original native supplies of unwashed-out fertility are enough for several generations.

We have given numerous illistrations in the *Prairie Farmer*. Right in the midst of these ashy plains, so barren that the natural herbage on twenty acres would not support a single steer, we have seen and described immense fields bearing all the wheat, oats, potatoes, timothy, alfalfa, etc., that could stand upon the surface, all in the most healthy vigor and turning out harvests which in amount and quality would astonish an Illinois or Ohio farmer. All this comes from simply turning water upon them two or three times in the summer.

The above was suggested by happining upon a memorandum which had got misplaced, containing some notes and figures written down while we were spending a little time last summer with Civil Engineer Walter H. Graves, who was formerly engaged for some time as topographer with the Government geological survey of the Colorado and adjacent Territory. To our question: "How much land is there in Colorado probably subject to irrigation?" he gave us the following from his carefully prepared note-book:

IRRIGABLE LAND IN COLORADO ACCESSIBLE TO WATER.

| LANDS. | Square miles. | Acres. |
|---|---|---|
| San Louis Valley | 3,096 | 1,981,440 |
| South-western | 1,080 | 691,200 |
| Western Colorado (Grand River Valley) | 360 | 239,400 |
| West-central Colorado (the Gunnison and Uncompaghre Valleys, etc.) | 720 | 460,800 |
| North-western Colorado (valleys of the Yampa, Bear, White, and other rivers) | 1,980 | 1,267,200 |
| North-central Colorado (valleys of Upper Grand, North Platte and other rivers) | 576 | 368,640 |
| Central Colorado (Grand Parks, Upper Arkansas, etc.) | 720 | 460,800 |
| In sundry small areas | 3,600 | 2,304,000 |
| East of the mountains | 41,868 | 26,795,520 |
| Total irrigable lands | 54,000 | 34,560,000 |

Colorado contains 104,500 square miles, or 66,880,000 acres. The two great States of New York and Pennsylvania together contain 93,000 square miles, or 59,520,000 acres. But a large part of north-eastern, east-central and southern portions of New York State, and much of central, western and south-western Pennsylvania, are mountainous regions, unfit for the plow. The mountains in these States are not covered with large, deep bodies of snow which remain to melt during the summer and send down abundant irrigable streams, as is the case in Colorado. So it is probably not an over-estimate to predict that in time, not far off either, Colorado will have almost as many acres of *cultivated* crops, as New York and Pennsylvania together. It mainly needs that the General Government should use some of its abundant surplus in providing sufficient reservoirs to collect the now wasted mountain waters and hold them until needed, and then for cultivators to carry out the system of irrigation now so rapidly developing. Large areas are already supplied independently of reservoirs, as they have a sufficiency of water in the streams coming down naturally. The above striking illustrations are based upon Engineer Graves' figures about the amount of land capable of irrigation. Whether there will be water enough to irrigate all this, so situated that it can be brought upon it, may be questioned; but if we suppose only half of that to be capable of easy irrigation, the figures will be a matter of no little astonishment to most people in our whole country.

# PROCEEDINGS

OF THE

# ANNUAL MEETING

OF THE

# NORTHERN COLORADO

## HORTICULTURAL SOCIETY,

HELD AT

BOULDER, DECEMBER 8, 9 AND 10, 1886.

In accordance with a resolution passed at the last annual meeting, held at Greeley, the Society convened at Boulder on the above mentioned date.

Appropriate rooms were secured in the County Court House, through the courtesy of the Commissioners, and the meeting was called to order by President FAUROT at at 10 o'clock a. m.

Much pains had been taken in making a fine display of fruits and vegetables, blooming and foliage plants, by President FAUROT, BRIERLY and HUBBARD.

Minutes of the previous meeting were read and approved.

The delegates and members were welcomed to Boulder by DR. BRACE, Mayor of Boulder, in the following very appropriate address, which was responded to by President C. S. FAUROT:

*Mr. President, Ladies and Gentlemen:*

If I were to name one blessing chief among the blessings of mankind, I should say it was health. If I should name one pursuit chief among the pursuits of mankind to attain that blessing, I should say it was horticulture. Nor do the blessings or the pursuit stop with the horticulturist. The fruits of his labor go out to gladden the hearts of the poor and rich alike, in health and disease, through the marts of the world. Some one has said that "on the table can be found the cause and the cure of every disease." But, I opine, that without your labor, but few would be cured. The delight of a pursuit that makes every barren field a garden, every weed a flower, and every tree to bear fruit, have a refining influence on the moral character of the man, second in importance only to his physical welfare. Among the early recollections of most of us will be found visions of the old orchard around which clusters the memory of home in the land of plenty.

Nature has blessed Colorado. The mountains on the west, like a great fleet of ships, their broad white sails gleaming in the sun, are anchored at our feet unloading their cargoes of silver and gold. Already to the east the Great American Desert is growing smaller, homes everywhere dot the plains, and they begin to bloom. I trust the day is not far distant when every boy raised on a farm in Colorado, grown to manhood and ready to leave in quest of fame and fortune the house where he was born, will carry not only the memory of a mother's blessing, but also the picture of a bright and beautiful home, where the apple tree blossoms in the spring and the vine hangs purple in the fall. A prophetic eye would to-day, from one of these mountain peaks, look out over these plains in every direction as far as human vision was possible, and see the green, and red, and yel-

low, the golden harvest burdening the earth, and the green pastures showing through the red autumn leaves; nor is this all; here and there the smoke of many factories is rising in the light air. Where to-day only hundreds live on the scanty products of the earth, the industries of a section, then thousands will live on the bountiful products of the earth, and the great industries at our doors. No reason exists why this should not become true. The opportunity and the raw material is here. A little time and the natural energy of the people of Colorado will make this one of the greatest States of the Union. This portion of the earth will surely be subdued by the genius of man, and compelled to give up her treasures for the comfort and happiness of mankind. When that crown to this great State shall be completed, there will shine no brighter gem than the one placed there by your hands, and chief among the blessings will be the fruits of your labor. You meet to-day knowing that your toil is being rewarded, that you are fulfilling your destiny. No more fitting place could be found for this meeting. No place where your labors already show such good results. No place where you could receive a warmer greeting than in the beautiful city of Boulder.

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Reply of President FAUROT to Mayor BRACE at the meeting of the Northern Colorado Horticutural Society:

*Mayor Brace, Ladies and Gentlemen:*

It is a source of gratification to me to have the honor of returning to you the sincere thanks of the Northern Colorado Horticultural Society for your kind words of welcome that you have offered to us at this time, and I can assure you that we appreciate them, for we know that they are not mere words of the mouth, but that they come from the heart, as your generosity and kindness is well attested to by the grand banquet that you have in store for the members of this society and their

invited guests. It shows to us, Mr. Mayor, that the people of Boulder City appreciate the grand work that is being done by the horticulturists of this State in advancing the interests of Colorado, and the people of Boulder City and of Boulder county should be proud (and justly so) of their fine fruit orchards and vineyards, and their fields of small fruits, for they are the banner county of this great State as a fruit-producing county, and this grand display of fruit before us at this time will bear me out in the assertion. Look back over the history of Colorado for a space of twenty years, if you please, and note the rapid advancement that the people of Colorado have made. At that time we had no fruit, and every one was ready to denounce fruit culture as a failure. But, thanks to a few noble and energetic men who were not willing to give up at one or two falures, but kept on until it is a demonstrated fact that Colorado is and will be in the near future one of the leading fruit-producing States of the Union, and with our manifold industries we can stand at the head of as a great and prosperous State, and the horticulturist and farmer are in hopes to be able to aid in developing the interests of Colorado. The mission of all the horticultural societies is, as you all know, more to develop fruit growing. It is an educator, and we claim for horticulture not only a place, but the first place. It is our aim to so educate the people that they will take some interest in building their district and public school-houses so that they will be pleasant and attractive to our boys and girls, and have them surrounded with shade and ornamental trees, and the grounds covered with a coat of luxuriant grass and decorated with flower beds. If you want a boy or girl to love their books and be loving and kind to their schoolmates, teach them to study nature and to appreciate the beauties found therein. Take the boy or the girl that loves nature, and they are the ones that make the

good and noble men and women of our Nation. I hope the day is not far distant when the works of horticulture, floriculture and agriculture will be introduced into our public schools. I say horticulture. What is horticulture? It is gardening. Gardening of every kind. It is the planting of forests on our broad plains; it is the planting of shade trees that adorn the streets of our cities; the planting of trees along our roadsides; the planting of orchards, vineyards and all our small fruits; the growing and harvesting of the fruits; and more than that, it is the attending of the little and fragrant flower that shall make glad the home of the poor man, or adorn the costliest or most gorgeous green-house filled with its exotics. Make the homes of the people of Colorado happy and beautiful. You cannot have a true home unless you have about it the fruits and flower beds. If we try to make the home beautiful and attractive for our boys and girls, they will be content and will not wish to leave the home of their childhood, and we will in this way keep our boys from the saloons and gambling holes that are so numerous in almost every town throughout the State; and this, Mr. Mayor, is the mission of the horticultural societies of this State. Is there one before me that has left a beautiful and attractive home, be it ever so humble, but that can look back with joy to those happy childhood days, and long for the time when we can go to those places that are so near and dear to us in memory. It is at the home of our childhood that we are taught by our kind and loving mother those grand principles that make us good and noble men and women. Show me the boy or girl that has been brought up amidst the fruit orchards, and with a home surrounded with flowers, and I will show you a strong, healthy and manly man, and a good and noble woman. It is to the farm that we must look for our men and women of brains and intellect. You will not find them among

the fashionable, educated boys and girls of our cities. Take, if you please, the men and women that settled Colorado, and who were they? They were the farmers. As they sifted the seeds of the Old World that they might have something pure and clean to plant on the virgin soil of America, so it is with those that have come to Colorado to make homes for themselves and their families. They have been sifted from all classes and from all parts of the Union. They are the choicest men and women. We have as proof of this our grand school-houses. There is none better, go where you may, and the finest buildings are our school-houses. Who brought this about? Was it the great monopolies? No, not by any means. It was the sturdy farmer—the advance guard of civilization, if you please —on whom the honors may rest.

"The king may rule o'er land and sea,
The lords may live right royally;
The soldier ride in pomp and pride;
The sailor roam o'er ocean wide;
But this or that, what e'er befalls,
The farmer he must feed them all."

The farmers and the horticulturists are the ones that make the great and prosperous country, and they should be the law-making people. It is a great measure their own fault that they are not. They allow others to dictate to them who shall be their law-makers, and it is, I am sorry to say, many times men that know but little about the wants of the farmer. Let the farmer spend a little more of his time reading, and he will make a more successful farmer. He will be more self-reliant, and will not be compelled to rely upon his neighbors for his knowledge. When he goes to the polls to cast his vote he will do it with more intelligence.

Again, Mr. Mayor, ladies and gentlemen, we thank you for your kind words of welcome, and trust that our

stay with you, though it be a short one, may be of some benefit to you as well as to ourselves.

The address was followed by the Secretary's report, which was principally made up by a review of the annual meeting held at Greeley one year ago.

DR. ALEXANDER SHAW then presented the following paper on:

# Apples of Colorado.

BY DR. ALEXANDER SHAW.

The possibilities of Colorado's future as to apple culture is but faintly conceived by those whose education has taught them to regard it as a portion of the late American desert. Capital and enterprise have done much within the last decade to dissipate this desert idea. The wanted supply of water has come to our relief. A rich soil, with all the elements of plant-food, is truly a desert without water. So far as the scope of apple culture in the future of Colorado is concerned, it will be bounded only by an extreme altitude and water supply. There are no meteorological influences not common to other States where apples are grown that will bar our success. In this connection some idea of the reclaimation of this vast desert waste may be had by reading the following extract from a paper read before the Society of Engineers, in Denver, June, 1886, by Walter H. Graves:

"The entire channel system of Colorado embraces something over eight hundred miles of large size canal completed, and about one hundred and fifty miles projected and in contemplation, and about three thousand five hundred miles of canal of secondary size. Of the extent of the tertiary or distributing system, it is im-

possible to form any idea, but it may be within reason to estimate it at forty thousand miles. The large canals have cost in construction about five million dollars, the smaller canals about three millions, and the entire system from ten to twelve millions. The total area of land that can be supplied by these canals is about two million two hundred thousand acres. The total area of arable land is about twenty-six millions of acres. The present population is about two hundred and twenty-five thousand. Thus it is readily seen that Colorado has ample facilities for four or five times her present population, and everybody is invited to come and try their luck."

## HISTORICAL NOTES.

For the past seven years I have made the possibility of Colorado becoming a fruit-growing State a study, and for the purpose of demonstrating the fact I have three times traveled over the fruit-growing portions of the State. The first time I saw (1883) about ten bearing orchards, and collected for the exposition of 1883, about seventy-five varieties of apples, twenty-one of pears, and thirty-one of grapes. Among the incredulous this collection was quite a surprise. In 1884, I made a collection of applies, one hundred varieties, from seventeen different orchards, for the World's Fair at New Orleans. The collection was quite a matter of interest among the many eminent horticulturists in attendance, as particularly of interest, being grown by irrigation and raised at a higher altitude than any other on exhibition. The current year I made a more extended visit—about fifty orchards—and resulted in the collection of about one hundred and fifty varieties, the samples of which are here before you on these tables. I have been particular to give each producer, locality and variety, expressly to show that the fruit-belt of the State is not found in any given locality. It obtains as much in the St. Vrain Valley as in the Arkansas Val-

ley. The home of the apple is as much in one part of the State as another, where the conditions of soil, altitude and water are right. A careless, indifferent grower is a failure with apple culture in any country or any locality, however propitious it may be. The price of fruit means labor, attention and care, as demonstrated by the samples on our tables. I will here refer to the list with such oral comments as I may make:

FRUITS AT THE EXPOSITION.

MR. JESSE FRAZER, of Florence, Fremont county, had of apples sixty-four varieties, consisting of Ben Davis, Perry Russet, Winesap, Benoni, Colorado Orange, Pennock, King of Tompkins County, Missouri Pippin, Northern Sweet, Willow Twig, Large Romanite, Frazer's Seedling, Vandever Pippin, Sweet Pear, Sweet Romanite, Winter Sweet, Rambo, Russet, Jeffries, Roxbury Russet, Jonathan, Fameuse or Snow apple, Bailey's Sweet, Bellflower, Striped Gilliflower, Lowell, Keswic Codlin, Ladyfinger, Autumn Strawberry, Jennet. Besides these there were thirteen varieties not named, and eleven varieties of seedlings not named. MR. FRAZER also had of pears eight varieties, consisting of Louisa Bond D'Jersey, Winter, Duchess, Sugar, Flemish Beauty, and three varieties not named. Orchard, three thousand trees, ranging from three to eight years; two thousand in bearing. Crop for 1886, about ten thousand bushels.

MR. J. A. MCCANDLESS, of Florence, Fremont county, had of apples twenty-five varieties, consisting of Winesap, Northern Spy, Bellflower, Bailey Sweet, Tallman Sweet, Little Romanite, Jonathan, White Winter, Pearmain, Fall Orange, Fameuse, Jennet, Wagoner, Pippin, Ben Davis, Large Romanite, Maiden's Blush, Perry Russet, and eight varieties not named. MR. MCCAND-

LESS has two varieties of pears not named. Orchard, four hundred trees, aged six to eighteen years; crop, 1886, about six hundred bushels.

MR. GEORGE MCINTOSH, of Hygiene, Boulder county, had of apples sixteen varieties, consisting of Ben Davis, Willow Twig, Plum Cider, Blue Pearmain, Fall Stripe, Walbridge, Little Romanite, Sweet Pear, Haas, Tallman Sweet, Jennet, Pewaukee, Rhode Island Greening, Perry Russet, Roxbury Russet, and one not named. Orchard, seven hundred trees, from six to eight years old; yield seven hundred bushels for 1886.

MR. J. W. GOSS, of Hygiene, Boulder county, had of apples five varieties, consisting of Tallman Sweet, Ben Davis, Walbridge, Pewaukee and Wealthy. Orchard, six hundred trees; crop, two hundred bushels, 1886; age, six years.

MR. JAMES ACKERMAN, of Hygiene, Boulder county, had of apples thirteen varieties, consisting of Ben Davis, Plum Cider, Pewaukee, Flushing, Spitzenberg, Roxbury Russet, Bassett Crab, Haas, Utter's Red, Sweet Pear, Fameuse or Snow Apple, Tallman Sweet, Walbridge, Minnesota Crab, and one variety of Bartlett Pears. Orchard, four hundred trees; yield, six hundred bushels, 1886; age, six to eight years.

MR. E. BIRDSELL, of Hygiene, Boulder county, had of apples nine varieties, consisting of Sweet Pear, Pewaukee, Fall Stripe, Ben Davis, Isham Sweet, Walbridge, Perry Russet, Jennet and Hyslop Crab. Orchard, three hundred trees; two hundred bushels; age, six to eight years.

MR. M. L. MCCASLIN, of Hygiene, Boulder county, had of apples two varieties, consisting of Bellflower, Duchess of Oldenburg, Northern Spy, Wealthy, Russet, and one variety not named. MR. MCCASLIN also had of pears, The Duchess, Bartlett and one variety not named.

Orchard, three hundred trees; one hundred and fifty bushels, 1886; age of trees from four to eighteen years.

MR. J. E. PENNISTEN, of Whitewater, Mesa county, had of peaches six varieties, consisting of White Cling, Finley's Cling and four varieties not named. Orchard, three hundred peaches; one hundred and fifty apples. Orchard four years, first year bearing.

MR. W. H. COFFMAN, of Whitewater, Mesa county, has of apples two varieties, consisting of Smith's Cider and Ben Davis, and of peaches two, consisting of White Cling and one variety not named. Seven hundred peaches. Apples four years.

MR. SHROPSHIRE, of Whitewater, Mesa county, has of peaches two varieties not named. Peaches, three hundred; apples, six hundred.

MR. JOHN A. SHAW, of Del Norte, Rio Grande county, has of apples two varieties, consisting of Whitney's No. 20 and Duchess of Oldenburg. Twenty-five apples; age, three years.

MRS. C. M. FINLEY, of Colorado Springs, El Paso county, has one variety of apples, the Pewaukee. Four hundred apples; pears, twenty-five; age, four to six years.

MR. D. M. ROE, of Colorado Springs, El Paso county, has of apples eleven varieties, consisting of Winesap, Ben Davis, Jennet, Little Romanite, Sops of Wine, Hyslop Crab, Hos (not Haas), Perry Russet, and three varieties not named. The gentleman has also of pears three varieties, consisting of Flemish Beauty and two varieties not named. Orchard, three hundred trees; age from six to fourteen years; two hundred bushels.

MR. L. B. AMES, of Littleton, Arapahoe county, had of apples seven varieties, consisting of Hyslop Crab, Bradley Crab, Imperial Crab, Ben Davis, Lawver, Jona-

than and Winesap. Orchard, two hundred apple trees; age, four to six years.

MR. EDWARD MONTGOMERY, of Littleton, Arapahoe county, has of apples the Wolfe River Seedling. Garden plantation, twenty trees; six to thirteen years.

MR. L. K. PERRIN, of Denver, Arapahoe county, has of apples, Whitney's No. 20. Orchard two hundred and fifty trees; age six to thirteen years; yield one hundred and fifty bushels.

MR. WILSON PERRIN, of Denver, and whose farm is in Jefferson county, has of apples three varieties, consisting of Red Astrachan, Duchess of Oldenburg and Red June. Orchard, three hundred trees; yield, four hundred bushels; age about twelve years.

MR. W. H. WILLIAMS, of Denver, has of apples thirteen varieties, consisting of Ben Davis, Tallman Sweet, Bailey's Sweet, Romanite, Fameuse or Snow Apple, White Winter Pearmain, Vandever Pippin, Northern Spy, Jonathan, Lady Apple, Winesap, Willow Twig, and two varieties not named, besides two varieties of pears not named. Orchard, one hundred and fifty trees; yield, three hundred bushels; age, thirteen years.

MR. HARPIN DAVIS, of Arvada, Jefferson county, has of apples eleven varieties, consisting of Talpahocken or Fall Pippin, Northern Spy, Limber Twig, Jennet, Shaker Pippin, Perry Russet, Maiden's Blush, Baldwin, Bailey's Sweet, Summer Queen, and a seedling not named. Orchard, three hundred; yield, three hundred bushels; age, twelve years.

MR. CHARLES T. WHITMORE, of Denver, has of apples three varieties, consisting of Missouri Pippin, Ben Davis and Wealthy. Orchard, two hundred and fifty; age, four to eight years.

MRS. L. E. COOK, of Arvada, Jefferson county, has of apples ten varieties, consisting of Maiden's Blush, Westfield, Seek-no-Further, Shaker Pippin, Russet, Hyslop Crab, Buckingham, Sweet Romanite, Bellflower, and two varieties not named, besides eight varieties of pears, consisting of Flemish Beauty, Sugar and six varieties not named. Orchard, one thousand trees; age, twelve years, not a full bearing year; yield three hundred bushels.

MR. WILLIAM LEE, of Denver, whose farm is in Jefferson county, has of apples twenty-seven varieties, consisting of Autumn Strawberry, Roxbury Russet, Golden Sweet, Summer Baldwin, Duchess of Oldenburg, Fameuse or Snow, Whitney's No. 20, Fall Orange, three varieties not named, Fall Baldwin, Northern Spy, Turner's Sweet, Summer Queen, Bailey's Sweet, Pryor Sweet, Maiden's Blush, Blue Pearmain, White Winter Pearmain, Smith's Cider, Roman Stem, Ben Davis, Jonathan, Tallman Sweet, Fall Wine, Straw, Red Astrachan, Willow Twig, Siberian Crab, Hyslop Crab, and Transcendant Crab. Orchard of six hundred, six to twenty-three years old, and yielded about three hundred bushels in 1886. It is the oldest orchard in the State.

MR. HENRY LEE, of Denver, has one variety of apples not named—Russians. Orchard of six hundred trees not in bearing; age four to six years.

MR. DAVID BROTHERS, of Denver, and whose farm is on Wheat Ridge, had of apples twenty-five varieties, consisting of Limber Twig, Fulton, Lawrence, Cole's Quince, Snow Apple, Bailey's Sweet, Transcendant Crab, Lawver, Winesap, Dutchess of Oldenburg, Roxbury Russett, Autumn Strawberry, Wealthy, Jonathan, Northern Spy, Perry Russett, Pewaukee, Ben Davis, Russett, Tallman Sweet, one variety of crab not named, and four varieties more not named. He also had of

gooseberries five varieties, currants two, cherries one, plums eight, strawberries four, raspberries four, blackberries two. He also had of grapes twelve varieties, consisting of Martha, Wilder, Salem, Hartford, Massasoit, Delaware, Concord, and five varieties not named. Orchard, three thousand; age, four to thirteen years; yield current year, about one thousand bushels.

MRS. J. W. RICHARDS, of Denver, whose farm is on Wheat Ridge, had of apples seventeen varieties, consisting of Northern Spy, Rhode Island Greening, Swaar, White Winter Pearmain, Autumn Strawberry, Ben Davis, Lawver, Jersey Sweet, Winesap, Fameuse, Jennet, Vandever Pippin, Pewaukee, Jonathan, Willow Twig, and two varieties not named. The lady also had two varieties of pears, the Flemish Beauty and Bartlett. Orchard, one hundred and fifty trees; age, six to eight years; one hundred and fifty bushels.

MR. JOHN GRAVESTOCK, of Cañon City, Fremont county, has of grapes four varieties, consisting of Catawbies, Brighton, Chasselas and Concord. Orchard, three hundred vines; not yet in bearing.

MR. A. E. GIPSON, of Greeley, had of apples ten varieties, consisting of White Pigeon, Russian, Wealthy, Orange Winter, Gideon, New Hampshire, Utter's Red, Long Field, McMann's White, Sietizer and Orion Crab. Orchard and nursery stock, twenty-five acres; not yet in bearing.

MR. E. N. ELTON, of Fort Collins, has of apples six varieties, consisting of Ben Davis, Maiden Blush, Pewaukee, and one variety not named. Garden plantation.

MR. J. S. MCCLELLAND, of Fort Collins, has of apples six varieties, consisting of Willow Twig, Haas, Wealthy, Pewaukee, Golden Russett and Ben Davis. Orchard, two thousand five hundred trees; but few in bearing.

MR. Z. E. PLUMMER, of Fort Collins, has of apples six varieties, consisting of Roxbury Russett, Roman Stem, Large Romanite, and three varieties not named. Orchard, about two hundred trees; age of orchard from six to ten years.

MRS. C. A. WHEATLEY, of Fort Collins, has Ben Davis apples. Ganden plantation.

MR. HENRY STRATTON, of Fort Collins, has Ben Davis apples. Not yet in bearing.

MR. T. W. GARRET, of Fort Collins, has three varieties of apples, consisting of two varieties not named, and the Wealthy. Orchard one hundred and fifty trees; six to ten years old.

DR. E. A. LEE, of Fort Collins, has one variety of apples, not named.

MR. THOMAS F. VOLLINTINE, of Fort Collins, has one variety, the Autumn Strawberry. Garden plantation.

MR. W. W. CHILCOTT, of Denver, has four varieties of apples, consisting of Ben Davis, Wealthy, Fameuse, and one variety not named. Orchard, two hundred trees; four to eight years; one hundred bushels in 1886.

MESSRS. PIERCE & GREEN, of Cañon City, have of apples nine varieties, consisting of Limber Twig, Ben Davis, Walbridge, Pewaukee, Fameuse, Wagoner, Jonathan, Winesap and one crab not named. Young orchard; in bearing, 1886.

MR. G. W. WEBSTER, of Hygiene, Boulder county, has of apples fifty-one varieties, consisting of Maiden's Blush, Fall Spitzenburg, George Webster, (a seedling) Winesap, Autumn Strawberry, Northern Spy, Jonathan, Missouri Pippin, Seek-no-Further, Huntsman's Favorite, Hygiene, (a seedling) Longmont, Lost Tribe, California Red, Short Stripe, Denver, Sweet Pear, White Pippin,

Green Newton Pippin, Winter Vandever, Perry Russet, Roxbury Russet, Ben Davis, Roll's Jennet, Hyslop Crab, Summer Queen, Fameuse or Snow, Summer Pearmain, Blue Pearmain, White Winter Pearmain, Clars Pearmain, Webster Beauty, Fall Pippin, Peck's Pleasant, Golden Russet, St. Lawrence, Greasy Pippin, Golden Pippin, Plum Cider, Wealthy, Small Romanite, Large Romanite, Whitewater, Cole's Quince, Yellow Streak, (a seedling) Honey Dew, (a seedling) Jersey Queen, Shaker Pippin, Lady Belle, Cluster and Home. The gentleman has also of grapes thirteen varieties, consisting of Concord, Delaware, Iowa, Champion, Salem, Missouri Rusling, Elvera Noah, Isabella, Catawba, Grues' Golden, Sweetwater, and Lindly. Orchard, trees age twenty-three years; yield three hundred bushels.

MR. A. W. WATSON, of Chaffee county, whose fruit orchard is seven thousand eight hundred feet above the level of the sea, higher than fruit had ever before been raised, had of apples four varieties, consisting of Ben Davis, Whitney's No. 20, Alexander Crab and one variety not named. Garden plantation twenty-five trees.

MR. W. HELM, of Cañon City, has of grapes ten varieties, consisting of Mission, Muscatel, Grand Blance, Concord, Golden Chasselas, Zinfield Wine, Sweetwater, Black Hamburg, Flame Tokay, Seedless Sultana and Gœthe. Garden plantation and nursery stock.

MR. E. BLAIN, of Grand Junction, Mesa county, has two varieties of apples, Genitan and one variety not named. He has also one variety of peach, a cling, not named. Peaches and apples four years old. Plantation three years old.

The Fruita Town Company, of Fruita, Mesa county, has hard-shell almonds and gourds, two varieties of peaches and one variety of nectarines.

MR. C. S. FAUROT, of Boulder, Boulder county, has of apples three varieties, consisting of Yellow Transparent, Ben Davis and one variety not named. The gentleman has four varieties of pears, consisting of Vicar of Wakefield, Flemish Beauty, Bartlett, and one variety not named; besides of plums three varieties, the Weaver, Forest Garden and Colorado Queen. Then of grapes he has fourteen varieties, consisting of Concord, Hartford, Moore's Early, Warden, Clinton, Mission, California, not named, Delaware, Massasoit, Salem, Brighton, Catawba, Chasselas, Pocklington. Of blackberries, the Lawton; of raspberries, the Hansel and Cuthbert; of gooseberries, the Houghton Seedling.

MR. LEMUEL C. MCINTOSH, of Boulder, has two varieties of apples not named.

MRS. R. B. WHITE, of Boulder, has of apples one variety, the Golden Pippin.

ALTITUDE AND APPLE GROWING.

The range of altitude at which I found apples growing was, at Grand Junction, four thousand five hundred feet, and at Buena Vista, eight thousand feet. Altitude is not the invariable rule indicating temperature which the surroundings govern. Nor does low grade of temperature necessarily bar the possibility of growing apples. Apples are grown in some parts of Russia where the thermometer sinks to forty-five degrees below zero. Sudden changes from heat to cold are more obnoxious to apple culture than extremes of heat and cold. Since the establishment of the Signal Station at Denver, the record shows a more equable temperament than any of the apple-growing States of the east. The average sunshiny days for the last thirteen years in Denver has been three hundred and forty. It is said that the line of the mean temperature of the United States passes through Denver. Hence, Colorado will

be spared those failures of the States which have a long continuation of zero weather. The winters of 1882, 1883 and 1885, in Iowa, Minnesota and Wisconsin, has set the orchard men to hunt for iron-clad kinds to stand their zero weather. All eyes have been turned to Russia for a remedy. Fortunately, we live south of the forty-second parallel of latitude, and as a consequence we have received no serious drawback in apple culture from continuous frigid weather. An examination of the list as above quoted, will show a greater variety of apples in successful culture than in any of the States referred to. Colorado is not under the necessity of seeking for Russian kinds, which at best are faulty in quality and keeping, and variable as to season. Until the necessity arises from the failure of old and well tried friends, it never pays to experiment with strangers. "Look well before you leap" is an old and well tried adage. As long as we can successfully cultivate the better varieties of summer, fall and winter kinds so as to give a succession of apples the year around, our time is better spent studying the conditions to improve the quantity and quality of what we have than go hunting for strange kinds of foreign origin. To be successful is to succeed.

The plantation of apple orchards as above referred to will, in the near future, soon be supplemented by others just coming into bearing. Of this class I note the orchard on the Agricultural College farm. It consists of one thonsand trees and one hundred varieties on trial.

In the Fort Collins neighborhood there are quite a number of orchards well cared for. Notably is the well cared for plantation of Mr. W. F. Watrous, which contains several hundred trees. Here I noted some of the most vigorous growing pear trees I have seen in the State. Mr. Hoag has a well cultivated young orchard.

A farm in this neighborhood without an orchard will soon be an exception to the general rule.

In the neighborhood of Loveland and Longmont, the same commendable spirit of orchard planting obtains.

Time did not permit me to see quite a number of bearing and newly planted orchards in the Hygiene and St. Vrains neighborhoods.

The Ralston Creek neighborhood has a number of new and old plantations which I did not see.

Wheat Ridge and Jefferson county generally has quite a large number of newly planted orchards. There are more and larger plantations of fruit north and west of Denver than there are south and east.

El Paso county has several fine orchards. The past year for the immediate vicinity of Cañon City was an off year for fall fruits.

Among the coming prospective fruit men of the State may be noted, Judge Felton, Mr. Rockafellow, General Cameron, Pierce & Green, John Gravestock and many others of the Cañon City neighborhood.

In the light of what I have seen, Colorado's facilities for growing apples successfully are fast coming to the front as the most prominent apple growing State in the Union.

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Discussion after DR. SHAW'S paper on "Apples."

MR. FAUROT: My estimate of the apple crop of Colorado for this year is 35,000 to 40,000 bushels.

MR. ACKERMAN: What is the difference between the Wolf River and the Wealthy? I sent a specimen of the Wolf River to a prominent fruit grower of Wisconsin, who pronounced the two similar. There were between four and five thousand bushels of apples raised in my immediate neighborhood this year.

DR. SHAW: The apples of the Wolf River are the handsomest I ever saw. The fruit from the tree in question was on exhibition at New Orleans and found great favor there. The tree was planted thirty years ago and has been fruiting seven years.

MR. WEBSTER: The apple in question is nearly as large as the Tetofsky. Trees with large leaves only do well here as they contain a great deal of sap.

MR. ACKERMAN: What is the difference between the Wolf River and the Wealthy? I want the question settled.

MR. MCCLELLAND: The Wealthy is an upright grower, and the fruit has a deep flesh stain that runs clear through. The Wolf River spreads a great deal and the fruit is perfectly white. Mr. Goss' apples were the finest I ever saw.

MR. GOSS: I have twenty-two in bearing, and the fruit is the finest I ever saw anywhere. On a twig eight inches long there were twelve apples. The wood of the tree is very tough, and there is not a limb broken, although they bear heavily this year.

MR. ACKERMAN: The Wolf River fills in the space to make a succession right through the season. Their bearing and cooking qualities cannot be beat.

MR. BADER: Have been planting trees for fifteen years, and all die at a certain age, except the Tetofsky, from some disease. The trees become black and come out of the ground. What is the matter?

MR. FAUROT: What kind of soil is your orchard planted in?

MR. BADER: Heavy black loam.

MR. WEBSTER: The orchard is on Left Hand, and covers an acre of ground. There are too many cotton-

woods around it. I had the same trouble and got over it by cutting down the cottonwoods and manuring the soil.

MR. BADER: Think the cottonwoods have nothing to do with it. The trees grow well for four, five and six years, and then commence to die at the top. The ground is well fertilized. My son-in-law had the same experience, and he had no cottonwoods around his place. My orchard is ten feet higher than Mr. Webster's. I think the land is too rich. My cellar near the orchard is perfectly dry.

MR. FAUROT: My opinion is that Mr. Bader's trees have their feet in the water.

DR. SHAW: Think they have been preyed upon by the cottonwoods.

MR. ACKERMAN: Had trees die in the same way as Mr. Bader's. Think under-draining would be of benefit.

MRS. CARR: Had a similar experience. Little dark spots came on the leaves and gradually spread until they reached the ground. All of our trees are affected the same way, and we never have any apples. There is no alkali in the ground.

MR. ACKERMAN: The difficulty is from below.

MR. FAUROT: If the tree is diseased in the root the top will show it first. What is the condition of the bark?

MRS. CARR: The bark is smooth and healthful.

MR. GOSS: From the two descriptions I judge the cases are different. MRS. CARR'S is from sun burn, water kills MR. BADER'S trees. If MR. BADER will dig down three or four feet he will find a stratum of clay that retains the water.

## AFTERNOON SESSION.

December 8, 1886.

The session opened prompt at 2 o'clock, with President FAUROT in the chair.

MR. JAMES ACKERMAN read the following paper on

# Success in the Apple Orchard.

Since we last met, another year has come and gone, and to the fruit grower it has been a year of plenty. Our trees, bushes, plants and vines have been loaded with fruit, and who, in all the world, have a better reason to be thankful to Almighty God for blessings bestowed than the fruit grower? In this year of plenty it would have been more appropriate for me to have written on the other side of the question, or, in other words, "Mistakes in the Apple Orchard," as I feel that I have made more mistakes, or rather been more negligent, than heretofore, and the reason—poor health. I have allowed my trees to over-bear, so much so that I have a few trees that are ruined, and my apples are small. Perhaps some may say, "why not put props under the limbs?" In the first place, want of time; in the second place, I do not think it is the proper way. Picking off from one-third to one-half the fruit would give you more pounds of apples, and of better quality. Of all my trees I had nothing that was loaded like the Walbridge. Next in order was the Ben Davis, Dutchess, Pewaukee and Utter's Red. My Sweet Pear and Tallman Sweet were very full, but did not break. Next in order of mistakes would be poor tillage, or rather no tillage. In the fifteen years that I have been in Colorado, I have never raised so many weeds. The conse-

quence is that what is now fully matured weeds, should have been luscious apples, to be converted into silver dollars. Another mistake. I have taken the suckers from my orchard but once the past season. Had it been my careful friend from Greeley, they would have been rubbed off as soon as they made their appearance. But we cannot all be careful now. Another mistake. The aphis have been quite bad on my trees, and more particularly on my crabs. They should have been destroyed, but were not. These are the mistakes of the season.

Now for the mistakes of the past. A large part of my orchard is set with currants, gooseberries and raspberries, and I find it almost impossible to feed so much on the same ground. Shall move most of my small fruit from the orchard in the spring. Another mistake: My trees, and particularly my younger orchard, were set fifteen feet apart. Should have been at least twenty feet. My reason is that it is difficult to give them sufficient food. Then, again, they do not get the proper amount of air and sun-light. But I console myself with the fact that life is made up of mistakes. These mistakes were not written with a view of finding fault, but that others might not fall into the the errors that I have. It has not been all mistakes with me, but on the other hand, I have been reasonably successful. I gathered the past season, with all my negligence, six hundred bushels of apples—perhaps more than I was entitled to. With my varieties, I am satisfied. Do not think I would make any change if I was going to set another orchard. Of my older trees that I have in bearing, six are Tetofsky, fourteen Red Astrachan, forty Duchess, eight Saps of Wine, eight Saxon, seventeen Plum Cider, eight Sweet Pear, twenty-six Pewaukee, sixteen Walbridge, fourteen Ben Davis, eight Golden Russet, ten Tallman Sweet, eight Fameuse, thirteen Haas, making fifteen

varieties that you might say are in full bearing. I have several varieties, but one or two of a kind, that are doing well.

And now for the season or time of ripening. Tetofsky, July 20; Red Astrachan, July 28; Duchess, August 1; Saps of Wine, August 7; Saxon, August 15; Plum Cider, September 25; Fameuse, September 30; Utter's Red, Sweet Pear, Pewaukee, October 1; Walbridge, Ben Davis, Tallman Sweet, Golden and Perry Russets, October 10. You will notice that between the fifteenth of August and the twenty-fifth of September there is much space. I shall fill that up with the Wealthy. My winter apples were gathered between the thirteenth and fifteenth of October.

And now a word for the crab. Although my good friend, DR. SHAW, would say that this world could get along without the crab. At my home standard apples are cooked and came on the table from meal to meal and from day to day, and were finally fed to the chickens; but when the crabs were cooked and came on the table, we always find the bottom of the dish. For sweet pickles there is nothing equal to the crab. Time of ripening: Transcendent, Nutall, August 20; Hyslop, September 1; Minnesota, Bassett and Briar's Sweet, September 25. As the cold weather sets in unusually early, I do not think the wood of the apple is sufficiently ripened to withstand a very severe winter. I am very often asked the question, "If you were going to set one thousand trees, how many Ben Davis would you set?" My advice would be one-fifth. Now let us stop right here and have the opinion of others. A friend came to me and said he would set out one thousand trees in the spring, and asked me the question. I told him two hundred. He went to a neighbor of mine and asked him the same question, and he told him four hundred. He went to another neighbor and he told him nine hun-

dred. He then went to Denver and asked the same question, and was told by a Wheat Ridge fruit grower eight hundred. Now, if the doctors disagree, what are we to do? At our meeting in Greeley a year ago, I decided to know more of fruit growing. I sent to Wisconsin and procured a full line of reports of horticulture from 1873 to 1885, and find, in looking them over carefully, that the scientific men of the east disagree in regard to the varieties, pruning, culture and location. I know of but one thing for us to do—still blunder along. Keep making mistakes, and when we meet together from year to year, tell each other of our failures, as well as our success. We are still in our infancy. We have many things to learn in regard to location, varieties, irrigating, mulching and tillage. By the way, I was in one orchard of about two arces this summer that had been cultivated once a week without crop, and it was certainly the best that I have seen in Colorado.

And now a word in regard to marketing, and then I am done. There were about three thousand bushels of apples raised on the upper St. Vrains the past summer. Some of my neighbors sold at two cents, some at three, and some at four cents, while the earlier varieties, such as Tetofsky and Red Astrachan, went at six cents. It seems to me that we could and should have local societies to regulate all such matters, and a secretary to gather and keep statistics and report to this society.

AFTER "SUCCESS IN THE APPLE ORCHARD."

DR. SHAW: Please give the first to ripen and the best to keep. A succession of the year.

MR. ACKERMAN: The Tetofsky is the earliest to ripen; the Walbridge is the latest. That is, in my experience. The Tetofsky is fifty per cent. better than the Ben Davis; the Walbridge is fifty per cent. better in

flavor than the Ben Davis, and forty-five per cent. better for cooking.

MR. WEBSTER: Kept Tetofsky apples until September by wrapping in paper. The Ben Davis and Winesap are the best keepers.

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MRS. J. W. GOSS read the following paper on:

## The Growing of Small Fruits.

How women can earn money and how be self-supporting has been a matter for discussion for many years. The tendency is and has been to become educated for teachers and the professions. Naturally ambitious to succeed, many overwork; and broken in health or extreme nervousness, unfits them for the work they have prepared themselves to do. Evidently the thing most needed now by woman "is to learn how to be healthy, strong, good-natured and helpful," educating not only the brain, but the hand and the whole being as well. All women cannot marry and be the helpless idol of an indulgent husband. Some will not marry, and many who do must be a willing help-meet. Out-door work is not to be despised by woman, for it is positively necessary to health and happiness.

Of all the pursuits now followed by woman, there is, perhaps, no other that offers more or greater inducements, or for which she is naturally better qualified, than the growing of small fruits. There is no more money-making crop than fruit, when rightly managed, and strawberries, raspberries, blackberries, gooseberries, currants and grapes, can each be made to yield a rich harvest. Only a small plat of ground is necessary for a beginning, increasing the area as means are afforded. Almost any woman can do much of the work herself, even

though not very strong. She can set the plants and gather the fruit, and get it ready for market. Much depends on the way it is prepared. If in addition to raising fine berries, they are set off to advantage by careful packing and a tasteful arrangement of green leaves, they will sell more readily. When berries are cheap, she can, with her own hands, make them into fine jellies, marmalades, etc., to be sold later, even if sold at a very small profit. Women do not overlook the minutest matters, and the study of the botany of plants, of birds and insects, injurious and otherwise, will all receive their careful attention. The examples we have had of women who have tried the experiment, show that they are eminently successful, raising the finest fruit, arranging it in the most tasteful manner, and receiving the highest market price for their products. The net profits from the sale of small fruit by two young ladies, settled in California last year, one of whom was a consumptive when she began, amounted to the handsome sum of $15,000. It is but a few years since they began the experiment, and besides accumulating a fortune, they have what is better, a comfortable home of their own and complete restoration of health.

The growing of small fruits on a small scale, is to be especially recommended to those married women who can obtain a small plat of ground for the purpose, who feel the desire, so common among women, for pecuniary independence. To the growing of small fruits might be added a few stands of bees, which almost any woman can care for, thus adding to her income and placing her in a position to realize comparative independence.

# Plum Culture.

BY G. W. WEBSTER.

The plum is a native fruit of Colorado, and by rights should stand among the foremost of fruit culture, but my opinion is that it will soon come to the front, when we learn a little more about the way to propogate and handle the trees.

Now, I have been a citizen of this valley ever since the spring of 1860, and have seen this fruit growing almost every year, and among the native fruit there are several kinds. Among them are some of the very best flavored plums I ever saw in any country, and I reckoned them for general cultivation as being the best for Colorado. But do not understand me to say that all of our wild plums are good fruit. Far from it. But the large yellow, with a red cheek; the long red plum; these two are cling stone. There is a large round purple plum, with little specks over it, this is a free stone. It is the only wild plum I ever saw that was a free stone. When a man gets these three varieties and cultivates them, he has something that has come to stay, and there is money in it. Just as soon as these plums get introduced into the market there will be such a demand for the trees that the nurserymen of Colorado cannot raise them fast enough. The demand will not be from Colorado alone, but orders will come from the east and the south, as well as the west. Now, you cannot plant the seeds of these and raise the same fruit, any more than you can the apple, but they must be grafted or budded. I have commenced propagating them in a small way, and have grafted some of the wild plums on the tame stalk. My reason is that our wild plums are small trees and the roots are small, while the tame plum is a large tree with large roots, and will produce a larger tree.

It would not do to bud, for there is danger of winter-killing, just like those we do get from the east. They are almost sure to be budded on the peach stalk, and we know that the peach tree in Northern Colorado is a poor tree. My reason for speaking so highly of our native plums is just like this: They are, without a doubt, the best for Colorado, and have been here producing fruit for hundreds of years before you or I came, for all we know. I can look back with regret from twenty to twenty-five years, when there was one of the finest plum groves on the Little Thompson I ever saw, and the trees were loaded with delicious ripe fruit. But, alas, where are they to-day? A thing of the past. The cattle have destroyed about all of the trees.

Now, I have given you the native plum of Colorado. There are other plums that are a success here. The Weaver is one of them; it is a native of the State of Iowa, and was found near Cedar river, growing on the old camping grounds of the Muskogee Indians. Its flesh is very rich and juicy. It is a free stone. Tree very hardy, and a very luxuriant grower. Commences to fruit very young, and should be in every orchard in Colorado. Some say the Forest Garden is good for Colorado, but never had it, and could not say. Have had a great deal of experience with plums in Colorado, and just for the novelty of it I will give you the names of them: Lombard, Jefferson, Dawson, Blue Egg, Yellow Egg, Orleans Purple, Purple Damascus, Wild Goose, Weaver, Green Gage; and every one had fruit in 1875, except the Green Gage. It was the tenderest of them all, but in the fall of 1876 the grasshoppers killed every tree on my place, and since that time I have touched lightly with the plum.

The nature of the plum is to grow close together, and I think it is better to plant them closer than any other kind of standard trees, so that the ground will be shaded

in the spring to keep the frost in the ground to prevent their starting too early, for the plum belongs to the family of pit fruits, and all fruits that have a pit or stone bloom before the foliage starts out, so the bloom has no protection. On the other hand, all fruits that have a seed, such as apples, pears, pomegranates, quinces, currants, gooseberries, raspberries, all have the foliage about two-thirds grown when they are in bloom. That is one protection in this country, where we often have late frosts. This will always be against raising plums, cherries and peaches, but more in some localities than others. The cañon winds have a great deal to do with the keeping off the frosts.

PLUMS.

MR. WEBSTER: The cañon winds are a great factor in fruit raising, as they ward off the frost. Where they prevail, crops are nearly always good. They prevail in most of the cañons and have the same effect as the warm currents of the ocean.

MR. FRINK: Do rains destroy the fruit?

MR. DICKSON: Does fruit grow outside these currents?

MR. WEBSTER: Yes, but not so well.

MR. RUST: What is the difference between the north and south side of the stream as to the intensity of the wind?

MR. WEBSTER: Cannot explain it. The winds are much stronger sometimes than others, but are never cold and ward off frost.

MR. MAXWELL: Is the sprout from the plum the same as the parent?

MR. WEBSTER: Only once in a while. I get more orders for wild plums than for cultivated ones. The Weaver is wild in Iowa. Never had a good crop from the

Wild Goose. The Weaver and Wild Goose have to be pruned. Never prune except to cut off the lower branches.

MR. MILLISON: Have best success with trees raised from pits. Natives always bear well, and bring good prices. The seedling plum has fine roots. After the first year I cut off the tap root four to six inches below the ground, which causes branching, and it makes the most profitable plum grown. Have a seedling Green Gage that is extraordinary, the fruit being almost as large as the Hyslop crab.

MR. WEBSTER: Think an orchard entirely from seed would be the best. Wild plum best with me.

MR. MILLISON: The seedlings of the pits do not sport as much as apple seedlings.

MR. WEBSTER: There is a great resemblance; have tried it and know. One seedling out of every ten is valuable. They should be planted in March. Walnuts and all others should be planted at the same time. Do not allow them to freeze before putting under ground. If not frozen under ground they will not grow. Maple seeds should be planted as soon as taken from the tree.

DR. SHAW: Maples grow two or three feet the season they are taken from the tree, if properly planted.

MR. ACKERMAN: Planted Weaver, Forest Garden and De Soto in hen yard, and gave plenty of water. Is this the best plan?

MR. MCCLELLAND: In my experience, yes.

MR. TOBIAS: Think Weaver the best. Plum blossoms do not fertilize during a rain.

MR. BROTHERS: Weaver is iron-clad. Forest Garden does not bear well with me. Golden drop is good. Wild Goose of no account.

MR. ACKERMAN: The Long Bark and Washington do not bear well, but trees are very thrifty.

## Pear Culture.

BY G. W. WEBSTER.

It is a well known fact that it is in its infancy. This lamentable fact may be attributed to the fruit growers of Colorado for not setting out the trees. Perhaps the reason why they have been more skeptical about the pear than the apple, is that the idea has all along prevailed that it is not hardy enough to withstand this climate. But my experience and observation teaches me quite differently, for the pear tree in Colorado has proven itself to be at least as hardy, if not more so, than the apple tree. It may require a little more care and attention for the first few years, while yet in its infancy, but once started and established, it is one among the hardiest of our fruit trees, and we have nothing that is more productive. Besides, we all know that there is no other standard fruit in the market that is more delicious, more sought after, or that brings a better price in the market than the pear. As proof of this assertion, Colorado pears are to-day retailing in Longmont for twelve and one-half cents per pound. We have trees in Boulder county only about sixteen years old, that did, this season, yield one thousand pounds to the tree, which, at twelve and one-half cents per pound, would bring one hundred and twenty-five dollars per tree. Now, to plant one acre in pear trees, setting them twenty feet apart each way, requires one hundred and ten trees, which at the age of sixteen years, would give us one hundred and ten thousand pounds of fruit, which at twelve ond one-

half cents per pound would give us the snug little sum of thirteen thousand seven hundred and fifty dollars per acre. I do not wish any one to be misled to believe that pear trees do not begin bearing until they are sixteen years old. They generally commence yielding fruit when from seven to eight years old, and as a rule, are ever after annual bearers. Past experience teaches me that twenty feet apart each way is the proper distance for all standard trees, be they pear or apple. This gives to the trees room enough to sustain themselves from the soil for years and years to come. But no soil, I care not how good, nor whether in Colorado or any other part of the Union, is strong enough to afford sufficient nutriment to keep an orchard thriving without plenty of manure and proper cultivation. Perhaps some one would ask what kind of manure is the best for an orchard of trees? In answer I would say that good barnyard manure, well rotted, is the best we have, and I recommend its use freely. The best time for putting manure on land (and an orchard is no exception to the general rule), is early in the spring.

The cultivation of the pear tree differs very materially from that of any other kind of trees. While young and growing, and before they are old enough to begin bearing fruit, they should be thoroughly cultivated to insure a vigorous growth. As soon, however, as the tree begins bearing, the ground should be seeded down with tame grass and the cultivation should cease, but the manuring and top-dressing should continue every year. To those contemplating the setting and cultivating of the pear, the question naturally arises: "What kind of trees should I get; the dwarf or the standard?" Some have said, and still contend, that for Colorado culture you should get the dwarf. But I say, by all means get the standard. My reasons are as follows, to wit: The dwarf pear is grafted or budded on the quince stalk, which by

nature is a small shrub of exceedingly slow growth. The root naturally is not able to furnish sufficient nutriment to make a perfect tree, and consequently the fruit itself is imperfect. As the standard tree is grafted on its own seedling, the roots will be able to furnish nutriment according to the required growth of the tree, and if properly cared for the result will be you will have a thrifty and perfect tree, also perfect fruit.

The question now arises, "What are the best varieties of pears for the climate and culture of Colorado?" I find that we can raise successfully, not only the summer and fall pears, but the winter pear also, and would recommend for summer varieties: The Tyson, Madelain and Seckel. The first named is an upright tree, and a vigorous grower; the flesh of the fruit is melting and sugary. The second on the list is an excellent early pear; flesh white and juicy, with a sweet and delicate flavor. The Seckel is an American pear, and it is claimed for it that it is the richest and best flavored variety known; furthermore, the tree is the healthiest and hardiest of pear trees.

For fall fruit: The Bartlett, Flemish Beauty, Bell Lucrative and Sheldon take the lead. The excellent qualities of the Bartlett are too well known to all lovers of this delicious fruit to need of me any description. The tree has proved itself to be well adapted to Colorado. The Flemish Beauty is an excellent variety of fruit, with a large, luxuriant tree, that I claim is as hardy as a cottonwood tree. The Bell Lucrative and Sheldon are both excellent fruits, and I recommend them as hardy trees, thrifty growers, and well adapted to successful cultivation in Colorado.

The Winter Belle, Winter Nellis and Winter Scotch, I claim to be the best varieties for winter use. Without going into details as to the particular merits of each of

these varieties, I would say are all excellent fruits that are good during the winter months. The trees are all luxuriant growers and well adapted to our climate.

Now we have selected the varieties of fruit for our pear orchard, and the next question arises as to what kind of soil to select to set them in. We know from past experience that fruit growing on the low bottom lands in the Eastern States, where they have season rains and dark, heavy atmosphere, has proved a failure. But in Colorado, where we have the bright sunshine and pure, dry atmosphere, and raise fruit by irrigation, it will grow to perfection on the lowest bottom lands, even as low as the water's edge, or upon the highest mesa lands, wherever it is possible to get water with which to irrigate.

THE PEAR.

DR. SHAW: What is your method of growing pear nursery stock?

MR. WEBSTER: The pear is so different from other fruit trees that it requires a different method. As the pear root goes down nearly straight it is very difficult to make it grow. I cut off all of the tap roots from the graft, transplant them several times before giving them a permanent place, and do not loose a single tree. When you get rid of the tap root and the roots begin branching there is no further trouble.

DR. SHAW: Pear trees too often have too little root. There are a couple of pear trees near Florence that bore fifty bushels of pears this year.

MR. WEBSTER: I brought my pears from California in 1870. They will average about seventy-five pounds to the tree, and brought eight cents a pound. I do not cultivate them after the first year, as they do not bear under cultivation.

MR. ACKERMAN: Have not irrigated my pears for six years. They were irrigated but one year since they were set out. Had a good crop. Some of the fruit weighed eleven to twelve ounces.

MR. GOSS: Grow the Bartlett pear. Have no success under cultivation. Trees bloomed a second time and matured some fruit from second bloom.

The Osborne Summer and Keifer pears were discussed at length; the general opinion being that while the tree was very hardy, the fruit of both was small and knotty, and not worthy of a place in the orchard.

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# Report on Pomology.

BY J. S. MCCLELLAND.

There has been great advancement in pomological matters during the past year. Even old-timers who knew fruit couldn't be raised in Colorado, because they had tried it (had planted a few seedling apple trees and let the stock pasture on them all winter), and therefore knew all efforts in that direction would prove a failure, have, some of them, become convinced that a few hardy apples can be grown in this State. So we move on slowly to certain success.

The amount of fruit grown in northern Colorado the past season is largely in excess of any former year, and the mania for planting is just getting possession of the people. Those that are wise enough to drive away the eastern peddlers and procure acclimated stock that has not lost most of its vitality by a long dry voyage, may do well. Thousands of trees will be put out the com-

ing spring, and it is the duty of this society to tell them what varieties to plant.

I have not been over the district sufficiently to tell what fruit has done the best, but from my own knowledge would think that among apples the Ben Davis, Wealthy, Oldenburg, Pewaukee and Tetofsky, in this order, had borne the most fruit. I would place the yield of apples in this State the present year at near, or quite, thirty-five thousand bushels.

Pears and peaches are still a matter of experiment mostly.

The crops of plums and cherries were not large.

Grapes bore well, and the prices were fair.

Of currants, there was an immense yield and the prices were low.

The crop of gooseberries was so large that many acres were not picked at all.

All berries were more plentiful than ever and prices ruled very low—many times barely paying expenses.

Many are plowing under the berry plantations, and most all are decreasing the acreage, so that the prospect is fair for somewhat better profits in the future—though the skies are not entirely cloudless. Most of those who grow for market, I am satisfied, could make more money—or lose less—by decreasing the acreage and intensifying the culture of what they do grow.

The creditable display of fruits at our County Fairs, and the wonderful show at the Denver Exposition have, in a measure, revolutionized the popular idea of Colorado pomology, and the prospect is certainly very promising of soon growing a sufficient supply of fruit for our home markets.

# Report of Committee.

*Mr. President and Members of*
*The Colorado State Horticultural Society:*

Your committee, appointed to compile a list of fruits best adapted to the northern district of Colorado, would beg leave to report as follows:

FRUITS FOR NORTHERN COLORADO.

*Summer Apples*—Red Astrachan, Oldenburg, Tetofsky, Yellow Transparent.

*Fall Apples*—Fameuse, Wealthy.

*For Trial*—Excelsior.

*Winter Apples*—Ben Davis, American Golden Russet, Tallman Sweet, Pewaukee, Walbridge.

*For Trial*—Wolfe River, Gideon.

*Crabs*—Whitney, Transendent, Martha, Hyslop, Brier Sweet.

*Pears*—Flemish Beauty, Clapp's Favorite.

*For Trial*—Indian Queen.

*Plums*—Weaver, Forest Garden, DeSoto.

*Cherries*—Early Richmond, Late Richmond.

*For Trial*—Ostheim.

*Strawberries*—Crescent, Manchester, Jucunda, Wilson, Cumberland.

*For Trial*—Jewell.

*Raspberries, Red*—Turner, Cuthbert, Shaffer.

*For Trial*—Marlboro.

*Raspberries, Black*—Mammoth Cluster, Gregg, Louisiana.

*For Trial*—Duncan.

*Blackberries*—Wilson, Snyder, Kittatiny.

*Currants*—Red Dutch, Fay's Prolific, White Grape, Cherry.

*Gooseberries*—Houghton, Downing.
*For Trial*—White Smith, Industry.

*Grapes, Black*—Moore's Early, Worden, Concord.
*White Grapes*—Martha.
*For Trial*—Niagara.

## Strawberries.

BY MR. J. M. SACKETT.

My experience on strawberry culture has been so limited in comparison with most of those here present, that I feel the attempt to write of my success is over-bold, and I must beg for your indulgence. Indeed, the only object I have in view is that it may perhaps stimulate others more competent by far than I am to give us the benefits of their experience. I have raised berries for market but two years. I started with some fifteen different varieties, and after two years' trial have finally anchored on four kinds, namely: James Vick, Captain Jack, Bidwell and Sucker State.

There are so many different opinions as to the James Vick that I think that variety must depend almost entirely upon the soil, which is, perhaps, something of a drawback, as most strawberries will grow well any place and under any treatment, seemingly. I have, however, only good words for the James Vick, after having tested them well for two years. Though not, as a general thing, particularly large, I have picked some of the largest berries I ever saw from them. At the second picking this year, I think I never saw a more

brilliant sight. The ground was ablaze with them. The vines are very rank growers, consequently the berries are well up out of the dirt, and one thing more greatly in its favor as a market berry is that it may be allowed to hang on the vines longer than any other I have tried without material injury, as they do not get soft. The color and flavor are all that could be desired. The Bidwell is the earliest I have. The berries are large, good flavor and color, long and pointed in shape, and the only objection I have to it at all is that the point is usually white, making it look unripe. The Sucker State is also a large berry, ripening later than the other varities I have mentioned. It is quite a sweet berry, color very dark red. I call it a coarse berry, but it takes well in the market on account of its size and color. The Captain Jack will hardly need a description, being so old a berry, and I consider it the best in existence. It is, perhaps, a little sour, but of fine flavor, a beautiful bright red in color, and a most prolific bearer. I believe they would bear the year round if they only had a chance. I picked a pint of berries the seventh of October.

I will now give a synopisis of my plan of raising berries. Secure the four kinds I have mentioned, set them in rows three and one-half feet in the row, (it is supposed the soil is good and rich), now cultivate well the first year. Do not let the plants run all over the ground; direct the runners to make a good matted row of plants about one foot wide. In the fall cover the rows with straw or hay. Cut straw is best, as it will let the berries come up readily in the spring, and the berries will be clean and nice for use. Before the runners take root, work the ground well with a cultivator between the rows. Then allow the plants to run where they choose. They will fill the cultivated space. Then plow up the old row, and you have a new bed.

My soil is a sandy loam and does not take much water, consequently my views will differ somewhat from those that depend wholly on irrigation. A fruit grower should be progressive, quick to abandon old varieties and old methods, quick to perceive and adopt new varieties and methods when they promise to be profitable. I think some of the qualifications necessary to a fruit grower's success are: Close and careful attention to details, patience, persistence, thoroughness, the same as in any other business.

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Then followed a general discussion on "The Strawberry:"

MR. RUST: Think clay soil is best for strawberries. The Wilson is my main crop.

MR. MCCLELLAND: Plant mostly Crescents. Can raise eight quarts of Crescents to one of Wilson, to say nothing of the size of the fruit.

MR. FAUROT: Grow two quarts of other varieties to one of Wilsons. Mulching increases the crop from one-third to one-half.

MR. TARVIN had no good results from pistillates. Planted mostly Wilsons.

The difference between staminates and pistillates was explained fully.

MR. RUST: Manchester, Jucunda and Triple Crown do best for me.

MR. MCCLELLAND: Have success with Manchester, Crescent and Jucunda. The Crescent is not soft with me.

MR. TARVIN: Captain Jack, Manchester and Jersey Queen, with a few Sharpless. Had three thousand quarts from an acre; two thousand quarts were from one-third of the piece that was planted to Wilsons.

MR. SACKETT: Mulching increases the size of berries.

The importance of a union of the fruit growers was urged, as only by uniting their forces can a ready market be assured.

The idea of a canning factory on the coöperative plan was also urged, and individual experience in that line given by Messrs. FAUROT and RUST, which was very discouraging. It was urged that all small berries should be canned, and the entire crop should be turned into the canning factory at such a time as the price in the market was too low for profit.

The meeting adjourned to 7 o'clock in the evening.

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## EVENING SESSION.

Opened as per adjournment, with President FAUROT in the chair.

The following paper on Irrigation, by J. S. MCCLELLAND, of Fort Collins, was then read:

# Horticultural Irrigation.

The subject of irrigation, unlike its practical application, is to most persons quite dry, so, if able to express a few hasty thoughts upon this subject without putting you to sleep or driving you from the hall, I shall deem myself fortunate. To do justice to this subject in many of its phases would require a long series of articles, written by persons who had given a long study to its theory as well as its practice. Irrigation has been practiced in many countries since the dawn of recorded time.

We have no report of any country where this artificial system of watering was once needed that has ever afterward received sufficient rain-fall to mature crops. We may, therefore, dismiss from our thoughts the vain imaginings of so many tenderfeet who predict that our extensive system of ditches will soon be unnecessary. We know from experience the great amount of water that is necessary for growing small fruits and many vegetables, so that even should there be sufficient rainfall here to mature crops of grain, the grower could not dispense with irrigation.

Should we accept the view of the very wise Colorado legislature, which referred all temperance legislation to the irrigation committee, we should find that irrigation, like charity, covereth a multitude of sins. Of course, only a great genius could have discovered the relationship existing between the application of water to crops and the great demon of drink. It almost makes one shudder to think what a terrible strain that startling discovery must have made upon the massive brain of the modern wit who originated that brilliant idea. He certainly could not have been addicted to the habit of putting into his mouth that "which stealeth away men's brains." Let us trust that the new legislature, so soon to assemble, will contain but few members who will desire thus to mix whiskey with their water, or who will think it smart to refer temperance legislation to a committee whose sole duties are in relation to the beneficial use of water to growing crops.

There are three general methods of irrigation. First, by flooding; second, by absorption; third, by sub-irrigation.

The first is that system of running water over the entire surface, which is generally practiced with grain and with grasses; such crops as are not worked or culti-

vated, and is one with which the horticulturist has but little to do.

By absorption is meant the system by which the water is run in furrows to wet the soil; or between the rows, and not over the entire surface. As this is the method most generally adopted by fruit growers, it is, of course, the one with which we have now to deal.

The system of sub-irrigation, or conducting the water entirely under ground in pipes or troughs, may be the coming one, but of this method I know but little except in theory, and shall not refer to it again. Nevertheless, I consider it the correct theory, and when it can be instituted and practiced at a sufficiently reasonable cost, shall be ready to adopt it.

The general subject now under consideration admits of a great diversity of opinion and practice. No two soils, or crops, require just the same treatment, and no two persons would give it to them if they did. So I can but give you the results of my experience in a disconnected and desultory way, trusting that the discussion that may ensue will show the experience of our different intelligent experimenters. My soil being a clay loam, with a red clay sub-soil that is very porous, and not being subject to seepage; my practice is to wet the ground most thoroughly when I do apply water. Especially when putting in young plants, like strawberries, I let the water run until the ground—all of it—is so wet you cannot step upon any part of it without sinking in as deep as the ground is plowed. Then, after the ground settles, I turn on the water again and endeavor to keep the ground at least damp until the plants get well established. Strawberry beds, whether young or old, should never be allowed to become dry, except after fruiting, and not very dry then. This is not so necessary with blackberries, raspberries, and other plants whose roots

run deeper, but to let any of them wilt for want of water, materially diminishes the quantity, and often the quality of the fruit. Land that five years ago would not soak five feet from the ditch, now, after heavy manuring and sub-soiling, has become filled with angle-worms and will soak a rod or more, and a similar stream that would run through in ten minutes, would now not get through for twenty-four hours. So that the time that water should be run on a piece of land is only determinable by the result obtained. Necessarily, soils that have water within a few feet of the surface need less moisture than others where it is ten or twenty feet below. In wetting small fruits of all kinds I think it is preferable to run the water in furrows between the rows rather than have the ground level and flood the whole surface. The ground does not become so hard, and I imagine the plants do better for me.

"Ah," says one, "my land is so steep that if I run water in the rows it washes and leaves a ditch between them." Just so. In laying out a plot for either fruit or vegetables, arrange it so that there will be but little fall in the direction in which the irrigating water will have to run, and you will see at once that that little matter is settled. Now, if you plant on the hill-side, either the main or small ditches will have but very little grade. My practice is to give the grade to the main ditch in such cases, and to make it large at first, or after it washes out considerably, to fill it up with strawy manure. Then it will take a little time to get the water running through the manure properly, and it will pay to spend some time with it, for the water will not come out with the same color it went in with, by any means, and I don't know but this is the best way to fertilize most varieties of small fruits. You will then find it will be many years before the ditch will wash again, and the refuse of the manure furnishes a very convenient

material to dam the water either in or out of the rows. Some persons run a wooden trough from the top to the bottom of the grade with water-holes for every row, but these long troughs cost considerable money, do not last long, and are always in the way of the team in either cultivating or hauling off the fruit. I do not like them. They are neither convenient nor ornamental. Strawberries, perhaps, need more water than any other crop. I have irrigated them after each picking with good effect.

As to my orchard, I run the water close to the body of the tree for several years after planting. After that I care not if the water does not run so close, provided the ground is all thoroughly wet before the water is turned off. Apple trees require a good deal of water. So do pear and plum. Both the latter have been known to do well where the soil is perpetually wet. Cherries will grow best in moist soil, but are apt to grow late in the season, and in case of a severe winter, get severely injured, if not killed entirely. From early spring until August, trees should be kept well irrigated. From that time until November it is certainly best to withhold the the water, giving them a chance to ripen up their wood. In November, before the ground freezes, they should have another good wetting, and they will then be in good condition to go through the winter. There are some soils that this might not be the best method to irrigate fruit trees, but it is for my soil.

One of the most important duties in growing fruit is proper irrigation, and it is a labor I have seldom entrusted to any one else with satisfactory results. It needs the personal supervision of the grower, and while it is easily performed and a pleasing labor, yet after you have all the ditches arranged in the most convenient manner, you may put in some one who will go in with a shovel and in fifteen minutes cut and slash so that it will take a week to get matters into shape again. Then,

after you manure your rows heavily, it is necessary to watch your water closely or you will soon lose the most valuable portion of the fertilizer you have put on. I have always found this watering a very pleasant and light task, and in attending to it myself I keep a constant oversight of all portions of the place, and know just the condition of all the fruits constantly.

There are drawbacks attending those at the lower end of a long ditch, but there are advantages also, not the least of which is the warmth of the water by the time it gets to you. Cold water will at times injure plants that are tender, but warm water seldom will, and most always induces immediate growth.

Fruit must have water, and I believe those who experiment once with putting fertilizers in their irrigating water and noticing its wonderful and immediate results, will never abandon it afterwards. Have a large pond raised above the level of your fruit beds, fill it with manure, then turn the water into it, and after soaking awhile, turn it on to the rows of fruit, and you will be surprised at the results. There is but one caution to be observed, and that is to be careful that the decoction is not made too strong. When we have a good stream of water with which to irrigate, it is very easy to regulate the strength to suit ourselves. There is neither fruit nor vegetable that this will not benefit.

Thus, you have the results of some of my experiments in this arid country, and if your experience does not agree with mine, it is because your soil or yourself is not similar to mine or me. Even should I ever attempt to grow fruits in a country that is not arid, I should not care to do so without full preparations for irrigation.

After which followed a general discussion on "Irrigation:"

MR. WEBSTER: Flood my orchard. It never hurts my crop. Use this method because I think it keeps the tree in better balance not to run the water too near. Scatter my manure over the ground instead of putting it around the roots. My land is black loam. I irrigate every month in the year. Late irrigation improves the size of the fruit.

DR. SHAW: The most healthy looking orchard I have ever seen was planted thirty feet apart and flooded.

MR. FAUROT: Sandy loam requires flooding. On clay soil, running in ditches is sufficient.

MR. WEBSTER: Experimented with Box Elders and other forest trees. Those not irrigated late killed down, while, where plenty of water was given, they came through all right.

MR. ACKERMAN: Have some trees that have not been irrigated for three years. Keep my land damp, but not too wet, until September first, and never give them a drop after that. Never thoroughly soak my land. All trees commence a second growth in September.

DR. SHAW: What difference is there between the watering of strawberries and apples late.

MR. MCCLELLAND: Length of roots.

DR. SHAW: Apples grow about one-tenth of their size the last month, and should be watered at that time.

MR. T. R. OWEN: Have two Siberian crabs, twenty-five or thirty feet from a lake, that have not been watered for ten years, yet they always bear.

MR. TARVIN: Have seen an orchard consisting of Ben Davis, Spitzenburg, Duchess of Oldenburg, Early

Harvest and some crabs, that are always wet and bear good crops.

MR. WEBSTER: Buds will never freeze where the limbs hang over a stream. The water protects them.

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# Legislation.

BY MR. HIRAM PRINCE.

Congress should be asked to pass an *equitats* law in order to regulate the inter-state commerce so that the legislature may be enabled to fix rates for freight and passengers coming in and going out of the State. Railroad legislation is a very important matter. The magnitude of its importance is only exceeded by the necessity of the passage of a just law, and will require conservative consideration. It is a fact that by reason of railroads that have been built in the State of Colorado the interests of the State, not only financially, numerically and commercially, but the agricultural interests, have been advanced more in a few years than could have been done in a hundred years by any other means, and their power to still advance these interests is immense. This very power leaves them dangerous to public good while unrestricted. The local roads, by oppressions, discriminations, extortions and, possibly, unconstitutional handling of coal and pooling with other monopolies. Discriminations in regard to rates insure an apparent fact, that rates are too high, or the discrimination could not be permitted. They would not do this and insure losses. A powerful attempt at monopoly by the millers' association, depending to some extent on the discriminations of railroads to carry the scheme into effect, while farm-

ers, carrying mortgages at high rates of interest, would be compelled to raise wheat at ruinous prices, and in the end lose their farms to the moneyed aristocrats, who call their money eastern capital to evade assessments, and so compel the farmers to pay more of the tax. This is "a government of the people, by the people and for the people," and we have a right to restrict dangerous monopolies and pass such laws as will insure good government. In justice to the companies and rights of the people, place it out of the power of the railroads to enrich mercantile and other monopolies at the expense of small merchants and the working classes. The people demand action of the coming assembly, and do not believe that the legislature can delegate its power to a commission to fix rates. They should fix rates and provide for their being carried into effect. Advisory commissions cannot give adequate relief, and only entail additional expense on the people, and is a moneyed king's scheme, and worthy a monopolist's invention. I would suggest just laws and enforcement of them, and a double-quick repeal of the present commission.

### A STATE WATER COMMISSION.

A Board of Commissioners, composed of the Governor of the State, State Engineer and County Judge of any county wherein the adjustment of the water may be necessary; the County Judge, or Judges, to be paid a reasonable fee for the time actually spent in the performance of his duty.

*Duties of said Board*—No new ditch or canal should be taken out of any stream without permission of this board; said board shall determine whether all the waters have been appropriated, and keep a record of the same, so that the people may consult these records before buying lands under canals constructed by syndicates who often buy cheap lands and con-

struct ditches in order to sell land with water-rights, at high prices; buyers are defrauded and no conditions are provided so they can learn these facts. This board should convene at an appeal of the people, and settle and adjust any differences that may arise by reason of injustice or incompetency of Water Commissioners. This board would be of importance to regulate water when two or more districts are formed on the same stream. I might mention last year's conflict on the Platte. Water Commissioner of District No. 8 took out all the water, so that Water Commissioner No. 2, below him, had nothing to take out, not even stock water, yet he had some ditches with as old rights as any in the State. Old ditches were ordered down in District No. 8, while District No. 7, an heretofore supply to District No. 2, as much so as No. 8, was having ample water with ditches taken out, many of them, within the last two years. All the late ditches in District No. 7, should have been shut down, in accordance with priority right, and a board of this kind is necessary to regulate Water Commissioners in cases of this kind, or other emergency.

*Needed*—Amendment to Section 87 (33), in Division XI., appeals in adjudication of water-rights. The expression of the provision is: "After the lapse of four years from the time of entering the final decree." The words "four years" are obnoxious and should be erased, and the word "twenty" inserted in its place. It should always be legal to attack frauds, and some of the most unreasonable frauds have been practiced and sworn to, and permitted, in some of the water districts; and especially in No. 6; both as to quantity and to date in years when taken out; many ditches have dates seven to ten years ahead of their construction. The injustice of this must be apparent to all; and the four years' limitation places an obstruction in the way of justice being done.

*Needed*—A repeal of the present law regarding head-gates, and a law provided to enforce head-gates, so the Water Commissioners can control the water in the ditches.

*An amendment to the law in regard to stealing water*—If a ditch is cut and water found running on a man's land, it should be sufficient to convict the man who is in charge of the cultivating of the land, of a misdemeanor.

*An amendment to the law in regard to Water Commissioners' Assistants*—He should be allowed the number sufficient to control the water, and the time should not be limited, but should employ them whenever necessary.

*Needed*—A bill defining duties of water for domestic purposes. It is certain the framers of the Constitution were intent on protecting the settlers on the streams, and prevent water being taken out of the streams for irrigating purposes when the streams were low, which would rob them of the old riparian right to the use of the water for domestic purposes. But the long canals are making such claims for water for domestic use that it will in a very great measure destroy the duty of water for irrigating purposes to the old settlers of the State who have taken out first ditches. Here, I take it, is needed legislation. It is eminently unjust to destroy the industry of one part of the commonwealth to build up the other.

NEEDED—A REVISION OF THE REVENUE LAW.

Interest is too high, penalty too severe, the time is too short for the assessor to do his work, and many things need changing. My paper is too limited to mention them all.

ROAD LAWS.

An amendment is needed to our road laws, or the present should be better systematized.

A GOOD LAW.

Section 1, in Division III, giving commissioners the right to regulate the price charged for delivering water, is a good law. As the country has developed, the duty of water has expanded. New regulations need to be added. Commissioners of counties where heads of canals or ditches are located or taken out of the streams, said commissioners should be given the right to regulate and establish the price per inch that water should be delivered for the entire length of such canal or ditch, notwithstanding they may run through two or more counties. State Engineers might be added to the boards to assist in determining rates that water should be sold for. The people should have the right of immediate appeal to the board, in case of needed relief from oppression or injustice in regard to rates. A penalty should be provided and rapidly enforced upon any person or persons or corporations for formulating any agreement or contract in regard to measurement of water, which is not in conformance with the statutory provisions for measuring water. An inch of water should mean the same thing to every person in every part of the State. It will be said that water should be delivered by the cubic foot per second. That would be correct, but the people need educating up to this method. Until other provisions for measurement are made, let the statutory provisions prevail that the people with a common interest may have a common measure. The water of the State is dedicated to the people, subject to appropriation, priority giving the better right. Appropriation is the taking to yourself, the beneficial use of, and application of, on land, so far as irrigation is con-

cerned. The actual user is the appropriator, and any ditch carrying water, other than what it may be using on lands belonging to the ditch company, is a common carrier, and should be subject to any or all restrictions necessary to a properly governed people, as other carriers should be. The capitalists who have invested large and larger sums of money to develop our State have been benefactors to many people who could take land to farm, but could not build canals to irrigate them. They deserve our admiration and consideration for adding wealth and prosperity to our State, and should receive a just compensation for their money invested, but should not be permitted to utilize the waters of the State as capital to enrich themselves, or be permitted, by exhorbitant or unjust rates of carrying water for the users and tillers of the soil, to impoverish them, the majority of whom are paying high rates of interest on their lands, have heavy taxes to pay, and often pay too much for water delivered, and with low prices of products, deserve consideration and honest legislation.

### NEEDED AMENDMENT TO THE FENCE LAW.

Strange as it may seem, one of the greatest investments in the country, one among the most costly productions of human industry, is the common fence. You will scarcely believe me when I state that the fences of the United States have cost ten times the amount of specie there is in it. In many States the fences have cost more than the fences and farms are worth. The stockmen can buy their cattle and turn them on the range. The farmer, who often starts poor, must buy implements, build, purchase seed to put in the ground, and fence to protect his crop, although he may have no cattle of his own. We need a defined legal fence. Section 1, of the present law, was mutilated, and is defective, and with sixty-four thousand miles of fence in this

State, I dare say that there is not ten miles of legal fence in the State, according to any provision of law. Section 1 should be made to read: "Three barbed wires, with posts not more than thirty-three feet apart, or sixty feet apart, with stays not over ten feet apart; that a farmer may be legally enabled to collect damages done his crops by stock, after making a reasonable fence to protect them."

### THE MILK FIEND IS QUITE ACTIVE.

A bill should pass the General Assembly to prevent the adulteration of milk, and, as no one but adults adulterate milk, the penalty should not be less than five hundred dollars; not merely that it mitigates against the milk interests, but that it should prevent deleterious drugs from being fed to children and babies. Many receipts have been sold to our leading dairymen, that with ten per cent. genuine milk they can make an article that is very difficult to detect. Children need protection.

### NEEDED LEGISLATION.

An appropriation for the Bureau of Immigation to advertise the advantages to be had in the State; canneries for fruits of various kinds, and of excellent qualities of beans and tomatoes. We excel any part of the world either in quantity or quality, and with our advantages of feeding alfalfa for beef, we could sustain beef canning with success. We need oat mills for making oat meal and grits. We, in this climate, can produce a better quality of oats for this purpose by irrigation than can be produced in rainy climates. We should advertise the opportunities for men to start dairy farms. Farms of twenty to sixty acres could be made very profitable by cutting and feeding alfalfa—the correct and economic way of feeding dairy cows. One acre of alfalfa so fed is worth three acres of the best blue grass. One

million two hundred thousand dollars that goes out to other States for butter and oleomargarine should circulate in our own State. To say the least, we pay for the product of twenty-five thousand cows fed in other States, is a mild hint to invite immigration by advertising for people who will milk, if our people won't, or cannot get time from raising wheat.

### SANITARY CONDITION.

In regard to the sanitary condition of our State, I am confident there is no climate so curative for dyspepsia, asthma, or the early stages of consumption. I would say to the consumptive, come gradually. Some dyspeptics are benefitted by living in Denver, but in the mountains sanitary conditions are complete. In the interest of humanity then, if nothing else, we should advertise this feature of Colorado. Being cured of asthma of long standing, and nearly a quarter of a century's residence in this State, and experience and observation have taught me whereof I speak.

### MEMORIALIZE CONGRESS.

Our senators and representatives should be importuned to get an appropriation from Congress to build reservoirs in our mountains, and for the turning of Grand Lake into the different streams this side of the mountains—the Boulder, St. Vrains and Thompson creeks. Government aid is given to railroads, to rivers and harbors, by millions, all to promote commerce and increase the wealth of the Nation. Every acre of land brought under cultivation and irrigation would increase the wealth of the State and add to the wealth of the Nation, and increase our tax-paying power. Thousands of acres of land by this means could be brought under cultivation; we could offer homes to thousands of people in crowded cities of the east and increase our population

and the prosperity of the State and Nation. The Goverment scales are out of balance, money is accumulating enormously at one end, and the agriculturists tilting up with empty pockets at the other, by reason of revenues, taxation, high rates of interest and low prices of products. That, notwithstanding the sixteen hours a day of labor, many are unable to pay their debts, and this is when money is accumulating at the rate of nearly two millions per annum in the public treasury. Our revenues are too high; but as these revenues are by far the heaviest on liquors and tobacco, things which are not a necessity to human existence, but a luxury of a morbid appetite, or a curse, as you choose to name it. People are not compelled to buy these things. To no other one thing can you so largely attribute the success and wealth and maratime greatness of England, as to the fact that for five hundred years no country has so well protected their manufaturing interests. Skilled labor has been well protected in the United States for a number of years, and very many of the proprietors of manufactories are wealthy; many of them millionaires; and it has been somewhat detrimental to the agricultural interests. Manufacturers have grown richer and farmers have grown poorer. Agriculture, in a highly improved state, is the means by which to exalt a Nation and contribute to its enduring prosperity. All trades and commerce depend on this art as their foundation, so we ask an appropriation from Congress for a loan, for a period of ten years, of the sum of $5,500,000,000, to be equally divided among the States and Territories, according to the number of acres of land in each, to be loaned at the rate of two and one-half per cent. per annum, for the benefit, first: of the farms that are at the present time held under mortgage or trust deed, to be loaned in sums of one-third of the cash value of the farm or real estate on which it is loaned; second, all who may wish to borrow until it is exhausted,

on like conditions. One of the brightest provisions in American history is the homestead law, by which a man can get a farm by living on it. The record would be no less bright by enacting a loan, wich would enable them to keep these farms, many of which are slowly but surely drifting into the money lender's hands. A loan of this kind would make a happy and prosperous agricultural people, and this, in turn, would add prosperity to all branches of every industry, and in ten years the Government would have its own again, with usury; and the stars on the old flag would seem to shine brighter, a glory would radiate around it to the admiration of the world, the coming generations would be blest; and the financial chronicles of New York would collapse.

Needed reform in the expenditures of the General Assembly of the State. Salary of seven dollars per day, and go-as-you-please, ought to be changed. They should receive five hundred dollars and mileage for the term, and furnish all of their own stationery. This would save thousands of dollars in printing, useless measures, and stop much stealing. All of the committee men's clerks should be dispensed with, except the judiciary, and the amount so saved could be appropriated to State institutions.

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## The Benefits of Horticultural Meetings.

BY MR. JOHN A. ELLET.

Though horticultural societies are now numerous in all civilized and enlightened countries, they seem to have originated early in the present century. The London Horticultural Society, formed in 1808, is the first society of the kind of which we have any record.

The progress of the parent society was steady, its growth remarkable, and its influence great. It infused into the minds of the horticulturists of that day and locality, a spirit of inquiry, reflection, discovery and intention, which has done much for the advancement of practical horticulture, while it has done much more to dignify and ennoble one of the grandest occupations known to civilized man. The practical utility of such societies was at once recognized, and it was not long before they were organized by hundreds throughout Great Britain and Germany, and they now exist in vast numbers in all progressive nations. It is an interesting and suggestive fact that the intelligence, thrift and practical success of a community can always be accurately measured by the number of its agricultural and horticultural societies, and the interest which is manifested in them. They are schools for the more general diffusion or knowledge of the most practical and useful kind, and the man must indeed be very learned or very ignorant whose information is not increased, whose views are not broadened, and whose sympathies are not deepened by attendance upon such a school. It is there that experiences are compared, mistakes are corrected, and systems improved. It is then that enthusiasm is engendered and a spirit of emulation of the best achievements is inculcated. And all these things are elements of success.

It is said that necessity is the mother of invention. If that be true, is it not probable, that the necessities of agriculture, emphasized and made prominent by the early horticultural societies, were important factors in bringing about the wonderful improvements, which the nineteenth century has witnessed in agricultural implements? Men now living have seen the wooden plow supplanted by the iron one, the flail giving place to the treshing machine, the scythe abandoned for the mowing machine, the sickle and cradle resigning in

favor of the reaper, and the reaper itself improved and perfected into a self-binder, performing service for man, which a few years ago, seemed impossible of accomplishment except by a human hand, guided and directed by a human intelligence. In manufacturing the grain into flour, also, the same progress has been made. Though wheat has been ground, in mortar or in mill, as a food for man, from time immemorial, some of the most important improvements made in the art of making flour have been consummated within a dozen years. The question naturally arises: Has the quality and quantity of the crop kept pace with the facilities for planting, culivating, harvesting, transporting and marketing the crop? If we were to confine our inquiry to the progress of gardening only, and in the exceptional development, many would be inclined to give an affirmative answer to our question; but if we should include the general range of farm products, every one will agree that the answer must be in the negative.

Mr. Henry Stewart, associate editor of the *American Agriculturist*, and a recognized authority on agriculture, says: "What the ultimate possibilities of growth in any crop are, is unknown; but it would seem as though they depended greatly upon the supply of water absorbed, sufficient nutriment, of course, being provided. Rye grass, upon irrigated fields, richly fertilized, has grown at the rate of one inch per day, and repeated cuttings have been made at intervals of fifteen days, during a season of months. Crops of grass on irrigated fields, of a total weight of more than eighty tons per acre, have been reported by trustworthy English farmers. Irrigated grass fields in Italy support easily two head of fattening cattle per acre, every year, and have long done so. In hundreds of localities in European countries are irrigated meadows which have borne grass without any sign of deterioration within the

memory of the inhabitants or the knowledge of the readers of local histories, although the crop has been cut and removed every year during this indefinite period. Whether or not these crops could be further increased by more skillful management, is not necessary to inquire. These products are so far beyond the dreams of an American farmer, that they may well be considered fabulous. But there is no reason to doubt the facts. On the contrary, they should be used as a stimulus for us to adopt, wherever practicable, the methods by which these crops are produced."

The methods referred to by Mr. Stewart, are surface irrigation, similar to that we practice. It would seem very crudely and imperfectly in Colorado. If this record of achievements long since accomplished, which Mr. Stewart says is not to be doubted, surprises and startles us, what are we to say of the claims of Mr. A. N. Cole, as set forth in his work upon subterranean irrigation, called the "New Agriculture."

Think of Early Rose potatoes at the rate of twelve hundred bushels to the acre. Strawberries at the rate of four hundred bushels to the acre. Raspberries and blackberries at the rate of five hundred bushels to the acre. Marrowfat peas at the rate of five hundred bushels of pods to the acre. And Champion of England peas at the rate of one thousand bushels of peas to the acre. But there are other claims set forth by Mr. Cole quite as remarkable as the quantity and quality of his productions. He claims that the ground will not freeze when prepared under this system, and that the producing system in the latitude of New York may thus be lengthened from forty to sixty days. I know the derision with which such claims will be met by many, and it may be that such derision is entirely just. But I submit that if you continue to half starve ten head of cattle on a farm of one hundred and sixty acres, while an Italian can

fatten three hundred and twenty head of cattle on the same ground, it ought to beget in us a modest, thoughtful, teachable spirit in reference to possibilities in other directions not fully explored by us. While blind credulity is dangerous in agriculture as elsewhere, the safe rule always is: "Prove all things, and hold fast that which is good."

That, as I understand it, is just the subject of horticultural societies. Each member profits not only by his own experience, but by the experience of his neighbor, and thus increases the fund of his information in geometrical ratio. In furtherance of this plan of disseminating practical horticultural information, we ought to have, in connection with our Agricultural College, a much larger number of experimental stations. Some of these might very properly be the farms of intelligent, enterprising and distinguished horticulturists, who for a reasonable consideration, would give to the State certain privileges upon the premises, as well as full reports, at stated periods, of the results of all experiments; and especially those of a nature not likely to be undertaken by individual enterprise.

I was much struck with the remark made by an intelligent gentleman from the east, with whom I once visited at the Perry White place, in the suburbs of Boulder. Said he: "I never saw so much produced on so small a piece of land. If you people could show every stranger who visits Boulder that garden, it would do your State more good than the whole display you are making at the Denver Exposition."

There are certain special problems vitally affecting our prosperity, to which the attention of all our farmers ought to be directed; and to the solution of which the professors of our Agricultural College ought to give their most careful skill, ability and attention. Among them I will mention:

*First*—Whether any horticultural or agricultural crops can be successfully and profitably grown at this altitude, during average seasons, without irrigation? If so, what crops, and how should they be harvested, cultivated, marketed or fed?

*Second*—Would the winter irrigation of meadows and pastures, so successfully practiced in southern Europe, be practicable or profitable in this climate?

*Third*—Is there any grass seed that could be sowed upon our lands above ditch, which would take root with or without plowing and flourish in this climate, which would furnish more pasture than the native grasses of our plains, and be in all respects enough better than our native grasses to pay for the substitution? If so, what is the grass, and how and when should such grass be sown?

There are other similar questions which will readily occur to your minds, and open up a vast field for patient, methodical experiment and research. And the results of those experiments should be carefully preserved. It is the province of agricultural and horticultural societies to so encourage, direct and aid this work, that the results may be profitable to us in our day and generation, while they bequeath a vast fund of reliable information to the millions who will one day inhabit the vast empire now known as the Great American Desert.

## Canning and Preserving Fruits.

BY MRS. A. WILD, of Loveland.

Being requested to prepare a paper for this meeting on "Canning and Preserving Fruits," I will give a few hasty remarks, but feel that there are many abler for the subject than I am. It may be interesting to know that we

are indebted to Pompeii for the great industry—canning fruits. Years ago, when the excavations were just beginning, a party of Americans found in what had been the pantry of a house, many jars of preserved figs. One was opened, and they were found to be fresh and good. Investigation showed that the figs had been put into the jars in a heated state, an aperture left for the steam to escape, and then sealed with wax. The hint was taken, and the next year fruit canning was introduced into the United States, the process being identical with that in vogue twenty centuries before. The ladies of America who can their fruit for domestic use, do not realize that they are indebted for this art to a people who were literally ashes a few years after Christ.

Some one says God might have made a better fruit than the strawberry, but he never did, and we are ready to echo the sentiment. When we see the scarlet beauties getting ripe, we begin to realize all the capabilities, although the quality of the article may depend on the cook, yet with a good receipt and care, very nice and tempting results may be accomplished. I prefer the small dark-red varieties, Wilsons, to can. The very large ones cook to pieces, and are not so good a color. I find better success in handling them in small quantities, say six to seven quarts. Place the berries in a colander or sieve, and pour water over them to remove all sand or dust. Hull them carefully and then take three-fourths as much sugar as you have berries, and leave them stand over night in a porcelain or granite dish. Then in the morning strain off the juice and put it on to cook. Let it boil for five minutes, then put in the berries and let them come to a boil. Dip them out and can immediately, and seal tightly, and if there is more juice than you wish to can with the berries you can make jelly by adding one-fourth more sugar and boiling fifteen minutes. Then put in any open vessel and put

away. By the above plan of canning the strawberry, I find it keeps its color and flavor much better than any other way.

*For canning Raspberries*—I take one cup of sugar to two quarts of berries, and only boil them five minutes. I think boiling fruit too long makes it hard. Do not add any more water than you actually need.

*For Blackberries*—I observe the same rule as for raspberries, except taking one cup of sugar to one quart of berries.

*For Blackberry Jam*—I crush one quart of berries, fully ripe, to one quart of sugar, granulated, and cook gently until thick.

*In canning Currants*—I wash them first, then take off the stems carefully so as not to bruise or jam them, then fill my jars as full as I can get them, seal them and place in a boiler or kettle of cold water, and put on the stove to boil. Let them boil twenty minutes, take them out and have a hot sugar-syrup ready, open the cans and pour it over the fruit, then seal up tightly and set away for use.

*For making Currant Jelly*—Boil the currants twenty minutes, strain the juice and measure one pound of sugar to one pint of joice; boil the juice two minutes, then add the sugar and boil the whole together one minute. Now it is ready to fill the cups and set away to cool. Do not cover until cool.

*For canning Gooseberries and Grapes*—I do the same as with currants, observing the same rules.

*Tomatoes*—The cause of so many losing their canned tomatoes is that they leave them until they are too ripe, when the acid in them approaches fermentation. If you have them in your own garden, it is nice to put

them up a few at a time and keep them in a cool place till fall. Pour boiling hot water on your tomatoes and peel. Then put them on to cook, never using tin or an iron kettle to cook them in. Boil fifteen minutes, skimming off the scum that rises, and can. I think the dark colored glass jars are the best. I find the addition of a little salt has a good effect.

*Tomato Preserves*—Take the yellow variety as soon as ripe, scald and peel. Then to seven pounds of tomatoes add of sugar seven pounds, and let them stand over night. Take the tomatoes out of the sugar and boil the syrup, removing the scum. Put in the tomatoes and boil gently for fifteen minutes. Remove the fruit again and boil till the syrup thickens. On cooling, put the fruit into jars and pour the syrup over it, and add a few slices of lemon to each jar.

*Apple Jam*—Take one gallon of cider, or in the absence of cider, a cup of vinegar will answer. Put in five pounds of pared and colored apples, and let them boil until they are quite fine. Then add three pounds of sugar and boil for one hour, or until it is as thick as is desired. Just before removing from the stove, flavor with an even teaspoonful each of ground cinnamon and cloves. The jam should be stirred constantly.

Had I a voice of such power as to penetrate the ears of every farmer in the land who has hitherto failed to provide for his family an abundant supply of small fruits in their season, I should now tone it to the highest pitch, and with the greatest emphasis at my command urge upon every delinquent one to make preparations for a generous supply in the future. It seems strange that in a land where small fruits can be grown so successfully, and with comparative ease, that there should be so large a per cent. of thrifty farmers who are still without even a strawberry bed.

# Æsthetics in Horticulture.

BY MR. T. R. OWEN.

The first thing that attracts the attention of the American on his arrival in England, is the beautiful landscapes, neat and attractive appearance of the road-sides, hedges, hills, and cosy cottages, and neat out-buildings of the rural portions of the country, and as he approaches a town or city, the splendld road-beds, level foot-paths, avenues of arching trees, smooth lawns and highly cultivated flower gardens, even the vacant spots about the railway stations are covered with nicely mowed grass, and are made to look ornamental, attractive and refreshing, attracting the traveler often times to forego the luxury of a rapid trip through such scenery on wheels, and to make his journey on foot across the country, over the hills and far away. Indeed, it has become quite the proper thing to "do" Europe and the Continent by bicycle or on foot—a sad old time they would have "doing" this section of the country by either of said means. Irrigating ditches and bad bridges (such as they have in the adjoining [?] counties), do not make good roads, and alkali flats and road-side hedges made of three strands of painted barb-wire, with posts two rods apart, are not sufficiently enticing to make a man leave a palace car to hunt landscapes or scenery down our muddy, dusty lanes, shaded by prickly pear and fence posts.

In the first instance, we see the effect of æsthetical horticulture, while in the latter instance, we find a total absence of either æstheticism or horticulture. England furnishes us with two types of the genuine æsthetical horticulturist—the practical æsthetical horticulturist, the English gardner; and the dude æsthetic horticultur-

ist, Oscar Wilde. And yet, Oscar did good in his way, for he caused certain silly simpletons to sigh and say they saw something sweet in the sunflower, that they never did see until he showed it to them.

Now, if we can only enlarge on the Wild(e) theory, and convince the public that sunflowers are the proper thing for bridal wreaths and festive occasions, we, too, in a very short time, can have farm houses, painted fences, good roads, Hawthorn hedges and cottonwood avenues, and the whole face of our plains, instead of "blushing as the rose," would brighten as the sunflower, being a happy blending of the beautiful with the beneficial; and this is what is meant by "Æsthetics in Horticulture."

Now, what we want in this country is a little more of the one, and not quite so much of the other kind. We need something more than a mere landscape gardener, but cannot afford to live on æstheticism and good taste alone. We must be able to make flour as well as to cultivate flowers. We must be prepared to make an attractive landscape on our farms before we can enjoy it from the standpoint of a Wilde, but at the same time we ought to cultivate our tastes so that when we do see the beautiful, we can appreciate it. We want to be able to select the best building site for our homes, with a view to health, comfort, convenience and attractiveness. We want to know the style of home that will best conform to the surroundings. The color of paint that blends the best. The best fruit and ornamental trees, and just where and on which side to plant them; whether in the foreground or in the background. The relative position of barn and other out-buildings. How to lay out roads on the farm so as to be convenient, good, and yet attractive approaches, without cutting up the land to a disadvantage. How to set out clumps of shade trees without obscuring the view, but at the same time affording shade

and shelter to stock. How to set out an orchard with such rule and regularity that it can be cultivated to advantage and will attract the attention of passers by. Not as Bob Niver run his ditch. We must know in addition to how to plant a grape vine, how to care for it, how to trellis it, how to prune it, how to preserve it, how to prepare it for the market; for, bear this in mind, that looks on a farm is like fat on a horse, it is a good color and commands its own price. For how do we judge of a man's thriftiness more than another if not by the looks of their respective surroundings? But some man with a practical turn of mind will say: "It is all mighty pretty, but it don't pay." Such a man, while his neighbor has become prosperous cultivating grain and fruits for himself, has become stoop-shouldered raising mortgages for someone else. It does pay. What is pretty, pays. A child in its infancy is attracted by what is pretty, and a man is attracted by what is beautiful.

Possibly, for the purpose intended, my views have taken a broad range, and relate more to agriculture than horticulture. Yet, horticulture and husbandry, are, or should be, hand-maidens, and the two constitute agriculture. We can't be horticulturists unless we are husbandmen, but we may practice husbandry without horticulture. Horticulture is the æsthetics of agriculture. Æsthetics means "the theory or philosophy of taste, the science of the beautiful in nature and art." As applied to horticulture, æstheticism means judicious selection of plants and fruits, ornamental and careful care and culture of the same. The taste to select the best varieties, to keep everything about the garden neat, to prepare the product for market so as to look tempting and attractive and produce a demand. Suppose a case: That we send twenty pounds of the same kind of grapes to the same market, ten pounds in a candle box, and

ten pounds in a neat basket, with now and then a green leaf just peeping out enough to contrast with the luscious blue tint of the fruit, suggesting freshness and flavor. Which would sell first, and for the most? And yet some gardeners complain of their merchants, and accuse them of selling the fruit of others while theirs is left to wither and rot. Horticulture is a science, and the successful horticulturist is an æsthetic. It is a science, it can be taught, not only in our colleges, as at Fort Collins, but on the farm, at the fireside. Then if it can be taught and it does pay, it should be encouraged, and all honor and praise to this Association, that has voluntarily assumed this labor of love, and with what success they have met, witness the creditable display around us. Here before us is an actually tangible display of æsthetics in horticulture. The judgment shown in the selection of the different varieties, and the cultivated taste manifested in their display. A little leaven leaveneth the whole, and one display of this kind will do more to awaken interest in horticulture, and encourage æsthetics in the same, than all the lectures that can be written. Everybody ought to encourage the good work. I confess that you have encouraged me, and I believe that I can encourage you.

Section 7, of Article XVIII., of the Constitution of this State, says: "The General Assembly may provide that the increase in the value of private lands, caused by the planting of hedges, orchards, and forests thereon, shall not, for a limited time, to be fixed by law, be taken into account in assessing such lands for taxation."

I do not know of any law having been passed pursuant to that provision of the Constitution, and if this Association deems it advisable, I will champion with pleasure such a bill in the next General Assembly. I think it but just and proper, under the circumstances, that this in-

dustry should be fostered and encouraged by just and appropriate legislation; and as yet, we have hardly passed the threshold of horticulture, and the way to success is still beset with false croakers and chronic prophets, who tell us that this is not an apple or small fruit country, and that failure will be the common lot of all who attempt it. Our laws, as they are, instead of promoting or encouraging horticulture or æstheticism, in fact, has a contrary effect, for if a man with feelings of refinement and æsthetic taste improves, adorns or beautifies his place, along comes the assessor and raises the valuation accordingly; while his slovenly neighbor, who is content to live in a hovel, is only taxed on his land of an equal number of acres. The one is a blessing to mankind, the other is of no use or benefit to any one but himself. Industry and enterprise is taxed, while laziness and selfishness is rewarded. The better principle would be to reward and encourage improvements and progress by a proportionate reduction of taxation, or exempt from taxation, as contemplated by the Constitution, and punish shiftlessness and selfishness accordingly. Then the average farmer will see that "Æsthetics in Horticulture" pays.

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This paper closed the evening session and completed the programme for the first day, and the meeting was adjourned to Thursday, December 9, at 9:30 o'clock.

## MORNING SESSION.

THURSDAY, December 9, 1886.

The interest which the meeting of the society had aroused in the minds of the people of Boulder and adjacent points, and the interest manifested in the cause of horticulture was plainly visible at an early hour on this day.

The beautifully decorated hall, with its fine display of fruits and flowers, was a scene of busy life for a full hour before the opening exercises were announced.

Many visitors gathered in the hall and made a full survey of the different tables of fruits with anxious inquiries as to the methods used in the management of the orchards from which they were taken.

Promptly at the hour announced in the programme, the president was found in the chair, and the opening exercises were begun with a selection of music by the Boulder Brass band.

After which the regular exercises were taken up in presence of a full house, and the following paper was announced:

# Cultivation of House Plants.

BY MRS. GEORGE SAVORY.

I have been asked to write what I know about house plants. If it had been what I do not know, I think I could have filled volumes; but as this society is for the purpose of teaching us more in regard to the culture of fruit and flowers, I shall expect to be better able to write upon this subject myself next year.

Very early in the history of the world the people saw the use and beauty of flowers. As far back as we have any trace of men we find that they were in the habit of cultivating flowers, and so decorating and arranging nature as to supply a pleasant spot where they might retreat and enjoy bright colors, rich foliage and sweet perfume. Among the most famous of ancient gardens, the ruins of which still remain to give us an idea of their vastness and grandeur, were the hanging gardens of Babylon. They were one of the seven wonders of the world. I have read a very romantic story of their origin. It was said that there once lived a great Assyrian king, who was very devoted to his wife. Everything she asked of him was immediately granted. She came from one of the most beautiful valleys of Persia, and had always lived amid the most romantic scenery, beautiful trees and banks of flowers. Babylon was a dull place. Nothing but bare hills and dreary heaths. So the queen, tired of these uninteresting views, begged the king to make her a garden to remind her of her own beautiful valleys. The king, to gratify her, set an army of laborers to work, and thus the bare fields were converted into beautiful gardens. Although we may not have the beautiful gardens of Babylon, we can do much to make our homes lovely; and what is there that has a more refining influence than a home with lovely surroundings?

Few things add so much to the cheerfulness and comfortable appearance of a room during winter than a window filled and enlivened with plants. Geraniums, primroses and lantanas prove very satisfactory. They are strong and vigorous in growth, easy of culture, attractive in foliage, and very profuse bloomers. They can be cultivated with unvarying success. The foliage geraniums, silver and gold leaf, also the sweet-scented varieties, are very ornamental. Plant them in sand and

leaf-mould, with a little charcoal in the bottom of the pots, and they will repay you all the care. They are not troubled with insects and will survive a very dry atmosphere. A beautiful hanging-basket can be made by planting around the edge of the basket Kenilworth ivy and Wandering Jew, in the centre a pink and white Oxalis. For the hanging-basket there is, perhaps, no plant that proves more satisfactory than this, as it is a free bloomer, has thick foliage which forms an unbroken mass of green leaves. Water this and all plants in the basket with tepid water, into which a few drops of ammonia have been added. The amateur florist can not be too careful in the watering of house plants. Plants that are growing rapidly or are in bloom, take up a great deal of water through their roots, especially in the dry atmosphere that is common in our living rooms, and they are easily injured by receiving too little, or on the other hand, the soil will become sour if watered too much, and the plants will not thrive. They should have a shower-bath as often as once a week, as that is the best safe-guard against the red spider. Turn all window plants once a week to keep them in shape, as they turn to the light. Do not be afraid to trim out the buds, if very abundant, as they will blossom longer and better. And for our windows, we must not forget the running vines, as they are deserving of special mention for draping and festooning, thus forming a frame-work or bower, very graceful and beautiful. The Maderia vine is one of the most rapid climbers, and is strong and vigorous. Ivies, both English and Scotch, are favorites. A very pleasing effect is produced by placing a pot of the vines on each side of the window, training the vines up each side and over the top, the clinging tendrils twining wherever support is offered. I have not tried to give you a list of plants, as I know you could get a better list of any florist than I could

possibly give you. Those who have window plants can not always keep the temperature high enough during the night to keep them from freezing. Where it is feared they may freeze, it is best to cover them with two or three thicknesses of newspaper. If the plants are found to be frozen, remove them to a room where the temperature is but a few degrees above freezing, that they may thaw out gradually.

We all desire earnestly to make our homes attractive, and much has been written about beautiful homes, especially for the farmer, and perhaps the reason why our homes have such an air of forlornness, is because in this not very old country the farmers and farmer's wives, in their desire to get clear of debt and improve their farms, have spent more time in work which would give returns in dollars and cents, and they have let the looks take care of themselves. We should make our homes beautiful, bring to them flowers, plant them about us to bud and to bloom, and to every inmate it would be the dearest spot on earth—a place of beauty and a joy forever.

CULTIVATION OF HOUSE PLANTS.

DR. SHAW: Colorado sunshine makes flowers here brighter than anywhere else in the world. Have been very successful with house plants, especially roses. The standards are the more hardy. In the fall I lay them down and cover with straw, with a little dirt on top to keep the straw from blowing away. The Bennett rose does well here. The Paul Neran is very large and hardy. The White rose, Madame Planter, is very fine, and the most fragrant seen in this country. General Washington is a good rose.

Among the climbers, Prairie Queen and Queen of the Prairie are the best. Clematis, in variety, does well, and the bloom is large. Many persons mistake the flower for the bud. It lives very well out of doors. The Honeysuckle

family succeed well. All roses and vines do better when covered, although there are a few that thrive without. The Seven Sisters is a very fine rose, but is not fragrant. The Dundee Rambler rose will run over the entire side of a house in one season. The plants should be given rich earth. Never use fresh manure, but take well-rotted cow manure. Liquid manure is best. The pots should be well drained. I put a couple of inches of fine coal in the bottom. Coke is very good for that purpose. Keep the top of the ground well loosened up.

## Vegetable Culture.

BY MR. J. W. ANDREWS.

To every man starting in business, the question arises, "What is my object? Is it pleasure or profit?" Most of us will answer, "Profit." There is no pleasure in labor and anxiety in any pursuit, without we think we will be benefited thereby. In other words, it is the money we hope to get out of the business that we are after; therefore, we should labor to get the largest return possible to the amount of labor and expense entailed. A nice, clean field of grain, potatoes, or garden stuff, looks well to the casual observer, and speaks well of the owner. All men should feel that what is worth doing at all, is worth doing well, and how to know when a thing is well done, is best answered by experience and good judgment. To no business is this rule more applicable than to vegetable culture. The importance of this branch of the business can be best estimated by the fact that vegetables constitute largely the food of the world. It is written, "Man

shall not live by bread alone," but nowhere do we find it written that he shall not live upon vegetables alone; but we have a case on record of long standing, where a company of men did live on vegetables alone. Daniel, the prophet, did actually refuse to eat King Nebuchadnezzar's meat and drink his wine, and when told by the Prince that his refusal to do so jeopardized the Prince's head, Daniel still stood on his dignity and proposed a ten day's test, with the following result: At the end of the ten days Daniel and his company appeared better in flesh and fairer in countenance than any of those that ate meat. Then, Daniel was preferred above and before all others of his time, because of the excellent spirit that the abstaining from use of wine and meat produced within him.

So Melzer, the priest, took exception to wine himself, and also meat, and asked Daniel and his friends no more to eat meat, but gave them all the vegetables they desired. The stringency of the times, longevity, good health, and the example of the good old Jew, might suggest to many of us farmers the wisdom of discarding the brewery wine, using less of the cattle king's meat, and living more largely upon our own products, and thereby sustain fatter carcasses, fairer countenances and plumper pocket-books—which always win the admiration of the fairer sex. That Colorado has the elements in, and varieties of soil, that qualifies her to compete with any section of the world in vegetable culture, need not be stated now, for that fact has long since been established, and notwithstanding this fact, the time has been, and continues to be, that many farmers have never set apart a plot of land for this purpose. Some of them are large hearted enough to let that job to their beloved wives. Some of the highly esteemed wives appreciate the privilege and conduct it to a successful issue.

The first requisite of success in vegetable culture is a right preparation of the soil; the second, is good seed planted at the right time; third, generous cultivation; and fourth, generous and careful irrigation. The soil should be broken six inches deep or more, between that and twelve inches will answer every purpose, and always in the fall, if possible, for several reasons: The winter frosts pulverize the ground beyond what man can do; the snows of winter and early spring leaves a moisture in the soil that is mostly lost by deferring the plowing until spring; weed seeds germinate early, and when weeds appear before planting, turn the soil over again, run over the gronnd with a Gale sulky harrow, and don't forget to work into the soil all the well-rotted manure you can get. To insure good seed, send to some reliable seedsman for the varieties you desire to cultivate. After you have succeeded in growing a crop, select your best matured specimens and grow your own seeds from them, and keep it from year to year. The ordinary observer has noticed that after a heavy, dashing shower, followed by a hot sun, the soil will bake. All soils do it more or less. Irrigation keeps the ground in the same condition, hence, the necessity of stirring the soil as soon after irrigation for root culture, as the dampness will permit. Weeds and grass consume the food that is necessary for the growing crop. Even when the land is rich enough and contains enough for both, the former will succumb while the latter flourishes. A strong, vigorous weed, with roots running in every direction, will seize on all moisture within its reach, to the detriment of every plant within the compass of them. Nothing should grow where a plant is desired, but the plant itself. The best time is to destroy the weeds as soon as they appear.

We will notice but a few of the varieties, and those that come under our own experience. First on our

list is the beet. Lay off the land in rows three and one-half feet apart; a corn marker does the work admirably and leaves a deep enough furrow to receive the seed. For early use, plant as soon as the frost ceases to appear. Early red turnip is good. The hand is the best of all seeders; but if you must do the work by machinery, use Matthews' garden seeder. Cover the seeds two inches deep with the hoe. As soon as the weeds appear, go for them. When the plants are two inches in length, thin to the distance. When the ground becomes too dry for the plants to thrive, make furrows between the rows with the plow and turn in the water, being careful not to let the water run too long, for early in the season the water is cold. For stock, feed the Silesian Sugar. It is the only kind I have tried; plant any time before May. Viewing beet culture in the light of profit alone, the sugar it does produce, or might produce, is well worthy of our attention. One statistician quotes the product of the sugar of the world from the beet at eight million tons. Of this amount the United States produces only one thousand tons. All told, the United States produces yearly one hundred and fifty thousand tons of sugar and imports every year one million tons. We are told that our worst alkali lands will grow the beet, and since raw sugar is largely imported into this country for refining purposes, some of these times we will make the startling discovery that a Boston syndicate has made a corner on our alkali flats. A hint to the wise is sufficient.

The bean does well on new soil, and requires but little water. Plant two inches deep in rows two feet apart and eighteen inches between the hills. About the bean I have but little to say. My last planting was destroyed by a new-fangled bug; in make-up he resembles a half-fledged potato bug, in color resembles a gold bug, in action convinces me that he was a humbug, and

had come to stay and destroy my crops in a way that I despise.

Cabbage is quoted in the Chicago market at $3.00 per hundred weight; in Boulder it is worth $1.50 per hundred weight. At three and one-half feet between the hills, one acre will produce 3,555 heeds. Estimating the heads at five pounds each, one acre will produce 17,775 pounds. One dollar and fifty cents per hundred weight amounts to $266.62. One man can attend two acres. Twice $266.62 is $533.24. How does that compare with wheat at sixty-five cents per bushel, labor thrown in? Five pounds per head is a very low estimate, having grown them myself that weighed thirty, and frequently have seen them that weighed fifty pounds. A very rich deep soil is best adapted to cabbage growth. For early use, the Jersey Wakefield is good. Plant early; light frosts do not injure; rows four feet apart and three feet between the plants; keep down all weeds; cultivate generously; irrigate liberally until heads have their growth, then take off the water and let them become solid, otherwise the heads will burst. For intermediate use, Vilmosan's Early Flat Dutch is among the best for all purposes; the Winnigstadt can't be beat. For the destruction of bugs, I would recommend alum water. Proper winter storage is essential with all the winter vegetables. The old way of storing cabbage, is to make a frame of boards after the fashion of a hot bed, six feet wide and as long as you need; plant the cabbage root down and cover with boards; throw over the boards dirt or any coarse litter. Cabbage partially matured, stored in this way will fill out during the winter.

Turnips, beets, carrots, parsnips and potatoes should be stored in pits dug in the ground, with an escape-pipe to let off impure air.

The cucumber requires a warm location. After the soil becomes warm, plant in hills, four feet apart. Put

in plenty of seed, and when you get a good start, thin to your liking. Wood ashes are a good fertilizer; coal ashes are better than nothing. Place well rotted manure three inches under the surface. Plant the early Russian variety. Take good care of your vines, and the crop will be simply immense.

Select a warm and light soil for the melon. Work well rotted manure thoroughly through the soil. Plant the seeds of the musk-melon six feet each way, and thin the plants to two in a hill. The seed of the water-melon should be planted in hills eight feet each way, and thin the plants to two in a place. Use the hoe freely and often, and water liberally until the first setting is matured. Take off the water and trim the vines beyond the last setting. Ferry's Peerless is good enaugh for me.

One authority says not to plant the onion on land where potatoes grew the previous year. While I believe he is right I will not attempt to explain why. Gregory says to plow the ground not over five inches deep. I don't believe Gregory ever grew onions in Colorado. I claim that ten inches is better than five. Manure heavily with well rotted barn-yard manure, especially the surface, to the depth of three inches. Lay off the rows one-half ten inches apart, the other half twenty inches apart, make your irrigating ditches in the wide spaces; plant three pounds of seed to the acre as early in the spring as the soil can be worked; when the plants are two inches high thin out to suit the size you wish to grow your onions—the larger the onion the milder the flavor. If you wish to grow onions the size of a soup plate, thin to eight inches between the plants. If size of a tea saucer, thin to five inches between plants. Always thin early, for late thining checks the growth of the remaining plants. Don't undertake the work of

thinning the onion patch on horseback. Stick to the ground, and if you are a man of stature, get down on your knees. The exercise is humiliating, but the result is most favoring. Irrigate when they need it; not oftener than once a week, and not very heavy. Many a fair prospect for an onion crop has been ruined by too much water. Cease irrigation and cultivation the first of August, and proceed to roll the patch lightly with an empty apple barrel. There is more solid strength, flavor and fragrance in the onion to the square inch than anything else in nature. To some of us this is altogether contrary to our aristocratic sentiments, but the medicine virtues of the onion, when fairly tested, will outweigh the prejudices of the most fastidious. My experience in storing the onion has been in an underground building, with bins eighteen inches in depth. When the onions are perfectly dry, with tops on, place in the bin; keep well ventilated until winter sets in; then close up, and disturb only what you use until spring, when they will be found in good order.

The potatoe cuts no small figure in keeping peace in every well regulated household. New sod land is best adapted to its culture. Plough deep and pulverize thoroughly. Plant four inches deep, in rows, four feet apart. Cut off the end of the potatoe with the cluster of eyes and give it to the pigs; cut the remainder of the potatoe to one eye in a piece. Always plant in the ground. I have tried "new of the moon" and "old of the moon," and had the best success when I planted in the ground. Plant one eye in a place, one foot apart. Keep the soil loose from the time the plants are six inches high, up to the time the blossoms are formed; then hill up high; irrigate often and moderately. The sequel to good potatoe crops is good soil and uniform moisture. If your land is old, place over the potatoe one inch in depth of partially rotted straw before cover-

ing with dirt. On steep ground, I would recommend, after the potatoes are planted, a mulch of old hay or straw, five or six inches deep; this plan is successfully practiced where they don't have to irrigate. Six hundred bushels of measured potatoes have been grown on one measured acre of land, in Colorado. Cut down that yield one-half, and estimate the market value at one cent per pound, and the profits will exceed the profits of strawberry culture at last year's prices. A newspaper makes the statement that four million dollars' worth of potatoes are imported into New York City ever year.

The Pumpkin and Squash are both at home in Colorado. The Hubbard is the stand-by, and compares favorably with the Georgia sweet potatoe. The Winter Crookneck for Thanksgiving pies is superb.

As it is desirable to have tomatoes early, start the plants in a hot-bed; transplant once or twice, then plant in a dry poor soil; but little water is required.

The seed of the turnip can be grown as early in the spring as the ground can be worked. For fall and early winter use, I grow the White Dutch; for winter use and early spring, I grow the White Egg. Grow my seed and turnips the same season. Finely pulverized new soil is the best. Sow broadcast the first of August; drag the ground with a light harrow; then make irrigating ditches every six feet. Wait long and patiently for the seed to germinate before you irrigate for that purpose; never flood the turnip ground; under-soaking is much the best. The best success is the result of the best cultivation and closest attention.

Then followed a general discussion on "Vegetable Culture:"

MR. RUST: Get my poorest tomatoes on the poorest soil.

MR. NEWLAND: Always plant on richest ground and have good success in tomatoes.

MR. ANDERSON: Plant tomatoes on poor soil, as they grow too much to vine on rich soil.

MR. H. G. WOLFF: A light rich soil is best for earliness and productiveness. Coal ashes have no good effect.

MR. ACKERMAN: Use my best ground for tomatoes. Set out five feet each way. Dig a hole for each plant and fill it with a mixture of mountain earth and sand. Get very few tomatoes on rich soil.

MR. BROTHERS: Get my best tomatoes on sandy loam. Make my land pretty rich. Ripen two weeks earlier without fertilization.

MR. WEBSTER: Tomatoes grown on clay soil keep better. Those from bottom soil are more watery.

MR. TOBIAS: Always fertilize in the hill.

MR. MILLISON: Plant tomatoes in medium soil. The Livingston is the earliest, and bears well until frost, the last fruit being almost as good as the first.

MR. WEBSTER: Tomatoes ripen quicker on poor soil, but do not bear so well. The Livingston is the earliest. I thin out the foliage on bottom soil, and stake the plant, as there is danger of rot if grown upon the ground.

MRS. SAVORY: Grow tomatoes on gravel and loam. Put straw under plants on low ground.

MR. GOSS: Is the tomato a vegetable or a fruit? Custom house officers collect tariff on it as a vegetable. They ripen quicker on barren land.

MR. FAUROT: Where there is no frost the tomato does not die.

## POTATOES.

MESSRS. FRINK and POST had a fine display of potatoes, but the sessions were so taken up with the consideration of other subjects that but little time could be given to their display. A good many questions were asked, however, and below will be found the main points brought out.

MR. FRINK: My potatoes are raised in the mountains without irrigation. Late Rose grow very large and yield immensely. Some of them weighed five pounds. We have fifty bushels that weigh two pounds each. Some of my potatoes are seedlings. We want an organization for the protection of our industry, as we cannot raise the valley fruits.

MR. RUST: The potato draws largely of potash from the soil. I think manure will assist in growing them.

MR. FRINK: Potatoes do best on new land. What is the cause of scab? These scabby potatoes are of fine quality.

JUDGE HOUSEL: Think it is not in the soil. In 1862, Boulder county produced the largest crop of potatoes I ever saw. I even saw four hundred bushels to the acre. The next year, on the same ground, with the same treatment, the crop was an utter failure. I raise good potatoes every year. The Morton White is among the best. Can not get good late potatoes.

MR. FRINK: Morton White is good and yield tremendously. White Neshannocks are very good. The blue Neshannocks have run out.

MR. TARVIN: I plant on sandy loam and have good success. Last year I planted on white clay and had no potatoes.

JUDGE HOUSEL: I attribute scab to grubs in the soil that eat the potatoes.

## AFTERNOON SESSION.

December 9, 1886.

The following paper was read on:

# Apples of Commerce.

BY DAVID BROTHERS.

The effect of commercial pursuits is to deal in such articles as yield the largest profit at the least cost.

The requisites of a good commercial apple are color, size and quality. As to flavor and keeping, an apple orchard, for profit, should be so classified as to give a succession of fruit for the greatest possible length of season, which involves a judicious selection of summer, fall and winter varieties, for commercial use. Ability to stand transportation is essential. Fruit that cannot be marketed in a presentable shape is objectionable for commercial use, however good in all other qualities.

My idea is to confine my selection of varieties to a few well known and well tried kinds to be preferred for commercial use. I will name them in regular order of succession, under the head of summer, fall and winter, noting the quality of each as succeeding in Colorado—soil and climate.

*First—Summer*—Tetofsky: Early, large size, fruit light yellow, tree hardy.

Red June: Ripens early, red in color, fruit rather small in size, good to cook or for table use.

Red Astrachan: Ripens early, July and August, red in color, good for cooking or for table use.

Duchess of Oldenburg: Tree iron-clad, early bearer, fruit good size, cooks well, sub-acid, and one of the best summer apples.

Whitney's No. 20: A good market apple and fine for dessert, small in size, color light red and yellow, tree hardy and of best known kinds, for table as well as cooking.

Sops of Wine: Tree a good grower, fruit fine size, fair and good apple to cook, color red streaks splashed with white.

Summer Queen: Large and cooks well, fine flavor.

*Second—Fall*—Maiden's Blush: Fruit medium in size, bright red blush on one side, tree rather tender when young, yet hardy when it gets older, good variety for market.

Buckingham: Large size, red, cooks well, sub-acid, and good apple for general market.

Fameuse: One of the best fall apples we have, tree rather tender when young, good for cooking or table use.

Autumn Strawberry: A fine apple to cook or eat, and sells readily.

Wealthy: Tree hardy, crops early, and is the best fall apple I know of, both to cook and for table use.

Bailey's Sweet: Tree medium hardy, a good apple to eat or cook, and a good shipper.

Vandever Pippin: Large yellow, red on one side, flesh crisp, sub-acid and good flavor, one of the largest apples grown, splendid for cooking and very good for sale.

*Third—Winter*—Ben Davis: Tree hardy, fruit early, prolific bearer, a profitable market apple; Ben Davis stands No. 1 in number of apples raised, "stands transportation so well," is the testimony of fruit dealers in nearly every State where they are grown.

Wolf River Seedling: Beauty not excelled, large, sub-acid, cooks well, tree hardy; season, early winter.

Plum Cider: Tree hardy, fruit fair in size, sub-acid, light color, cooks well, a fair dessert apple, good keeper; season, December.

White Winter Pearmain: Tree tender when young, but one of the best apples that can be grown, both for dessert and cooking purposes, and for market.

Walbridge: Tree hardy, fruit medium in size, prolific bearer, quality good; season, January to May.

Pewaukee: Tree hardy, fruit large and a good safe keeper; good tree for Colorado.

Shaker Pippin: Tree hardy, good bearer and long keeper; good in season.

Isham Sweet: Tree hardy, very good as a dessert apple, sweet, good for canning purposes, large bright red.

Talman's Sweet: Tree hardy, good grower, prolific bearer, one of the best sweet varieties known, large size, very light color.

English Golden Russet: A good keeper, also good for cooking and table use, a vigorous grower; tree hardy; bears shipping well.

Rhode Island Greening: One of the best cooking apples grown, tree good grower, fruit large size, skin greenish yellow.

Jonathan: Tree quite tender when young, medium bearer, hardy as it gets older, is No. 1 to eat and cook, sells in every market.

*Crabs*—General Grant: Fruit large, very dark red, with a few light spots on it.

Hyslop: An old sort, but one of the very best crabs known.

Siberian: A golden yellow, beautiful ornament to the garden, good for preserves and jellies.

APPLES OF COMMERCE.

MR. BROTHERS: The California Red is the best apple that grows. My trees are very hardy and were planted in 1868. The Wolfe River is a hardy, good grower.

MR. GOSS: How is the Wolfe River for an eating apple?

MR. BROTHERS: Very nice. Sub-acid. St. Lawrence and Newton Pippin are good fall apples.

DR. SHAW: There is no such thing as fungus growth on apples in Colorado. The Fameuse is not affected by it.

MR. GOSS: Is the Pewaukee a winter apple? I class it with the fall apples.

MR. WEBSTER: The Pewaukee is a winter apple. All Russian winter apples become fall apples here.

DR. SHAW: The Pewaukee was originated in Wisconsin. It is not a long keeper with me.

MR. BROTHERS: The Wealthy comes right after Duchess of Oldenburg. The Wealthy is good for cooking from the time it is half grown, and is the best keeper among the fall apples. All apples are from two to six weeks earlier this year than usual.

MR. ACKERMAN: Pewaukee keeps generally until February first. This year they are from a month to six weeks earlier.

MR. WEBSTER: Think the early ripening of fruit this year was due to the warm weather in May.

MR. GOSS: I give the unusually warm weather as the cause. There are fifteen days' difference between this year and last in the ripening.

# Home Surroundings and Their Influence.

BY MRS. A. S. BENSON.

Perhaps you think I am going to describe a "model home," with perfect surroundings; where the inmates sit in the lap of luxury; where everything goes like clock-work; where the work is always "done up;" where dirt and disorder never enters; one where the children, and grown folks too, are always on their good behavior, and have never shown each other their selfish side. But we live in a work-a-day world where, if a home is kept at all, it must be done by hard work; and angels on earth are not found outside of story books. Still, with most of us, our truest happiness is found in our homes, and it is well to consider how to calculate our surroundings, so as best to insure the comfort and welfare of our families.

"Oh, dear," says one mother, "I know just what is coming, and I don't want to hear it. Every newspaper I see has an article on a wife's duties, and how a home should be managed. I know it by heart. The house must always be in perfect order—even though it be the play-ground of four small children. There must never be a speck of dirt on the white aprons and snowy ruffles of these same little ones. The toilet of the wife and mother must always be immaculate. The food must always be carefully cooked, served just on time, and the table spread with the most spotless linen, even though the stove smokes, baby has the croup, and you have had a short allowance of water for the past month. It is necessary to be surrounded with birds and flowers. Music is indispensible, if you expect to keep your husband and children at home evenings. It is no use to tell me these things. We can't afford a piano or organ,

and I have no time to play on one, even if I had the talent. The little knees, elbows and toes wear out the clothing so fast, they keep me always busy. The children will get into the dirt, and the cooking will sometimes turn out wrong; and such things as I read make me discouraged."

To such, I say, impossibilities are required of no one, and to make the best of our time, talents and surroundings, is all that should be required of anyone. In the first place, we must consider what our home is. It is not reasonable to expect the same comforts on a five hundred dollar cottage that you would find in a five thousand dollar home; nor should the five thousand dollar home be furnished in the same style as the five hundred dollar cottage. Each one of these should resemble the other in neatness and good order. But these resemblances must necessarily end; and by neatness, I do not mean that everything should be painfully in good order, that a child dares not play, that a book must not be displaced, where chair and sofa tidies are so "fearfully and wonderfully" made that a tired hand cannot rest on them. The carpet that is too nice for your children to walk upon; the chair that is too fine for them to sit on; the book that they must not read, because it is too elaborately bound, will never elevate or refine them. It is well to teach that a parlor is not to be used like a workshop, an upholstered chair like a saw-horse, and that a book is not made to play ball with. Teach the little ones to put their books, play-things and clothing in their proper places, after using them. It will teach them good order, and save your time for something more necessary; and certainly a neat home has a refining influence upon a family; and this cannot be secured unless the other members of the family do their part, as well as the wife and mother.

Right here is a good place to say that among the best things with which to surround our family are good books and papers. Pray don't think it makes no difference what your children read, so long as they are great readers. Bad literature is as dangerous to their welfare as bad companions. You, who would not permit your children to associate with robbers and murderers, the outlaws and vile ones of earth, do not give them as companions these same criminals, dressed as heroes by the pen of the sensational novelist of the day. Keep flashy literature out of their way till they have acquired a taste for good, solid reading, and you may be sure they will never go back to it. I would also include in the prohibited list, the "namby-pamby" literature of some of the story papers, which, if it does not teach anything positively immoral, still does not teach anything. Such reading weakens the mental digestion to such an extent that at last it becomes impossible to assimilate the solid food of literature. If you should keep your child on a diet of saw-dust, while it might not be poisonous, yet starvation would be the result; and reading matter that teaches nothing is the saw-dust of literature. But do not expect your children to take kindly to the pages of Emerson or Carlyle; nor even to pore over the pages of Macauley's History of England, or Bancroft's History of the United States; though you can educate them to the two latter at a much earlier age than you might think, and the former will be appreciated all in good time. There are so many good books for juvenile reading that it is impossible to recommend them all; but I know of no better, purer, more morally healthful books, for small children, than the "Prudy" and "Dotty Dimple" series, by Sophie May; and even mothers may learn lessons of patience and good government from them. The "Rollo" books, and many similar works, teach our children of other lands, in simple form, be-

sides inculcating good morals and teaching them good manners. As they grow older, historical novels, of high standard, like Scott's Waverly Novels, will make them anxious to read history. Then furnish them with good, solid books, and encourage them by reading with them. Take turns reading aloud, parents reading with the children, and talk over what you read. The older ones will often be benefitted as much as the children.

"Well," says one, "We know just what is coming next. In the regulation model house, flowers always follow books." That is all right. The flowers are just what should be there, provided you don't over-do it. The woman who has plenty of help can revel among the flowers, and everything around her be the better for it. But you, my good friend, with a large family, and all of the work to do alone, content yourself with a few pots of sweet, hardy plants. Don't let the little Bobby go with his knees bare, because your plants must be dug around and watered. Don't let your tired husband wash the dinner dishes before you can have supper, because your plants have to be re-potted. As to out-of-door flowers, husband and wife must work together in this. A yard, to which all of the domestic animals, from the horses to the pigs and chickens, have free access, is not the place for a flower garden. For those who have but little time to devote to it, a small, properly fenced yard, mostly in a smooth, green lawn, dotted here and there with trees and flowering shrubs, will give the most satisfaction. Leave showy annuals, "ribbon borders," etc., to those who are not overworked. I might say almost the same things of fancy work. In its place it is a nice thing to do, and to possess; but don't let your children go ragged while you piece "crazy quilts," nor oblige your husband to eat a cold dinner because you are painting "such a lovely panel" or "plaque;" and above all, don't fill your rooms so full of such things that people

will suppose they are visiting a county fair, instead of a home.

And now, my dear house-keepers, remember that your home surroundings must necessarily accord with your finances; but it is not necessary that the home of the poor should be unhappy or uninviting. You, with pleanty of wealth, may have all of the novelties of the old world and the new. It is right, if you can do so without wronging any one, that you have paintings and statuary, carpets, furniture and plate of countless cost. It is not right for people to have such things who cannot afford them. Much home happiness is lost by people trying to live beyond their means. It is hard for one with a small house and moderate means to go to a mammoth furniture store to select furniture for that modest house. The simple cottage bedstead, and plain bedroom furniture that are needed, and really wanted, look so shabby beside the thousand dollar bedroom set, that one can hardly realize how fresh and dainty and "just the thing" they will look when placed in a little home. In spending money for home adornments, like many another good things, to give happiness, the line must be drawn at what can be afforded. Every lovely thing that you purchase, whether it be furniture, paintings, books, music, or costly dress, if it be so much beyond the means that should be used for such things, or if it lay extra burdens upon the already over-worked husband and father, will prove a thorn in the flesh. At the same time, no man should refuse the means for the comfort, instruction, and innocent means of amusement of his family, claiming that he cannot afford it, while he is spending larger sums on drink, tobacco, betting, or any other selfish diversion, which only injures him and brings unhappiness to his family. I think, often, the money spent in such ways, seems much smaller to a

man, while that spent by his family seems much larger than it really is. Once I knew a worthy couple, in moderate circumstances. Both were industrious and economical, but the husband was somewhat addicted to the use of the weed. The wife was a neat body, and it seemed to the husband that the calls on his pocket-book for that useful article, soap, were quite too frequent; so he remonstrated. Did that woman pout, or cry, or scold? Not a bit of it. She simply said, "John, every time you buy a quarter's worth of tobacco for yourself, just buy a quarter's worth of soap for me." He agreed to do so, and was astonished to see how the soap piled up on the shelf at home, while occasionaly his wife would say, "Next time you get tobacco, instead of soap, you may bring me a quarter's worth of starch," or thread, or some household necessity. "A word to the wise is sufficient."

And now, my dear friends, whether we dwell in stately mansions, in commodious houses, in humble cottages, or even in a pre-emption shanty, or a dug-out, let our home surroundings be—devoted love between man and wife, parents and children. No home, however elegant, can be happy without this, and with it, no matter how humble the home, happiness will be found. May no serpent of unkindness or discord enter our Eden. As the happy Christmas time approaches, we each do our best to secure, "Peace on earth, good will to men."

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After MRS. BENSON'S paper had received its proper attention, it was thought a fit time to revise the fruit list, and the Secretary was called on to read the list for consideration.

*Summer*—Dutches of Oldenburg, Tetofsky, Red June and Summer Queen.

*Fall*—Wealthy, Fameuse, Plum Cider, and for trial Excelsior.

*Winter*—Ben Davis, Walbridge, Pewaukee, Sweet Pear, Talman's Sweet, White Winter Pearmain, Newton Pippin, Jonathan.

The list was pronounced complete as it now stood, and ordered to be entered in the records.

The session was adjourned for evening at 7:30 o'clock.

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## EVENING SESSION.

Evening session was opened as per adjournment, and the following paper was read:

# New Fruits.

BY MR. A. E. GIPSON.

Among the American apples, the most promising seem to have originated in Minnesota and Wisconsin. Of these may be named the Excelsior, a fine September apple, of medium size, yellowish, with red cheeks; tree very strong, upright grower and very hardy, highly promising; originated at by Mr. Gideon, and fruited at Greeley.

The Gideon: This is a grand apple, which has also fruited at Greeley. Its season is a little later than the Wealthy, from the seed of which it was produced. The fruit is from medium to large, and a rich yellow, slightly reddish in appearance. So far, this impresses me as being hardier in tree and better in fruit than its parent, and seems worthy of general trial.

The Lou: Is another Minnesota seedling of great merit, over which MR. GIDEON expresses himself in terms of the highest praise.

McMahon and Wolf River: Are Wisconsin seedlings of good appearace, and are destined to popularity. Both are large fruits of good quality, and both have been pretty widely tested in the severe climate of the northwest. Of the two, the McMahon seems the hardier, although they are generally classed as iron-clad.

Several other aspirants for public favor, of considerable prominence could be named, but I must pass them to the notice of Colorado seedlings. Of these I regret not being able to obtain a complete list. For descriptions I am indebted to MR. V. DEVINNEY, of Denver, and MR. WEBSTER, of Boulder county, and take pleasure in presenting the same to-night.

RUSSIAN FRUITS—APPLES.

*Summer*—Yellow Transparent: Medium in size, of sprightly acid quality and handsome. The most valuable early apple so far.

Moscow Pear: Very early, a true iron-clad, being among the hardiest apples known in northern Russia, good for eating and cooking.

Thaler: Promises to be a rival of the Yellow Transparent, which it resembles.

Red Duck: Fruit large, bright-yellow, apple earlier than Tetofsky, name does not seem appropriate.

Juicy White: A good tree for the far north, and a heavy annual bearer, fruit yellow, tender and good.

Summer Sport: A large brownish apple that has fruited in Greeley, medium in quality, tree seems very hardy.

Yellow Sweet: Said to be fully as early as the Yellow Transparent, medium to large and iron-clad.

Pine Apple: Very hardy, tree resembles Yellow Transparent, and about the same season.

*Autumn*—Russian Gravenstein: A very promising tree and valuable fruit.

Heidorn: According to MR. GIBB, this is a very beautiful, large sized, striped apple, of sweet and delicate texture, and promises to succeed over a wide section.

Titooka: A very large fruit, that promises to be the autumn Oldenburg of northern Iowa.

Charlamoff: A favorite late summer apple in many parts of Russia, Germany and France. Wherever fruited in this country it is said to be a fruit of excellent quality and good size.

Switzer (late): The Russian Fameuse, one of the best, fruit medium in size and pronounced good enough for an epicure.

White Pigeon: A handsome yellowish apple.

Hibernal (late): This is one of the true iron-clads that has stood where the Oldenburg fails; has fruited quite freely in the cold north-west; fruit good size, greenish-yellow, with stripes and blotches.

Saxonian: Fruited for five years at Baraboo, Wisconsin, and highly prized; in some parts will take the place of the Fameuse.

Burtooka: A reddish-yellow apple, of medium size, which Prof. Budd says may be safely tried far north.

Borovinka (late): Classed as a true iron-clad, resembling the Oldenburg, but hardier and better in quality; an early bearer; a month later than the Oldenburg.

Yellow Annis: Very hardy; a true iron-clad where apples can be grown; medium in size.

Noble Red Streak: An early bearer; very sweet and good; late fall or winter.

Longfield: Very valuable; undoubtedly one of the best of the Russians.

Antonooka: The king apple of central Russia; fruited in Greeley; large, bright yellow.

Arabka: One of the leading winter Russians; fruit large and resembles Blue Pearmain; will ripen its wood in one hundred days after it commences growth in the spring.

Repka Materka: A fine sweet apple.

Pink or Red Annis: Called a treasure for the northwest on account of its extreme hardiness.

White Russett: Very hardy and promising over a wide area; fruit medium to large, covered with splashes of red; subacid and good.

Romna: Prof. Budd says it seems as hardy as a willow and good; tree a very strong grower; fruit round, yellowish and medium size.

Green: Pronounced a fine tree and a true iron-clad; one of the best winter apples in central Russia.

Recumbent: Very hardy and early; has proven much hardier than the Oldenburg in Minnesota, and resembles it in general appearance.

MR. WEBSTER'S SEEDLINGS.

St. Vrain: Is a seedling from the Rambo, but ripens in August, is a much finer flavor and is much larger, but in shape and color resembles its parent. The tree is very hardy and an upright grower.

Colorado Favorite: Is a very long, yellow apple, with small brown specks. It is very fine, flesh yellow, subacid; one of the best cooking apples in the market. It

resembles the Swaar, of which it is supposed to be a seedling. The tree is very hardy.

Hygiene: Is a seedling from the Snow or Fameuse, but is a much finer apple and some larger; somewhat more acid; flesh very white; almost entirely red; very fine shape; season, December to January; as hardy as the cottonwood.

The George Webster: Is the largest seedling in Colorado. Its parent is the Plum Cider, and it is the same shape, but larger; color, red cheek; small red stripes; background greenish color; just acid enough to give it a fine taste; flesh a little yellow and one of the best bearers in my orchard; tree iron-clad; season, December and January.

The Home Apple: This is about the size and shape of a Winesap, but in color is rather of a yellowish, with small specks, and fine flavor; one of the best eating apples; season, December to January.

Longmont: A deep-red apple and the shape of the Spitzenburg; flesh yellow; acid in flavor, and as fine an eating apple as is in my orchard; good December, January and February.

PEARS.

The best tested of the Russian pear is probably the Bessemianka. It is seedless, of medium size; green, with some russet, and often blushed on the sunny side. Flesh tender, juicy, almost buttery and better than good for dessert. Leaves a dark green, and never rust or mildew; a good upright grower. The above is Prof. Budd's description, who thinks this pear destined to prove hardy and bear abundant crops of fruit over a wide area of the west.

Several choice crabs have been introduced quite recently. Of these may be mentioned the Sweet Russet

and Telfar Sweet, both delicious little apples; the Martha, Isham Sweet, Shields, Florence, September, Brier Sweet and Whitney. These are all valuable and worthy of a better place in every orchard, for it should be remembered that that this fruit can be utilized for many purposes that the standard apple cannot. Besides, the crabs have been found to stand the test winters of the north-west, better than even many of the so-called iron-clads. Then, again, they are desirable for both shade and ornamental purposes.

The Limber Twig: Is spoken of as another valuable and very hardy pear from Russia. Hundreds of others are now being tested, and from these tests we are pretty certain to find something that will solve the question of pear raising in colder regions of the country.

### CHERRIES.

Among cherries the Ostheim and Valdimar varieties are undoubtedly the most prominent of the Russians, the former being mentioned by Prof. Budd as "beyond a doubt the hardiest varieties of really good cherries in the world.

Our own Rocky Mountain Dwarf is certainly worthy of cultivation, and by proper selection this fruit may be much improved. It is an early and abundant bearer and entirely hardy.

### PLUMS.

The plum of the hardier varieties will be found well adapted to northern Colorado. So for the DeSoto, Forest Garden, Weaver, and in some localities the Miner and Wild Goose have fruited abundantly. Of these, the Forest Garden is, I think, the earliest. The prominent newer sorts are Moore's Arctic, Shippers' Pride and Marianna. But much may be expected of our Colorado natives and seedlings. Several of these of

really good quality have been tested and promise good and valuable results. On my own grounds are quite a number of sorts that I hope to be able to report well of in the future. In this connection I take pleasure in calling attention to the new plum of our President, MR. FAUROT. He describes it as a beautiful upright grower, very hardy and a good bearer. The fruit is of a yellowish red and of good size and flavor. One of the finest plums for Colorado. That is what MR. FAUROT thinks.

APRICOTS.

Of this fruit several selected Russian varieties are being introduced, which are worthy of trial. These are the Budd, Alexander, Alexis, Catherine, Nicholas and Gibb. It should be remarked that the first introduction of apricots from Russians were seedlings, and many of those which have been distributed so widely are therefore tender and inferior. This is most generally the case with seedlings of any fruit. Look out, therefore, for trees of class that are offered under the general name of Russian apricot. It may be very good, but it is liable to be worthless.

GRAPES.

The list of new grapes is large, and I will only refer to the Moore's Early, Worden, Niagara, Empire State and Minnehoka, as perhaps the most prominent now before the public. It is safe to say that the list for northern Colorado should be limited to at least half a dozen varieties.

CURRANTS.

Fay's Prolific: Seems likely to sustain the claims made for it by the introducers. With me it has proven very satisfactory.

The White Versailles: Is recommended as a valuable white variety, but has not yet been sufficiently tested.

It is said to resemble the red variety of that name very closely, except in color.

No new black currant has been originated recently to my knowledge.

### RASPBERRIES.

The list is quite a long one, but those now attracting most attention are the Earheart, Everlasting, Marlboro and Golden Queen.

The first-named seems worthy of trial on account of its continuous bearing habit. Several prominent horticulturists speak of it as a valuable acquisition.

The Marlboro (red): Still receives a good deal of praise and considerable criticism. With me it has done very well, and bears an abundance of very large, handsome berries. So far, I regard it as one of the best red raspberries in cultivation.

The Golden Queen: Is a yellow berry, the future of which is, perhaps, in doubt. It is claimed by some to be the best of its class. As a market berry, it is not likely to prove in large demand.

The Lucretia Dewberry: Ought to be given a fair trial. It has points of considerable merit. In some localities it will prove more profitable than the blackberry.

### BLACKBERRIES.

The Ancient Briton, Stone's Hardy, Wilson Jr., Early Cluster and Early Harvest, have strong advocates. In the cold sections, the first-named is in strong favor. But all of these sorts appear to have, in some localities, some conspicuous weakness, and, on the whole, it is doubtful if the old Wilson Early, for general culture, has been superseded. In Boulder, however, I understand the Wilson is not a success.

STRAWBERRIES.

Last, but not least, the strawberry is receiving unusual attention. A score or more of varieties are being handled, but the New Jewell, Bubach and Jessie, hold first place. Of the latter, my friend, Charles A. Green, writes me, "Look out for this berry; it is sure to create a sensation." Many have journeyed hundreds of miles to see the fruit.

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Then followed the discussion of "New Fruits:"

MR. GIPSON: My paper was only suggestions. The list is merely for trial.

DR. SHAW: I don't want anything new. Have fruited 153 varieties here. Never had a Russian apple that would keep for me.

MR. BROTHERS: Has MR. GIPSON these apples growing.

MR. GIPSON: Yes, sir. I live in a portion of the State where we have been unfortunate in growing apples, and we want to find out by experiment, what are the best for us. I believe in Russian apples, and can show as fine specimens as can be found in the State.

DR. SHAW: The Russian apples do not have a good taste; they will not keep.

MR. BROTHERS: I believe in trying new sorts, and will try MR. GIPSON'S list.

# Landscape Gardening.

BY MRS. A. L. WASHBURN.

Of all the popular methods of education before the public at the present time, none can take the precedent of nature's instinct, which tells us, "Imitate what you see." This is the education that forms the common mind in spite of all the fine-spun theories in books into which the common mind seldom has a peep. "He who runs may read" the lessons taught by nature all about him, and may take note of the beautiful and pleasing, even in art. For this reason, if for no other, landscape gardening must henceforth take a prominent place as a valuable branch of the school of horticulture and call forth increasing attention and regard as its noble mission is more generally understood. Among human faculties, a desire to please is a noble unselfish attribute, and in gardening the art of pleasing the public eye may by classed among those elevated pursuits, that bespeak a generous heart, and regarding happiness as the basis of virtue, enhance the public good. In our nervous scramble to keep up with the sordid demands of this money-loving age we are apt to overlook the "department of public comfort," and to feel that in consequence of this neglect we feel the strain of money-getting still more. There is something essentially wrong in a state of society which finds beauty only in money-values and poetry only in gilt-bound books. We need more beauty in public view daily, and poetry will follow beauty in the soul, as speech follows thought. The mission of the landscape gardener is in the higher walks of art, since all art is but an imitation of nature and a true interpretation of her laws. There is no higher authority for us, for except we "look through nature up to nature's God,"

for good, we remain ignorant of those mandates which claim our first obedience and transgress only by following the man-made edicts of beings as blind as ourselves.

In the making of a home, few of the settlers of Colorado were so fortunate as to be able to take in account the ultimate appearance of their surroundings. Indeed, to please the public eye was farthest from their thoughts, since there was no public eye to please, and though in one sense pioneers be prophets, who, by dint of hard work, fulfill their own prophesies, not much was thought of the day when any but the hungry coyote would care about the location of the poultry yard, and lest he be too well pleased, the poultry yard was located as near under the proprietor's eye and ear as was convenient. The ever useful and available cottonwood was planted to shade the hot southern exposures. The wild rose grew where it would, undisturbed by the fowls in its native haunts, but alas for the rash woman who, with dim memories of the sweet brier under her mother's window, transplanted to such favored spot the wild sweet climbers of the glen below; with indefatigable scratchings and pickings and comfortable wallowings the meek-eyed hens wrought unconscious havoc, until despair abandoned the incipient elements of a budding landscape to the more near and evident profits of exchanging eggs for family groceries. And yet, had we but heeded, all about us lay the elements of nature's lavish distribution, ready to express by a little care and attention a thought of beauty and of nature's wealth. Along the creeks were groves of cottonwood, of willow and of birch. The tall featherly pampas grass waved in the wind. There were basket willows, red and brown. The wild rose—crimson, pink and striped—graced the winding banks of the tumultuous streams, overlooking the trout darting about in the waters below; while near the ripples, where the sunlight glanced

on wave-worn rocks of various hues, the wild flags lifted their brown velvet caps, sheltering the downy nest of the modest blue-winged teal. Solomon's Seal and pale purple violets dotted the spring meadows, and the swaying reeds by the river's brink bore up the blackbirds' family home. Then the rounded hills or abrupt bluffs made up the perfect background for the picture, ere the devastating hand of man mowed the meadows, depleted the streams, denuded the groves, and with arbitrary boundaries imprisoned the hills and furrowed their sides with the rapacious and destructive waste-ways of that modern instrument of torture, the irrigating ditch. And now, where are we? Nature's beauty all destroyed, at least as far as modern commercial farming can effect the destruction of every springing luxuriant growth; we must now engage a landscape gardener to lay out our grounds, and in penitential mood replace as far as possible the charms we have banished. Advantages and disadvantages counterbalance each other in the various conditions of life, and so of our grounds. Farms and homes near the original streams, once thought the only available situations, are being encroached upon by alkali gravel beds and a diminished natural water supply; while the native picturesqueness and variety of their landscape resources is unexhausted. On the other hand, the monotonous level of the bluff farms may claim a uniformity of soils and conditions, absence of objectionable features, and that the very blankness of the virgin soil affords a clean page on which a cultivated taste may write in thought for passing generations the history of a tree, a rock, a flower, a vine, or upon the wide-spreading lawn the evolution of a modern Jersey cow or silver-spangled hen from their wild progenitors.

In landscape gardening, utility is among the first requisites for beauty, which is not in some sense usefu

as alien to good taste. With all her lavish beauty, mother nature is our great economist, and from the humblest and apparently most useless need in her laboratory to the horizon of our human ken, nothing is lost or unemployed in the great chemistry of change. General form must approach the circle or parts of a circle, since the globe is the type of our lives, from the dew-drop to the over-reaching sky—from the human tear rolling down the oval cheek of sympathy to the rounded fulfillment of a well spent life. Graceful curves in walks and paintings, and in the contour of the ground, suggest the natural ease and comfort of our ideal conditions. An occasional short base line may be allowed, to convey a thought of strength, but even this must be avoided unless the backing is good and harmonious. Our fields and lots are generally bounded by straight lines; it is the *meum and teum* recognition given by modern society in a recognition of individual rights; but corners may be filled in with groves, bushes, vines, rocks or arbors. "As homely as a hedge fence," is the contemptuous comparison in use by our grand-mothers, but to my eye, a live fence or hedge properly trimmed, is far more beautiful than any other in common use. No doubt they are troublesome, but so is everything of value; and as to durability, there are differences of opinion, as also in the plant to be used; but whatever it is, let a few climbing roses be set along carelessly at intervals, (I mean with seeming carelessness). They will relieve the necessary uniformity of a boundary needing strength.

As to the kind of trees, shrubs and ornamental plants to be used, my own inexperience must be pleaded as a reason for not giving such details as, after all, must be largely determined by soil, location, space and means. Good taste, a faithful loyalty to nature, sanitary conditions and economy must govern us somewhat, no matter how

much money we have to spend in ornamentation. Good morals, as well as good taste, tells us to consult the pleasure and well-being of others before gratifying our own vanity. As a millionaire can neither eat or drink or wear more than a man of ordinary means without destroying the harmony of his being, he may not justly crowd into his city lawn large trees, incongruous statuary, enormous vases and artificial rock-work. While occasionally a vulgar rich man betrays this uncultured thought by thus flaunting his money resources before the passing multitude, it is fortunate that the public sense is oftener gratified by surroundings in better taste. The many elegant homes, surrounded by vivid lawns and tasteful growth, in Denver and some of the little suburban towns, indicate that private enterprise has found voice in public spirit in providing the indispensable water facilities, and has added not a little to the tourist praises of the Centennial State.

The work of the horticulturist, though not without its delays and vexations, is gratifying and ennobling, and tends to elevate the character. As men and women can enjoy through the senses but a given amount, and the enjoyment is largely drawn from the cultivation of plants, trees and flowers, and their orderly and beautiful arrangement to give the greatest pleasure to the eye, there is less demand for the false excitements of social and political life, and the worldly chaff that feeds not the soul.

You will see that no set of rules or arbitrary suggestions are embodied in this paper, but I trust that though brief and rambling, it may serve to introduce some valuable discussion among those who know more about it than I. Landscape gardening in the United States received a great and healthful impetus from the essays and published works of A. J. Downing, begun in 1841, and

continued at intervals up to the time of his sudden death, at the busy age of thirty-seven. Mr. Downing's ideas were practically illustrated at his beautiful home on the Hudson, and, just before his death, in the beginnings towards artistic development of the National grounds around the Capitol at Washington. The following graceful tribute to Downing, by Frederick Bremer, may well be transcribed in closing, reminding us of those who have worked with us, but whose seats are vacant to-day:

"And now, when the call has come, and my friend is taken away, and much of the charm of this world is taken from me with him, I solace my fancy with the vision I thus anticipated. I see my friend working in some more perfect world, out of more perfect matter, the ideas of beauty and perfection, which were life of his life, so to make it a fit abode for pure and heavenly spirits. Why should it not be so? I think it must be so, as God's gifts are of immortal cost, as well as the individual spirit to whom they are given. Is not all that is beautiful in nature, true and charming in art, based upon laws and affinities as eternal as the spirit which recognizes them? Are these laws not manifested through the whole universe, from planet to planet, from sun to sun? Verily, the immortal spirit will ever reproduce its inward world, even if the scene of action is changed, and the stuff for working is changed. Every man will, as it was said by the prophets of old, awake in his own part, when the days (of sublunary life) will be ended. I know that in my final hopes beyond this world, I shall look forward in prayer and hope, to a home among trees and flowers planted by the hand of my friend, there to see him again, and with him to explore a new world—with him to adore."

The following paper by MR. C. S. FAUROT, was then read:

*Members of the Society, Ladies and Gentlemen:*

Perhaps there is no other voluntary organization among men, that brings together in one common field, so wide a range of culture, taste and talent, and that

awakens a common sympathy among men of so varied occupation, as that in whose interest we meet at this time. While I have before me men of almost every profession, and from most of the occupations of life, we find all working hormoniously and to one common end. We gather here to formulate ideas and exchange them, that we may make them useful to us in the future. No matter whether we are republicans, democrats, greenbackers or prohibitionists, we are here for one purpose, to forget all but the one object of allying ourselves and ours to the good and beautiful in nature, and through nature, come nearer to nature's God. For many ages past, the theme of horticulture has been so interesting, that all the resources of language, of reason, and of the imagination, have seemingly been exhausted in the portrayal of the useful and attractive feature. Wherefore, the minds and pens are very rare that can add to the arguments or retouch the picture so skillfully drawn, without impairing the force of the one or the charming effect of the other. Indeed, such is the now common appreciation of the subject, that our children all dance with rapturous glee at the sight of beautiful fruits and flowers, while old age brightens into renewed freshness of life from the same cause; and at all the intermediate stages of life, in ours and all other civilized lands, the effects are no less inspiring.

Additional arguments, therefore, in regard to the usefullness and attractiveness of horticulture work, must now be as impotent as the pencil of the artist, to add to the beauties of the rose, or of the preparations of the perfume, to add to its fragrance. All that seems left for us to do is to consider the methods by which our fruits and flowers can be most successfully grown, and the improvements of each most satisfactorily received. But here, in Boulder, at the home of our State University, and so near to our Agricultural College, it becomes

especially appropriate to recognize the invaluable labor of the professors in that institution, in the lines of work that our own time is devoted to. It has been very gratifying to us, that the professors of our Agricultural College have been willing to meet with us, and to aid us. Further, the facts should be duly appreciated, that the superior facilities afforded by the various appurtenances of that institution, render it actually necessary for us to look in that direction for aid in the solution of many of our most perplexing problems, still involved in practical horticulture. With such co-laborers in the labor of our society, we may feel strongly assured that the advancements in Colorado horticulture this far so successfully made, will be followed by continual satisfactory progress, while the reputation of our State as affording comfortable and happy homes to men who are willing to work, has been steadily advancing for the last few years. It is a well established fact that the horticulturists have played an important part in securing that reputation. Horticulture, in its various branches, has already become quite an industry, and yet the returns so far are meagre indeed, compared to what they must be in a few years to come.

We have now about fifty thousand apple trees set in orchards, and perhaps about one-fourth of these are in bearing at the present time, producing in the aggregate about forty thousand bushels of apples. In our market they are worth about seventy thousand dollars, and the fruit from all of these trees will be immense, saying nothing about the trees that will be planted in the future. This is only a single industry, while the cultivation of the grape and all of our smaller fruits are of much greater value to the State. We cannot only raise the apple, but we can raise pears, plums and cherries, as has been demonstrated this present season. This is not only a source of revenue to the State in keeping thou-

sands of dollars at home that would otherwise go to foreign places, for the fruits consumed, but it gives lucrative employment to large numbers of families. But one will say if we keep on setting fruit we will overstock our markets. That is a great mistake. I don't think we will raise fruit enough in Colorado to overstock the market. It is not the amount of fruit grown at home that causes the market to fluctuate, as they have been doing for the past few years, but it is the foreign fruits shipped in here, and when we can grow the fruit to supyly the home demand then we will get better prices. Give the consumer good fresh fruits and you will find the demand will keep ahead of the supply. I can remember when a few quarts of strawberries would supply the market in Boulder; now it takes hundreds. Experience has conclusively shown that the public taste for fruits keeps pace with the increase in production. These desired articles are no longer considered articles of diet, and their healthfulness is generally conceded. Those who study closely the rate of mortality, tell us that within the last twenty years the average of human life has been materially lengthened; and while this may largely be due to the increased improvements in sanitary condition, there can be no doubt but the healthy addition to our diet of a large production of fruit has been an important element in bringing about the desired result. The number of dollars and cents returned to the producer for his fruits, is no doubt with a large class of men, the only question. But there are a few who hold that the sanitary influence of the home and the influence of the products of the orchard and the garden upon the health of the family are of much greater importance. It would be a very narrow view of the subject that did not embrace under this general statement the moulding influences of horticulture upon our social lives, and that the question of art and pecuniary returns do not go together.

There are a few who will tell you that you must ignore beauty if you demand profit. You must, they will tell you, ignore high social culture if you are to come down to the province of the mighty dollar. I don't believe that. If we take a natural view of real beauty we will be impressed with the idea that under the hand of the all-wise Architect, profit and beauty go together. We are sometimes told that horticulture is a higher or advanced department of agriculture, and perhaps this view is a correct one. It gives us the natural and reasonable view of the relation which the care of the garden, the conservatory and the green-house, the park, the lawn, the orchard and the forest, should hold to the rougher and more masculine departments of agriculture. So we have the right to regard the educational influence that grows out of horticultural pursuits as of a higher order and have a higher range than all those offered by any other occupation.

As a practical educator, we claim for horticulture, not only a place, but the first place. We do not believe it, then, either the token of crankism or special favoritism that would claim for horticulture a higher place in practical education than many of the conservators of our educational interests have been willing to grant. If you would make man happy and prosperous, bring him in harmony with nature. Nothing can effect this object so certainly as an earnest devotion to the pursuits of horticulture.

As a society, we are called upon to extend the field of observation and to recommend the fruits that will be most likely to succeed with us. But this is, indeed, a hard thing to do with our limited means of experimental work. But it has been the aim of this society, at all times, to recommend only those varieties that we deem worthy of cultivation, and to guard the people against the imposition of hordes of irresponsible tree

take this year for an illustration: The leaf-hopper destroyed the whole of the grape crop in some sections of the State, and did a great deal of damage here in this locality. Then we have the leaf-hopper that works upon the apple, and the codlin moth and many other injurious insects, and as we grow older the army of insects will increase in number, and unless checked by timely aid they will ruin one of the greatest industries of the State. We have, I am glad to say, a body of men to represent us in both Houses of our State Government that have the interests of the State at heart, and with a wise head and steady hand at the helm, I hope they will make wise and just laws, and that we as a State can point with pride to our Senators and Representatives as men of brains and honor, and that they will do something besides spend the money of the tax-payers; that they will do all within their power to promote the interest of their constituencies and maintain the dignity of our State institutions.

As we will have some good papers on forestry, I will not say much on this subject, but I should like to call your attention to a few facts. It is well known to most of us that give this matter any thought that the destruction of the forests along our streams, and at the headwaters where the supply comes for irrigating purposes, are being destroyed, and that very rapidly, and that it is having a very serious effect on the water supply, is a well known fact to those who take the trouble to investigate the matter. But there are a great many farmers who go to the mountains for their wood and fencing that do not consider that they are doing a very wrong thing. They know full well that the water supply is falling off, but they do not stop to think that they are the cause. They tell us it is because the fall of snow is less, or that the body of the snow does not fall early enough to get settled to withstand the heat of the sun or the warm

west winds. I do not wish to be understood that I would not have the farmers get timber and wood from the mountains, or prevent the mill men from sawing the timber into lumber, or the railroads from using what they need for constructing their roads, but I would advise a more careful and economic use of the timber. It is the removing of the timber from our streams that admits the sunshine and the warm west winds, causing the snow to melt much earlier in the season. We get the main flow of water at a time when we need it the least. The forests serve a two-fold object in regulating the flow of water. They not only protect the snow from the hot sun and winds, but they are a great store-house of moisture. The refuse that naturally collects in our forests becomes saturated, and aside from what it thus contains, in connection with the living foliage, makes a perfect protection against too rapid evaporation, the phenomenon of hard rains on the mountains without any perceptible raise in either spring or creek, and that other phenomenon of prolonged drought without any perceptible diminution in the flow of water, are constantly recurring, and have this explanation: Leaf and bark must first be saturated, then the moisture falls gently down on the sponge-like mass of roots; this is filled; then the ground beneath permeated with roots and softened by the upper deposit, the rain-fall is gathered deeper in the very heart of the hill-side, to find its way out through the openings that man and beast know so well. If you ask for more proofs, I can cite you to the floods we have in all the rivers that rise in what was once a great forest; but since they have been depopulated of these forests the snow melts at once, causing floods that do a great deal of damage to life and property. I hope every farmer will do all he can in protecting our forests, for in so doing you are protecting your own interests.

I should like to say a word in regard to the marketing of the fruits of northern Colorado. This society has for the last two or three years, tried to devise some means whereby the market might be kept from fluctuation, and that we might get better prices for the fruit placed upon the market; but it has not been so much of a success as we had hoped, for we have not had united action on the part of all the fruit growers, and it is impossible to do such without the entire action and sympathy of those engaged in the fruit business. I would recommend that you try to organize a Fruit Growers' Protective Association, something like that which California has, and get a united action on the part of every fruit grower in the State. There should be some law or laws enacted that would compel the commission merchant to show his books to those who are consigning goods to his or their houses, that we might know at what price our goods are sold, and to whom it was sold, and in this way we might know that we are getting just returns for our fruits. Although I do not believe in consigning much of fruits to commission men, it becomes necessary many times to do so, especially during the strawberry season, and in handling some of our softer fruits, such as the red raspberry; but we should try and have some understanding with the house we are consigning to, that they should not sell under a certain price. If we all understood this, there would be no trouble in keeping up the price of our fruits. It is a bad policy to consign fruit to very many commission houses in the same city, as they are all anxious for trade and will many times cut prices a little in order to get it.

I do not feel like closing this already too long article without congratulating the members of this society and all those engaged in the culture of fruits in this State, on the progress we have made, and the fine display of fruits here before us, speaks louder and with more force

than I can, of the success we have made and will continue to make in the future. We have been telling what we could do; now we bring you the fruits of our labor and demonstrate to you what we can do, and I think we should all take renewed courage from what we see here. But amid our prosperity, and at a time that our long and untiring efforts and hopes for Colorado to become a fruit producing State seems about to be crowned with success, death, ever in our midst, has selected this time for his victims three of our most earnest workers and much beloved brothers—J. E. WASHBURN, our worthy secretary, and WM. NEWLAND, our first vice-president—both called at the same time; one, after a long and continued suffering, the other, by a terrible accident, the details of which are still fresh in our memories. The third—BROTHER MCMILLAN, of Loveland—passed away after a long sickness. Thus, the plants of earth have only been transplanted to a fairer climate and a more beautiful home, "for in my father's house there are many mansions." The beautiful of home and home life only fits us for the more beautiful in the hereafter, and while we recognize the fact that of the earth we are and must perish as the laws of nature demand, yet nature mourns at the seeming loss and transition therefrom.

After the closing of the President's address, DR. ALEX. SHAW moved that a committee of three be appointed, to whom the address be referred.

MR. GIPSON moved that a committee be appointed to report on the death of members spoken of in the address, and the President appointed as such committee: A. E. GIPSON, J. S. MCCLELLAND and JAMES ACKERMAN.

MR. ACKERMAN, as chairman of committee on nominations, reported the following named persons for officers of the Association for the ensuing year.

MR. GIPSON moved as an amendment to MR. ACKERMAN'S report, that the Secretary be instructed to cast the ballot for the officers named by the committee.

Motion carried.

The Secretary then cast the ballot as follows:

*For President*—C. S. FAUROT, of Boulder.

*For Secretary*—P. D. GOSS, of Loveland.

*For Tresurer*—L. H. DICKERSON, of Longmont.

*Vice-Presidents*—JAMES ACKERMAN, Boulder county; PROF. JAMES CASIDAY, Larimer county; C. C. CALKINS, Weld county.

*Executive Committee*—J. S. BARRET, Weld county, and A. WILD, Larimer county.

MR. GIPSON moved that the Society extend its hearty thanks to the retiring President for his untiring efforts in its behalf.

The revision of the fruit list was called up again.

DR. SHAW moved that the Tulphocken apple be placed on the list for trial.

MR. GALLUP: In the east it is considered a poor apple. Has good size. Should prefer to try the King.

DR. SHAW: Would place the Vandivere Pippin on the list for trial.

MR. MCCLELLAND: Would inquire where in our district it had been grown.

MR. BROTHERS: Does well at Denver.

MR. ACKERMAN: Would place the Utter's Red on the list for trial.

DR. SHAW: Would place the Isham Sweet on the list. It is a large, fine, red apple.

MR. MCCLELLAND: Don't believe in recommending anything I would not try myself. Might as well recommend the whole catalogue.

MR. BROTHERS: HENRY LEE has the tree in bearing, and thinks well of it.

MR. GIBSON moved that the Society recommend the following: McMahon White, Longfield, Switzer, Talher and Moscow Pear.

MR. WEBSTER favored the members trying them, and the motion carried.

MR. GALLUP: Would place the Alexander on the list.

MR. MILLET: Would place the St. Lawrence on the list.

The Secretary read the report on fruits, as adopted at the last meeting, at Greeley.

The President asked for the report of the Committee on By-Laws.

MR. MCCLELLAND reported as follows.

NOTE BY SECRETARY.—No manuscript found noting report and adjournment.

## MORNING SESSION.

FRIDAY, December 10, 1886.

The officers and members of the society were again pleased to see the house filling, at an early hour, full of parties willing to learn of and inquire about the new industry that in the near future is destined to make home life in Colorado more bearable and pleasant, and our home surroundings like those of our boyhood days

of the far east—a stage of life that our thoughts will revert to with more pleasure than all others.

The house was called to order by PRESIDENT FAUROT at 9:30 o'clock, and the usual ceremonies of the opening gone through with.

The paper of C. C. CALKINS on drainage was read.

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# Draining.

BY MR. CARLTON CALKINS.

In general under-draining, the main result sought is the removal from the soil of the excess of water not required for the best development of plant life, and so accustomed are we to associate in our minds "swampy ground" with the term "under-draining," that we are apt to overlook the fact that many other benefits may be derived from a system of under-drainage, besides removing surplus water. While the cheapness of our lands and the cost of draining yet forbid us undertaking the work on general farm lands not two wet for cultivation, yet, for horticultural purposes, unless the ground has the best of natural under-drainage, it is scarcely a question whether the many other benefits to be derived will not offset the cost of under-draining the ground intended for either orchard, vineyard, or small fruit garden. Some of the benefits mentioned briefly, are: The deepening of the soil; the freer passage of air through the soil, thereby increasing the absorption of fertilizing substances from the air; pulverization of the soil is greatly increased, which, in its turn will—sponge-like—absorb and retain more moisture both from the air above and the deeper subsoil

beneath, thus helping to prevent drouth; and a much more even degree of humidity is maintained, for, should the soil become saturated, the drained ground will, on the one hand, free itself of the surplus water much the quicker, and on the other, for reasons already given, retain the desired amount of moisture much the longest.

For horticultural purposes, it is doubtful if healthy plants can be maintained on any ground in which water stands within two or three feet of the surface at any season of the year, to say nothing of the alkalies, which, in most places in our State, would be left in death-dealing quantities by such water being allowed to stand. Having satisfied ourselves that the ground on which we wish to plant our vineyard must be drained, the first step is to ascertain as near as possible the source of the water supply and the nature of the soil, because on this knowledge depends our ability to approach the desired means of doing thorough work with the least outlay. Sometimes the declination of the impervious strata on which the water is flowing—gotten there by irrigating higher lands above—is less than that of the surface above it. Consequently, near where this strata may be said to "crop out" the water is again emptied on the surface. Such ground may be drained comparatively easy by throwing a drain around the wet ground with its bottom resting on the impervious strata. This intercepts the whole flow and remedies the whole evil. But a more frequent source of the wet ground is where the soil over it changes from one through which the water finds easy passage, to another, like clay, for instance, which retards the flow, and an under-ground pond begins to form, which, in time, overflows its banks at the surface, and this added to the seepage which oozes through the clay to the surface on the down slope, presents to us a difficulty which cannot be overcome by a single ditch. It can be remedied only by a system of drains placed

near enough together all through the wet ground to collect all the water before it can reach the surface.

Having determined how the ground is to be drained, the next step is to secure an outlet. If possible, make one for all the drains. The main drain discharges here, and it must be large enough to carry the combined waters of all the drains. Do not take any chances on the fall or grade of any of the ditches. Any error will prove costly. If you are not capable of taking a few simple levels yourself, employ some one who can. Give all the ditches a fall, if possible, of at least one inch per rod—two inches is better, and is usually enough. Begin the whole work at the outlet, or the lower end of the drain, and its bottom should be at least two or three inches below the bottom of its laterals. There is no danger of getting the drain too deep to do good work, provided their grade is uniform, but the rapid increase of cost forbids their being placed much lower than four feet. One authority says a four-foot drain will cost fully twice as much a three-foot one. And also says the benefits resulting from the two different depths are in many cases in the same proportion. To experiment, I had one drain put in five feet below the surface, the ditcher agreeing to do the work for twice the amount per rod that he received for the three and one-half foot drains. He claimed he lost by the transaction, and I think I gained, as its operations extended more than twice as far as the others. This main drain must extend through the lowest ground. The contour of the surface will, in a great measure, determine the direction the others should take from the main, though the angle between the two, measured on the up-hill side, should not vary far from fifty degrees for the first few feet. The soil is the chief factor in determining how far apart the drains should be placed. The distance varies from twenty-five feet, in the stiffest clays, to two hun-

dred feet or more in gravely or sandy soil, assuming them to be three to three and one-half feet deep.

Board drains are by far the cheapest for the mains. One seven-inch and one eight-inch board nailed together at the edge and placed in the drain like an inverted V will have a cross-section measure of about twenty-five surface inches, and will, therefore, carry that many inches of water, or the combined waters of eight or nine drains laid with two-inch tiling, and running to their fullest capacity. This result, however, is obtained by cross-section measurements. In practice, the above sized main will carry much more than that because of the lessened friction. This is based on the supposition that their respective falls are the same. Such a drain will take less than twenty-one feet of lumber to the rod, where one-inch boards are used (one and one-fourth inch boards are better) which, at $18 per thousand, will be about thirty-eight cents per rod, or forty cents with nails and cross-cleats. For several reasons I prefer boards to tiles for the laterals as well, especially where ground is constantly wet with alkali water. Three and four-inch strips will do for these, nailed and placed as before. They can be joined at the end, either by having the end cleat across the bottow wide enough for two ends to rest upon, or when the two pieces of each section are nailed together, instead of having the ends even, misplace them a foot or more, being sure each pair are misplaced the same distance, thereby allowing us to nail the sections together at the ends, where the projection of one section laps on the corresponding projection of the preceding one. Material for a drain of this size will cost about eighteen cents per rod. My preference for board drains is not based upon prejudice and ignorance, as has been intimated to me, but from knowledge gained by observation, and experience gained in draining very wet alkali ground. With existing prices, the price of

board drains is one-half or less than that of tiling of equal capacity, material alone considered. Having an open bottom, it will act more rapidly when ground is saturated, and is fully as effective at all times. As to which is the most durable, I hope a succeeding generation will alone be able to tell. If all other things were equal, however, I would sooner chance the boards on that score, basing my judgment on observation alone.

Then followed a general discussion on "Drainage:"

MR. CALKINS: My tile cost two cents a foot for two-inch tile. They dissolve easily in alkali. Have been in the ground two years, and drain carried off the water, but the surface of the ground is so covered with alkali that no crop can be raised upon it. The drains are sixty feet apart, but half that distance is required to do good work. The drain is three and a half feet deep and cost one hundred dollars per acre. Boards sould be put under the tiling to keep it from sagging at the joints in soft places. I have reclaimed forty-five acres. I think they will last a man's life-time in alkali water.

MR. BROTHERS: The best land near Denver is still to be drained.

MR. GOSS: Made a drain out of boulders, with a slab on top, that does good service. Has been running six years.

MR. RUST: The boards must be covered with water all the time in order to preserve them. I use two and four inch tile. Three inch tile costs ten cents per foot. Don't think alkali water affects tile.

MR. CALKINS: The water comes from underneath and brings the alkali with it.

MR. SCOTT: Can I drain my land with a covered drain made of stone?

MR. FAUROT: It is the best drain you can make.

Mr. RUST: Don't think you can get the water out of such a drain.

## Cultivation of Small Fruits.

BY MR. J. L. BARRETT.

In consenting to prepare a paper to be read at this meeting, you will bear in mind the conditions were, a paper entitled, "Cultivation of Small Fruits from Actual Experince." The limitation, under such conditions, is somewhat serious, and the first question very naturally is, "Why was the call made to me?" more especially, too, since from the beginning to the end of the programme, as you will observe, no such limitation is imposed upon any other paper, and the only reasonable answer, it occurs to me, must be based upon the hypothesis, "the less one knows, the better he can tell it."

In the first place, let me say, and this applies, perhaps, equally to all small fruits, my experience teaches, that, as a rule, enough attention is not given to the preparation of the soil at the very outset. Not only should a soil, well adapted to the particular kind of fruit be chosen, but the preparation of that soil should be deep, thorough, complete and perfect, before a single seed or plant be deposited therein, in order to secure the best results. When thus prepared, the ground should be laid off with eye almost single to the saving of labor in the after cultivation. Long rows and straight ones, are important in fields of any considerable size. Then the time spent planting is of some moment. Other things being equally good, with some varieties, the fall

is undoubtedly the best; with others, the spring; and still others are so generally disposed that they will, perhaps, with equal readiness, respond to your efforts in their behalf, whether made at either season; but no matter what the season of the year, the work of putting out should be well done. No slip-shod effort should be tolerated for a moment. Extra time, extra care, extra money, even, thus invested, will yield a wonderful interest. Equal, if you please, to the two and three per cent. a month investments of fifteen years ago. Then the ensuing cultivation also should be thorough and systematic; and this for a two-fold purpose; first, to secure the total destruction of weeds; and, second, to further the growth and fruitfullness of the plant.

This cultivation is to be continuous throughout the growing season. It may not be intermittent, simply because the present crop has matured; but in this way alone can the just demands of a succeeding crop be met—and met they must be—and at the proper time. Further, the eternal persistence of the weeds must be opposed by an equal persistenee of us, the tillers of the soil. Besides, the full growth and maturity of the plant, on which is based the promise of next year's fruitage, is very greatly dependent on the last half of the growing season.

Again, experience teaches that another, and not inconsiderable element of success in the cultivation of small fruits, is the particular variety of the kind cultivated. Of course, this idea will have but little weight with those of my hearers, if there be any such, who are established in the faith that, "a berry is a berry," and "a potatoe is a potatoe." Many, however, will agree with me in the claim that there is a wonderful difference between the varieties, either of the strawberry or the potatoe, and upon that fact alone often hangs all the

difference between profit and loss in a crop of either. The varieties of all the kinds of small fruits are very numerous, and although the scope of this paper precludes a discussion on this point here, yet it goes almost without the saying, that a judicious selection is of prime importance, and especially is this true of blackberries, raspberries and grapes. And though equally true of these three kinds, yet not entirely for the same reasons. After the perfect preparation of the soil, the planting out of the fruits and their careful cultivation through the growing season, then comes the winter protection of the plants, which is probably of more consequence at Greeley, the scene of my experience, than here, immediately under the foot-hills.

We find, that so far as the three kinds named are concerned, the selection of hardy varieties is a matter of no particular moment. Every one needs protection to enable it to go safely through our average winter, and with that protection the most tender varieties withstand the climate every time, with just as much certainty as do the most hardy. Therefore, we have accepted the lesson and make selection of the best and most desirable varieties every time, without regard to hardiness, experience having already taught us that the iron-clads do not winter without protection, and that the best and most tender varieties go through with certainty whenever that protection is duly afforded. We furnish this potection to the grape, blackberry, raspberry and blackcap, by bending carefully to the ground, along the row, and covering with earth sufficiently deep to hold them firmly in place through the winter, in spite of the efforts of the winds from time to time to remove the covering; and remembering, that this object accomplished, the lighter the covering the better, both for the plant and for us. It has been supposed that this covering process should be delayed as long as possible in the

fall, in order to enable the wood to ripen up, and the foliage already fallen, else there would be a probability of the green foliage gathering moisture, heating and damaging the plant. However, experience has taught that these fruits may be covered quite early in the season without any detrimental effect, even as early as the middle of October, and while the plants are still abounding with a dense mass of green and succulent foliage. For several years my practice has been to cover very early, say beginning October 10, first as an experiment, afterwards from choice. This was, of course, before the leaves begun to fall, and involved the covering of a dense mass of plant growth. Yet, notwithstanding many weeks of mild and pleasant weather succeeded, in no case has any perceptible injury succeeded that could possibly be attributed to premature covering. The knowledge of this fact may be of some value, since those who delay till late, by the early freezing of the ground may be prevented from covering at all, and thus unwittingly suffer the loss of a crop.

As to the strawberry, early covering is not important, for the reason that we use for the purpose straw or coarse manure, some light material, with a view to protecting from frequent thawing and freezing in the spring; and this can be done as well after the ground is thoroughly frozen as before, and, indeed, perhaps better. In fact, it seems to be pretty well demonstrated that strawberry plants, well established and well grown, will go safely through an average winter and come out in good condition, with no protection beyond their own foliage. Indeed, some prefer turning them out in the fall to chance the winter on their own resources, as the stockmen do their cattle.

The most difficult thing in connection with the protection of small fruits by covering with earth, is to determine the exact time when the covering should be

removed. It is well understood that plants put forth more rapidly when protected by a slight covering of earth, than when out and exposed to the cool air, as well as to the occasional winds and frosts that are sure to come in March and April. The theory would, therefore, seem to be, "uncover as soon as the severe cold is passed, and before the buds are much advanced." And my experience, on the whole, rather tends to support the theory. However, I would not be understood to commit myself unreservedly to it. We all say, "any time after the first of March;" whenever a cold spell is over, and the air warms up with a good prospect of five or six days of pleasant weather, then uncover, and if the warm weather should intervene before a freeze, the plants will have become so hardy that they can stand a pretty hard freeze without injury. If, however, a freeze intervenes too soon after the protection has been removed, injury will be likely to result; and the longer the uncovering is postponed, the greater the danger to the plant if a cold spell does intervene before the hardening process is complete. I have uncovered at all times, from the first of March to the twentieth of April, and have found those uncovered early to stand a late frost without injury, while those uncovered more recently were badly damaged by the same frost. Still, early uncovering is always attended with more or less risk, because we can not with certainty forecast the weather in Colorado, even for a few days, and in case we fail in this, our efforts only count the danger we would avoid. And again, when we have, as we think, prognosticated wisely, and succeeded for weeks in hardening our plants by exposure, occasionally we experience extremes of cold very late in the season, and thus lose our plants that we fancied were past all danger. Last spring was an example of this, when the last days of March found the mercury down to thirteen degrees below zero, and

the twenty-second of April, 1885, it was down nearly to zero. Thus we see that early uncovering, as before remarked, is sometimes disastrous, while on the other hand, allowing the canes to stay until late, puts them further ahead and thus renders them more susceptible to injury from light frosts after they shall have been uncovered. Indeed, while exercising the best of judgment, with all the light accessable, like the manners of old, we are liable, while avoiding Scylla, to run directly upon Charbydes. This, while it may be unfortunate, is, nevertheless, true. If by chance, good luck, or as I prefer to call it, good judgment, we have succeded in bringing all our plants through the winter in good condition, then indeed, may we consider ourselves fortunate. Yes, happy. And we can begin another year just as we began this, yet with brighter prospects and brighter hopes, because we have a larger experience.

Suggestions in various directions, and at length, might be made, but enough has already been said for a starter, and my experience suggests that on a subject like this oral discussion is preferable to a written disquisition by one so poorly equipped as your writer is constrained to acknowledge himself.

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Then followed a general discussion on "Cultivation of Small Fruits from Actual Experience."

MR. GALLUP: I experiment only with small fruits.

DR. SHAW: Did MR. RUST try covering his strawberries with slabs?

MR. RUST: Yes. The result was rather disappointing. Never tried it but once. It will not injure the fruit unless left on too late in the spring. The slabs were laid flat on the rows, and as close together as could be. In the spring the slabs were placed between the rows to keep the weeds down until after fruiting. Think

the covering of slabs increases the amount of nutriment in the soil. I have never been troubled with winter-killing in my beds.

MR. GALLUP: Have better success when no mulch is used. My soil is light and sandy.

MR. RUST: Is there any difference between the roots of strawberries and those of other plants? Do strawberry roots die annually? Is there no preventative?

MR. GALLUP: The plant life is from two to three years. The roots die of old age.

MR. RUST: Do you have more than one plant in hill culture?

MR. GALLUP: Only one. The plant has a great many crowns.

MR. ACKERMAN: Tried hill culture, and at the end of three years my berries cost me fifty cents a quart. Have little success with any kind of mulch.

MR. GOSS: Mulch only to keep some berries back and prolong the season. I cover the berries as soon as the leaves show that fall is approaching. With the grape, I cover as soon as the leaves begin to fall.

MR. GIPSON: Cover my raspberries and blackberries with earth. The matter of hardiness is of secondary importance. I bend down by hand and cover by plowing a furrow from each side, being careful to cover with a shovel all that is left exposed.

MR. ACKERMAN: Which is preferable, bending sidewise or lengthwise?

MR. GIPSON: Lay them lengthwise in the row, as it is more convenient and saves much labor.

MR. MILLETT: The bushes should be bent towards the north, so that the new growth the following summer may shade them and thus prevent sun-scalding.

MR. FAUROT: Always bend my bushes to the east. It is almost three times the labor to bend them sidewise. I bury my vines as soon as I can, and they are as green in the spring as they were in the fall. They bend down easier by always laying one way.

MR. RUST: I bend my bushes to the south.

MR. MCCLELLAND: Lay them lengthwise in the row without regard to the points of the compass.

MR. RUST: Is our fruit injured by the extreme cold weather, or by dry winds? Should we wait to uncover until the sap starts?

MR. GIPSON: Think the injury is due to the extreme cold weather and dry winds, too, in Weld county.

MR. RUST: Have the Antwerp and Brandywine raspberries been tried here? Are they a good berry in this climate?

MR. GIPSON: Brinkle's Orange is a good one.

MR. RUST: What is the cause of the double blossoms in the Wilson blackberry?

MR. MCCLELLAND: The double blossom is a disease and the only cure is to dig up and throw over the fence.

# Currants and Gooseberries.

BY L. H. DICKSON.

The species of currant from which our cultivated varieties originated are probably native of northern Europe, as we do not find them mentioned by any of the old Greek and Roman writers, who were generally so particular to name every fruit known in their day. The English name, "currant," or "conans," as they were formerly called, was given them because of their resemblance to the little Zante grape, which is called "corinths" in the English markets, as it was formerly almost entirely imported from Corinth. The black, red and white currants, although known to the inhabitants of northern Europe for centuries, attracted but very little attention until within the past one hundred years. Turner, in 1557, does not name them in his list of cultivated fruits. Guarde, in 1597, calls the currant a "smooth-stemmed gooseberry." The black currant was formerly known as the "squinancy berry," because used to cure quinsy. The people of Siberia use the leaves of the black currant for making a drink, the same as we use tea. Loudon says that the leaves, when dried, are an excellent substitute for green tea, and that few persons can detect the difference. But we very much question this, though we confess never having made a trial. The red, white and black currants, one variety of each, were the only kinds known in cultivation until the beginning of the present century. Since that time considerable improvement has been made and numerous varieties introduced.

## PROPAGATION.

The method of propagating currants by seeds is seldom employed, except for the purpose of producing new

varieties; hence, but few will adopt this method, as it is attended with much care and risk, and in this country would not pay. But propagating by cuttings of ripe wood may be made at any time from the falling of the leaf in autum until the plants commence growth in the spring. The best plan is to take off the cuttings as soon as the wood is fully ripe. Cuttings planted early in the fall will usually become rooted before winter sets in. In order to obtain good results from fall planting, the ground should be well prepared and kept moist, or it will prove a failure in this dry climate. There is nothing easier to propagate than the currant (unless it be weeds), and one starting with but few plants, can in a very short space of time, with little care and attention, have all the plants they want, either for their own use, or for market. The plant may also be propagated from suckers or by layers, but neither of these plans are recommended.

### SOIL AND CULTIVATION.

We all know the currant is a plant that possesses great vitality, and will grow in all kinds of soil, and in almost any situation, but to bring it to perfection and make its culture a success, as well as profitable, it requires good culture and a deep, rich soil. It will succeed in almost any locality in the State, and I wonder why it is not cultivated more generally than it is, as there is no other kind of fruit grown in this State, that can be grown as cheap, and none more sure. The plants should be set in rows about five feet apart, and the same distance in the row. Clean cultivation is required, as with other plants, and if the whole surface of the soil is covered with mulch during the summer, it will not only insure the maturing of the crop, but it will materially increase the size of the fruit.

PRUNING AND TRAINING.

About all the pruning that is necessary is to cut out occasionally the old wood and shorten the most vigorous of the young growth. If too many shoots, or suckers, appear, and they are likely to become crowded, a portion of them should be cut out so that the sun and air may have free access to those that remain. The main object of this is to properly develop every portion of the plant. A few vigorous shoots will give more and larger fruit than a large number of weak and immature ones. Some train with single stems, and in some soils single stem plants will live and produce abundantly for a few years, and while young the fruit will be larger, but for general culture the clump, or bush form, is recommended.

VARIETIES.

Varieties are but few in number with me. I have only grown and fruited three in this country. They are the Red Dutch, Red Cherry and White Grape, all of which give the best of satisfaction. Though the Red Cherry is the largest and finest looking berry, the White Grape is the finest flavored.

Currants are not, as a general thing, consumed in as large quantities as some other kinds of small fruits, still every garden, however small, in city or country, should have currant bushes in cultivation. There is hardly a spot of ground in this broad State of ours, unless it be the higher altitudes, but the currant and gooseberry can be grown, with but little care and less expense. It seems passing strange that there is so little of this fruit grown in this State, when it is so easily produced, requiring no winter protection whatever—when raspberries, blackberries and grapes—in fact, all other kinds of small fruits, needs and must have winter protection. Very few, if any, of our smaller fruits are nicer or more

healthful for table use, than the ripe currant. They are also excellent for pies, jellies and canning purposes, and an excellent quality of wine can be made from the currant. Mr. Fuller, the eminent horticulturist from New Jersey, says: "In planting the common red and white kinds, four feet spart each way is sufficient. This gives two thousand two hundred and seventy-two plants to the acre. If we estimate a crop at two pounds to the plant, which is not one-half what they should produce when fully grown, we will get five thousand four hundred and forty-four pounds to the acre, or over two and a half tons, and at two hundred dollars per ton, it amounts to over five hundred dollars. Then we have the gathering, shipping, and other incidental expenses to deduct therefrom. But even then it will be seen that it is a profitable crop, and that by good cultivation the crop may be doubled."

The currant possesses many good qualities to recommend it for general use, and among which are its perfect hardiness, early culture, great productiveness, and almost certainty of full crop every year, besides the excellent quality of the fruit.

The gooseberry has no separate history from the currant. It was not known as a cultivated fruit until within the last two or three hundred years. In this country very little attention has been paid to the gooseberry.

### PROPAGATION.

The same methods recommended for the currant, with one or two exceptions, are equally applicable to the gooseberry. As a rule it does not ripen its wood quite as early in the season as the currant. But if the young wood is mature, cuttings should be secured in the fall after the leaves have fallen.

### PRUNING AND TRAINING.

The single stem system is recommended by most growers for training the gooseberry. The fruit is pro-

duced on short spurs on the two and three-year old wood, as well as on that of the preceding year, and the directions given for the currant are applicable to the gooseberry.

### SOIL AND CULTIVATION.

The goosberry likes a good rich soil, but, like the currant, it will grow in any and all kinds of soil, and under any and all circumstances. Though to bring it to perfection, decent and respectful treatment is required.

### PROFITS OF CULTURE.

In this country, where all fruit growers run to strawberries and raspberries, there is far less demand for this fruit than there should be. This fruit is generally gathered before it is fully ripe and used or sold for making pies, tarts and more particularly for canning. Two to four hundred bushels per acre can be grown at a cost, we believe, not to exceed sixty cents per bushels. As to the profits of a crop of this kind, any one can draw their own conclusions. The Downing and Houghton's Seedling are considered the best native varieties. They grow excellent berries and the plants are vigorous and productive.

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Then followed a general discussion on "Currants and Gooseberries:"

MR. ACKERMAN: Have no good results in cultivating after the first year. Mulch after that time very heavily. Picked twenty-two quarts of gooseberries from one bush. In picking my berries I strip the branch into a large pan and run the fruit through a fanning mill. Never have sold any gooseborries less than one dollar a bushel.

MR. RUST: I cultivate and have good success.

MRS. CARR: Is there a white gooseberry in the mountains?

JUDGE OWEN: Yes; but the flavor is very poor.

MR. GIPSON: English gooseberries are what we need. The Whitesmith and Green Globe are good ones.

MR. BROTHERS: Have four English gooseberries. The Whitesmith, Golden Yellow, Green Globe and Red. All are good producers. They do not mildew here. Colorado is one of the best places in the world for them.

MR. BADER: Make vinegar out of gooseberries and think it is the best I ever tasted.

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# Relation of Poultry to Horticulture.

BY MRS. W. W. TAYLOR.

When first called to the consideration of this subject a dim idea that horticulture might mean fruit culture exclusively, made the matter of treatment of this particular branch one of considerable anxiety, as I have had but little experience with fruit growing. However, on consulting Webster, I found much latitude was granted, as he assured me that horticulture was the "culture of a garden," and as I, in common with some of the illustrious members of this association, have had some experience with hens in gardens, the matter became somewhat simplified. Even in the limited time I have given to the study of this subject, very many classes of insects injurious to plant life have come to my notice that are the legitimate prey of domestic fowls, and for whose extermination the keeping of poultry can

be made doubly profitable. A large portion of these insects are, in one state of their existence, light colored grubs, which emerge from the larvel state in the earth and proceed "to climb a tree," when a thrifty Plymouth Rock hen, with a clamorous brood, should be right at hand, not to "nip it in the bud," but ere he has reached it. If, by chance, he should reach his goal, and in the heart of a rosy apple transform into a downy moth and sail away in the mellow sunlight, an active Leghorn pullet, with swift feet and strong wing, will overtake him in the flight, and manufacture him into a pearly white egg, fit to grace the table of an epicure. Meantime, others of his kin are slumbering in the earth, and will find an old speckled hen, with the brood of downy white chicks, with sprouting tails, and whose immediate projenitors decline to take a hand in their bringing up, will get right down to business in the soft warm earth, and drag them forth with their long toe-nails and pass them over to the merciless chicks aforesaid, who may themselves be served up in a few weeks on toast in the restaurant. The katydid and the entire cricket and grasshopper families are esteemed dainties in the poultry domain, and would it be a "fowl proceeding" to pass unheeded a delicate green cabbage worm, or the miller which produced it? If, by chance, they take the liberty, of dining on cabbage also, remember, it is but a just return for labor performed, and you will be much more benefited by letting the hens eat it than the worms. However, the chickens will not be liable to devour the heads unless they are already bursted open and reveal the white, succulent heart. The strawberry beds, unless newly set, may be entrusted to the care of hens and chichens at any season when not in fruit, and many an earth-worm and leaf-roller will be destroyed, and the surface of the beds be cultivated and fertilized.

In well established orchards it is sometimes best to seed down to clover, and in so doing new insects are established, common to this plant, which furnish another source of income to the poultry, as does also the tender leaf of the clover, which is a valuable green food for them, especially when they are allowed to run and pick it for themselves. Those tiny caterpillars that suspend themselves by threads from raspberry, gooseberry, currant, and other low bushes, and are, doubtless, enemies to them, fall an easy prey to the ever watchful hen, though she may be apparently dreaming, on one foot, with one eye shut, of the generous handful of screenings she had in the early morning, or the soft breakfast wet with warm milk that greeted her when she first came from her perch to meet the day. The birds of the air are the faithful allies of the fowls of the earth, as they capture such a number of insects on the wing or high in the branches far above the reach of our domestic feathered pets.

Fowls that are trained to be gentle, handled at will, may be made more useful than if timid or wild, as they will come readily when called, and will follow closely to destroy vermin, when the earth is upturned and boards or rubbish removed for them. It is a simple thing to teach them to be handled as freely as cats, by accustoming them from the first to eat often from the hand, and by sitting down among them they will crowd around you and in your lap, perch on your arm or head, and try to pick the buttons off your clothes. I have frequently gone out to the yard, taken up a handful of young chicks and put them into the kitchen window, where they would quickly devour all the flies congregated there, jumping half way up the sash to catch the stragglers. The breed has much to do with the docility of the chicks, as some have more quiet dispositions than others, and sooner learn to trust the hand that cares for

them. Only very small chicks may be allowed among small plants in the garden, as the tender vegetables, when first up, form too tempting a relish for their diet of worms and bugs; and wouldn't it be asking too much to expect them to eat only weeds?

The late improvements and inventions of light portable fencing has made it quite practicable to confine poultry much as we choose, at a slight cost, keeping them in or out of the orchard, vines and gardens at will. I hope I may see presented a plan for a building for the accommodation of both fruit and poultry, as I do not deem them incompatible, and they could be attended to in less time, with less danger of neglect, than if far apart. Cleanliness being of the utmost importance in a fowl-house, to derive the greatest profit, it will be more likely to get the necessary attention, if in the adjoining room we store and assort our fruit, bunch and arrange our early market vegetables, where we can toss out into the back yard the refuse and inferior specimens for the chickens, to serve as a variety to them. This fruit-room would, also, be just the place in which to run our incubators, as it should be frost proof, or nearly so, and the temperature as unvarying as possible, while it would not be much used during the late winter and early spring months, just when the incubator is most profitably operated. Aside from the income from eggs and fowls we should hope to derive, is the value of the fertilizers, the best known, to be accumulated through the year, right in the closest proximity to the location where needed, so that little excuse can be found for not applying it, and as much of it would be distributed and cultivated in by the fowls themselves, the fields would be enriched without extra labor.

Looking at this subject from my standpoint, the relation of horticulture and poultry is so very close that no horticulturist could afford to do without poultry, and no

poultry keeper should be without fruit, since there are so many kinds that may be set in a yard devoted wholly to poultry, with great advantage to both trees and fowls.

The choice of varieties of both fruit and fowls depends largely on location and market, as well as the tastes and experience of the persons engaged in their culture; but it is an undeniable point that neither can be raised without a liberal application of brains, perseverance and elbow grease, nor will they yield fortunes in a day.

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Then followed a general discussion on "Poultry and its Relation to Horticulture:"

MR. BROTHERS: Birds are very essential in keeping down insects in the orchard. Chickens do a great deal of damage and a great deal of good. A bill ought to be introduced into the legislature for the protection of birds.

JUDGE HOUSER: Chickens are my best remedy for insects in orchards.

MR. MILLETT: Is the leaf-hopper much of a pest here? It generally attacks young plants and the tender varieties of grapes. Do they come from the south?

MR. FAUROT: The insects attack the thin-leaved varieties, as the Delaware and the Clinton.

MR. GIPSON: Poultry does good in the garden and orchard. In the early spring they pick the crowns of the strawberry. They are especially good in the plum orchard, as they are of great assistance in keeping down the curculio.

MR. WEBSTER: The leaf-hopper came to my place from the south. They attacked the Clinton first, the Delaware next. Did not molest any other varieties.

MR. PABOR: The leaf-hopper, in my experience, attacks only the foreign varieties.

MRS. TAYLOR: Please give a description of the leaf-hopper.

MR. FAUROT: The leaf-hopper is about the size of a musquito, and has a long proboscis with which it punctures the leaf from the lower side and extracts the sap. I gather the leaves in the fall and burn them to rid myself of the pests, as I have noticed a great many of them among the leaves in the fall.

MR. BROTHERS: I rake the ground thoroughly, burn all the leaves and plow the whole place in the fall, and find it very effectual.

MR. MILLISON: Keep chickens in my plum orchard, and find it profitable. In strawberries and currants they do damage.

MR. FAUROT: Want my chickens dressed when brought near my fruit house.

MR. WEBSTER: To prevent the ravages of the leaf-hopper, take mixed salt and unslacked lime and scatter around the trees.

MRS. TAYLOR: Has any one an incubator in successful operation?

MR. WEBSTER: Plymouth Rocks are my best incubators.

MR. RUST: Hatched only fifty per cent. of my fertile eggs put into the incubator. Think the failure was due to careless handling of eggs.

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

## AFTERNOON SESSION.

The officers were at their desks promptly at 2 o'clock, and after a little preliminary work the programme for the session was again resumed.

# Cross-Fertilization.

BY PRESIDENT C. L. INGERSOLL.

Great is the mystery of life, and its propagation in race, species and variety. Why a creative power should produce of one group of molecules of matter a rock, of another a plant, and of still another an animal, and to the latter give that mysterious something we call life, with capabilities for its renewal in subsequent and apparently unending generations, and to the former only gave to exist as a mass or a crystal subject, to elemental warfare and ultimate disintegration, will probably ever remain a mystery; yet, it would afford pleasure and recreation for any one of you to speculate upon what might have been, provided different groups of molecules had been differently disposed in nature's economy, or provided some of the laws controlling the movements of these groups were more flexible. We will not deprive you of that pleasurable privilege, but for ourself we prefer to look at the more plain and practical features of the question, and only speculate where there appears to be an opportunity of gaining profit.

### FERTILIZATION.

We first meet with the question, "What is fertilization?" and before we answer it we propose to speak briefly, in detail, of the plant. It is divided into root and top. The growth may be according to varying

plans: One made up of bundles of fibres and leaves coming continually from a central stock—the corn plant. is a good example; the other taking on growth by concentric rings, as shown in most trees and shrubs.

In the latter we find growth following several regular forms, all agreeing in this, that as the plant expands it forms buds, and from them come leaves, which as they grow expand, and with this lengthens the stalk, forming inter-nodes and nodes, whence fresh buds start until the growth of the plant is checked by frost, decay, or untoward circumstance. As we watch the plant in its development we suddenly discover groups of buds, or single ones, differing from the others, in size, shape, and external covering somewhat. As they begin to open we wonder what fairy's wand has touched them, for they show edges of parti-colored leaves, and are rendolent with perfume, the proof of the nectar within which so soon attracts the busy bee and his equally active cousins the wasps and hornets. The bud opens: has it leaves? Yes! There are the outer ones which look so nearly like the old ones that we do not hesitate to call them such. The petals? Yes, they are parti-colored leaves; but the strange organs inclosed, what are they? Well, the botanists call them leaves developed in a peculiar manner, and proves it by finding for you these organs developed partly as leaf and partly as other organs. The outer ones, or the anthers, enclose in their walls a fine dust of curious shaped grains, if viewed under the microscope. The central organs, or organ, if compound, is also a leaf, curiously folded, so as to give one several curious pockets. The curious pockets are not there by chance, but when the time comes, they will be placed there, articles on deposit, which are to serve as the propagation of a new generation when brought under the proper conditions. The leaf which has within its folds the grains of dust, grows until at some point where

nature has provided a place for the edges to burst, and the grains of pollen are discharged. These falling upon the raw edges or tips of the curiously folded leaves, called the pistil, form a union, and in a way not understood very well, or easily explained, the plant proceeds to the task of storing up in little capsules, starch, sugar and other ingredients, to serve the young life of the embryo imbedded there, until it can thrust out its feet, the roots, when preparing to grow, and, to use an analogy, walk alone. This is fertilization.

The transfer of pollen from the anther to the pistils of the plants, and the resulting change whereby seeds are produced. The subject may be considered under three heads or divisions:

*First*—Close fertilization.

*Second*—Cross-fertilization.

*Third*—Hybridization, or out-crossing.

In nature there are some plants that it is well nigh impossible for the pollen of one plant, or even a bud on the same branch or spike to reach the pistil on another. Such plants must of necessity (unless by the merest accident), be fertilized by the pollen from each bud acting on its own contiguous or enclosed pistil. The wheat plant and many of the grasses are of this class. In the case of wheat, particularly, I am of the opinion, from careful and long observation, that the pollen is discharged and the pistil fertilized at the time when the anthers push out from between glumes. Every farmer is conversant with the growing of mixed wheats. Unless, by accident, they remain distinct for years in varying proportions, according to the varying prolific tendencies of the several varieties.

*Second*—Cross-fertilization occurs whenever a transfer of pollen takes place from a plant of one variety

upon the pistil of another, and seeds are produced by the transfer. In the majority of plants, such transfer may take place by one of several agencies, viz.: (*a*) The wind; (*b*) agency of insects; (*c*) flowing streams; (*d*) the agency of man.

If any of you have taken a walk on a bright May morning through a fine orchard, when the breeze is wafting the sweet perfume of the blossom-laden trees far and wide, and have seen the pollen dusted upon your clothing or floating in the air, and the thousands of busy bees flitting from flower to flower, we think you could easily reach the conclusion that, although most of the pistils were closely fertilized, that many, at least, had been cross-fertilized by these two agencies. Again, pollen dusted upon leaves, twigs or chips, and then falling into streams where freshets have landed these and brought them into contact with other flowers of their kind which were dipping and swaying in the turbulent water, may have been fertilized. There are some plants in nature in which it would seem to be utterly impossible for fertilization to take place, except through the agency of insects. The orchids have a pollen mingled in a gummy mass, and the pistil rises far above it; the insect, after the nectar, puts his feet in the gum, and in trying to free himself, clings to the pistil, and the act is accomplished.

From the observations of Dr. J. W. Beal, and his able helpers, at the Michigan Agricultural College, the following have been very fully established, viz: "Red clover depends for fertilization very largely upon the activity and number of the bumble-bees. In years when they are few in number there are very poor and small crops of seeds." The explanation is this: The honey-bee cannot reach the nectar or sweet in the blossoms, and hence, does not visit it, but work on the white clover, which has shorter tubes in its heads of blossoms.

The bumble-bee, having a long proboscis and tongue (ligula), can easily reach it in the red clover, hence, works upon it freely. Again, experiments were tried with black-wax beans, with very decided results, showing that those plants where the blossoms were protected from the movements and access of insects, produced far less fruit than those to which insects had free access. These two sets of observations would seem to show that in some plants the agency of insects is necessary to either cross-fertilize blossoms, or to fertilize them with their own pollen—close fertilize them. You are all familiar with the character of some varieties of strawberries, which in some unaccountable manner produced pistillate blossoms. Here the gardener recognizes the benign influence of the wind and his insect friend, and does his share by planting in near rows some variety which will give plenty of pollen in its blossom.

Having touched upon the natural agencies in cross-fertilization, we will now speak of man, another natural agent, who is supposed to bring intelligence and reason into his work, and thus accomplish much more than the other agencies can possibly do by their chance methods. We have already alluded to the two classes of flowers and buds in which we find close fertilization, the rule in the one open and free fertilization and in the other probable cross-fertilization, in a number of instances. This requires two kinds of precaution. In the case of the former, take out the anther before the flower has progressed so far as to discharge any of its pollen, and to fertilize and immediately protect the plant so that insects shall not visit it and disturb it, or the wind carry pollen to it. A neglect to do this early enough has deceived many a good man into the belief that he had effected a cross, when he had done nothing of the kind, but, having tampered with the flower and because of the rude handling disturbed its juices, the

head has been visited by insects, or the glumes remaining partly open the pistil has received pollen through the agency of wind, because the head has been unprotected and an entirely different cross produced from that intended. With open blossoms, like the apple, peach, cherry, etc., one should operate and cut out carefully the anthers, and immediately cover the blossoms. When ready to fertilize, remove the cover, perform the operation and re-cover, letting this remain until the blossom has become the set fruit, when the cover can be removed, the branch labeled, and then you run your chances of small boy and agencies of nature, such as wind and hail storms. If, after all, the chances have come and gone, your fruit remains, you have secured your object. While in college, a cross-fertilized apple was grown which showed several characteristics of both parents. The plant was carefully labeled and was often visited by members of the botany class and others interested in the work. One day the apple disappeared; the professor was grieved and talked to the students about it. The only satisfactory explanation was a cartoon soon after which represented an enlightened freshman, who was not yet up in the mysteries of cross-fertilization, coming in from work and, with hoe in hand, was pulling down the branch and reaching after the apple. So finished the summer's work.

*Third*—Hybridization is the result of cross-fertilization of different species, where this can be accomplished. This has been done in some instances with flowers and some fruit, but the results as a whole are not as satisfactory as when we take varieties. The different species of the strawberry and melon or gourd family hybridize readily with each other, but apples and pears have never been known to do so. This difference is probably due to the fact that the artificial classification of man has placed in some groups species nearly related and

closely resembling each other in all ways, while in other great orders the species is more widely differentiated, and hence have few features or habits in common, hence their refusal to accommodate themselves to the wants of man when he attempts hybridization.

RESULTS.

A few words as to the results reached thus far and I am done. The world owes an everlasting debt of gratitude to such men as Von Mous, who went on for years raising five generations of pears, with steadiness of purpose and care so necessary to successful work, and generations to come, as they eat the luscious fruit from the hundred or more varieties of pears brought out as the result of his labors, will rise up and call him blessed. I will also mention Dr. Knight and his estimable daughter, who raised many seedling cherries—some cross-fertilized among the number—and our own Dr. Kirkland, of Ohio, who did the same. Both were eminent and careful workers, and neither their names nor their work will be forgotten.

In England, in the cereals, much careful work has been performed by the Messrs. Carter, and on this point the editor of the *Gardeners' Chronicle*, in the issue of August 21, 1886, says:

"Those who know the structure of the wheat flower and its tendency to self-fertilization, will appreciate the care and nicety required in effecting cross-fertilization. The glumes have to be separated at a very early stage, the anthers cut away, and the pollen applied to the stigma; a procedure that requires at least an hour for each ear operated upon."

They have striven to get wheat that will ripen earlier in that climate, that being an important matter to them. On account of the destructive habits of birds, attempts are being made to propagate varieties with sharp, close set

glumes, sufficient to keep intruders at bay and lessen their work. Short, thick set heads attain this, rather than long, loosely set ones.

"Messrs. Carter have so arranged," says he further on, "that rows of these cross-fertilized wheats are placed between similar rows of parent forms—male (or pollen plant) on this, female (or pistillate plant) on that side; hence, visitors may see for themselves and contrast the character of both the parents and their offspring."

To the Messrs. Sutton we also owe a debt of science, at least for the eminent work performed on the potatoe. On the work he says: "Well, what if this be true, says the practical man, of what use is it to us? Here we join issue. We believe every fact, proved to be such, is capable of being either directly or indirectly beneficial to those who know how to apply it aright." To the stern Unitarian who can see no good in all this, he says: "It has not come home to him that the labors of the physiologist and of the gardener, of such men as Darwin and Knight, and of the host of experimenters and raisers of new pears, peas, strawberries, etc., are of any importance to him as a man of practice. The gardener knows better; he knows it so well, indeed, that he takes it as a matter of course. To him, cross-breeding and selection are things of every day occurrence. He knows that he owes his best brocolis, his choicest potatoes, his most esteemed grapes, to one or the other, or both of these practices. Once get the practical man to see this, and he will no longer be disposed to scoff at such practice from which so much has been done in the past, and from which so much may be expected in the future."

There is one phase of the subject to which I wish to call your attention. Our people are not so conservative as our English and German brethren over the sea; they are fond of change, and pride themselves on being in advance, where there are advances to be made. To be

first in possession of the new things that come out and have the name of so doing, is a truly laudable ambition, but on account of this tendency those who wish to get a living without work take the opportunity of playing upon the credulity of others. In this way incompetent and unscientific processes undertake to and do deceive both themselves and the people—more often the people. When a man tells you that he has, by cross-fertilization, brought out a strawberry, peach, pear or wheat, do not be in a hurry to believe him until you become thoroughly informed in regard to the method he practices and the general care he exercises in his work.

In conclusion, then, let me say that with the work that anyone can do with seedlings in horticulture, it is useless in my estimation for many persons to be engaged in this work of cross-fertilization, and the few, mostly for science, and secondarily for use; for with the work, such as done with seeds, which very largely must come from cross-fertilized blossoms where the insects or other natural agents have done the work, we may, from sowing a large number, obtain just as good results as when we apply the pollen and know the parentage. In proof of this I ask you to look over the lists of fruit and their origin in Downing in his larger work, and Thomas, in his "American Fruit Culturist." The origin of the larger portion is unknown, and these include some of our widest known and most popular varieties. But the scientific work should be done by the State or the Nation; and in the selection of individuals for carrying on such enterprises, only competent, honest and careful men should be taken, as with work that is to extend over the period of years the temptation is only too strong to fix up the results if errors have been made, and only the merest accident may lead to the discovery of the error perpetrated.

Let, then, the State move forward; let the bill now pending in Congress be passed, if possible, and last of all, let the work be carried out in one or more stations in a careful, scientific, conscientious manner, and by securing the best scientific skill, and using it for the benefit of the people.

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The committee on the death of members during the past year, came forward and desired to report as follows:

*To the Northern Colorado Horticultural Society:*

Your committee appointed to report suitable resolutions on the death of members of this Society during the past year, viz: JOHN E. WASHBURN, WM. NEWLAND and JAMES MCMILLAN, former active and useful members of this Society, beg leave to submit the following:

*Resolved*, That in the death of J. E. WASHBURN, our faithful and efficient Secretary, our Society has lost one of its best members. Always prompt and earnest in the discharge of every duty, he devoted his time and energies freely to the work of the Association, and it is not too much to say that to his untiring efforts we are largely indebted for the present prosperous condition of our Society.

*Resolved*, That in the death of WM. NEWLAND, one of the pioneer fruit-growers of Northern Colorado, and one of the founders of this Society, the cause represented has sustained a serious loss. A modest, quiet man, he was never prominent as an active worker, but was ever ready to lend a helping hand to the extent of his ability for the advancement of horticultural interests.

*Resolved*, That we sincerely regret the death of REV. JAMES MCMILLAN, of Loveland, who had proved himself an earnest friend of our cause, and gave no little assistance towards helping to build up and sustain the objects of our Society.

*Resolved*, That these resolutions be spread upon the records of our Society and a copy of the same transmitted to the families of the deceased members.

Respectfully submitted,

A. E. GIPSON,
J. S. MCCLELLAND,
JAMES ACKERMAN,
*Committee.*

MR. MCCLELLAND then moved that a committee of three be appointed by the Chair, to act in conjunction with the committee of the State Society, to formulate resolutions to the State Legislature to the end of consolidating the two Societies, and securing State aid in maintaining the Society.

Carried.

The Chair then appointed as such committee, JAMES ACKERMAN, of Hygiene, L. H. DICKERSON, of Longmont, and J. S. MCCLELLAND, of Fort Collins.

MR. MCCLELLAND moved that the next annual meeting of the Northern Colorado Horticultural Society be held at Fort Collins, Colorado.

Carried.

The next paper was then called:

# The Tree Peddler.

BY MR. NELSON MILLETT.

You have given me a tough subject—tough and inexhaustable. I wish I could exhaust him; but if I can make him half as tired as he has made me, I'll be satisfied.

There are tree peddlers and tree peddlers, the good and the bad, the true and the false, the honorable man

of business and the unmitigated scamp—the one a missionary of delightfulness, spreading beauty, health and joy; the other a bundle of false pretenses, scattering lies in his pathway and leaving nothing but disappointment behind him.

The business of selling trees through the country is a legitimate one, and the honest tree agent who sells at fair prices and delivers what he claims to, is an important factor in the development of our horticultural interests. To appreciate this, we have but to note the many fine orchards all over our land, standing side by side with the decaying monuments of blighted hopes, that mark the pathway of the itinerant humbug. But the honest tree peddler is such a *rara avis* in this great menagerie of fraud, that we will dismiss him with our blessing and turn our attention to the common enemy, his as well as ours.

Of the vast army of swindlers who annually invade our land, the lighning-rod agent, the patent-right humbug, the cloth vender, the patent medicine fraud, the snide jewelry peddler—of all this vast tribe, the tree peddler is the chief whom all the rest delight to honor, the general in command; a veritable high priest of the order of humbug. Endowed by nature with the "gift of gab," well versed in all the foibles of human nature, skilled in the art of deceiving, shrewd and unscrupulous, and utterly devoid of conscience, he is ready to capture his victim before he realizes that an assault is being made upon him. Ignorant of the first principles of horticulture, he makes up in assurance what he lacks in knowledge. He is so sleek and smooth and oily, you would think he had been rubbed with oleomargarine. Armed with his picture book and a smattering of horticultural terms, he starts out to enlighten the world. Like Bartholdi's statute, there is no lack of brass in his composition, and his mouth is a yard wide. I must

admit that he is a seductive fellow, and I do not wonder that men fall easy victims to his wiles. The very season and circumstances of his coming tend to make him a welcome visitor. In the dead of winter, when all nature is locked in icy chains, and we sit by the fireside with abundant leisure, then his gorgeous chromo of luscious fruits are pleasant things to contemplate. They seem to force the season. We can almost hear the twitter of the birds among the branches and scent the odor of "the flowers that bloom in the spring." The agent knows this, and understands that his own seductive suggestions are but the voicing of his victim's impulses, and that a handsome order is sure to be the result. If he come in the spring time, when the earth is warming in the sun, and everything is springing into life, and every breeze fans the general impulse to plant, his work is still easier and his harvest still richer. He is quick to "catch on" to every new variety, and always has them all. Old and extensive nurseries often run out of certain varieties; but the tree peddler, never. Tags are too cheap for that. The old conjurer who could draw all kinds of wine from one cask was nothing to these jugglers, who can sell you every kind of a strawberry plant from the Jersey Queen to the Big Bob, from an old bed that some farmer is about to plow under. He struck a bonanza a few years ago in the craze for Russian apples, and has ever since continued to work the vein for all there is in sight, and at present there seems little prospect of its pinching out. An order nowadays is not complete unless it includes a few iron-clads with unpronounceable names. If the apples themselves prove as hard as their names, we shall all need iron-clad jaws when our trees come into bearing. They would make dangerous weapons in the hands of the small boy, but very poor eating. We could never get our jaws around them. Then we might get a few syllables stuck in our teeth. Our tree peddler

pays but little attention to the old standard varieties—there is not money enough in them. He takes your order for all the latest novelties, and fills it where he can buy the cheapest. The refuse of old nurseries from which all the saleable stock has been taken, costs but little, and may sometimes be had for taking it out of the way. Change the labels, and, *presto*, the old currant bush masquerades as an upland or garden cranberry, at one dollar apiece; the scrubby seedling becomes a Russian iron-clad; while a Clinton grape vine, worth perhaps a nickel, is suddenly transformed into a Pocklington, a Brighton, or a Dracut Amber, and dirt cheap at a dollar and a half. One of the most unblushing frauds in Kansas last year was perpetrated by a brace of fellows (they generally go in pairs,) who sold the Downing gooseberry at a dollar apiece, claiming that they were so hybridized that they would not sprout from the roots. I have heard of hybridized mules that wouldn't kick, but never saw one, and must confess that I am somewhat skeptical on the subject; but I have as much confidence in a hybridized mule that wouldn't kick as I have in a hybridized gooseberry that wouldn't sprout at the roots, if you give it half a chance. They also represented that they grew six feet high, probably to keep up the price. These humbugs do not confine their operations to sparsely settled regions, where the people have but few opportunities for information, but they invade our towns and cities, and find their victims among the most intelligent of our people. A few years ago, a middle-aged gentleman of prepossessing appearance—they all are, for that matter—drove a very thriving business in Denver selling primroses, in sets of five colors: red, white, pink, blue and yellow. The neat little fiction in this case ran something as follows: "A few sets of these wonderful plants were imported from some foreign country for the Centennial Exposition, being the only

ones ever brought to this country. A Chicago floral company purchased the entire lot at the close of the exhibition, began their propagation, and were now prepared for the first time, to fill a limited number of orders at a dollar apiece, or four dollars for the set of five." He had his picture book, like all the rest, showing each color, distinct and glorious, and hundreds of our shrewdest business and professional men hastened to secure so remarkable a floral novelty. It was refreshing to hear one after another of them boasting of what a botanical acquisition he had made. In due time they came, neatly put up in separate packages, each labeled with its own color. A few months later they blossomed, all of one color, and you couldn't find a man in Denver who had heard of the glib-tongued gentleman or his wonderful primroses.

But the people are beginning to realize that pictures are one thing, and fruit is another. That it is easy to raise magnificent specimens of fruit in book form, of large size, high color and high price, and are not so ready to bite as formerly. Some new dodge must be resorted to, some new bait to entrap the unwary. So the picture book has been, in a measure, discarded, and our tree peddler has taken to carrying about samples of fruits preserved in glass jars, to which he points triumphantly in support of every assertion. There surely can't be any humbug about that. Every word he says must be true as gospel, for there is fruit to prove it. So down goes the order, and away goes the agent, laughing in his sleeve at the silly old gudgeon who has sworn for the hundredth time that he never, *never*, NEVER, would be taken in again. The more I think of it, the more I wonder at the gullibility of mankind. Men, who, in their ordinary dealings, are the most cautious and suspicious, who distrust their neighbors and will hardly believe their nearest friends, will swallow implicitly every

statement of these peripatetic peddlers, commit important interests to their care, and trust them in matters involving their entire future success. In planting an orchard, the cost of trees is comparatively nothing—their kind and character, everything; and yet men entrust their selection to wandering strangers, whom they never saw before and never expect to see again, who have no interest in their success, and who have every inducement to defraud. What does he care, that the georgeous rose tree, with its blossoms of many colors, or the superb magnolia grandiflora, die the first winter, because wholly unsuited to our climate, however desirable they may be in tropical and semi-tropical countries? What is it to him that your Keiffer pear turns out a miserable little scrub of no earthly value, or your beautiful American Beauty rose proves to be nothing but a worthless wild rose of the hedge-row, or at the best, only a June rose, of which you had more than enough before? What does he care, the scoundrel, for the long years of toil and care which you bestow on some pet novelty for which you have paid him a high price, only to dig it up at last and throw it away as a worthless thing that you would have scorned to plant had you known what it was? He never expects to come your way again; trust him for that. I will not attempt to estimate the amount of money that is sent out of our State every year for nursery stock, but the sum is a large one, reaching many thousands of dollars, and mostly paid into the hands of wondering peddlers, a tribute to cunning and rapacity, and a drain upon the resources of our people. The question is, "What are we going to do about it?" And I confess it is a conundrum more easily asked than answered, and I will not attempt to answer it in full. My aim has been, briefly, to picture an evil, not to prescribe a remedy. I will, however, make a few suggestions. The case is the more difficult, from the fact that

those most needing it are not here to take their medicine. They have no money to fool away on horticultural societies, but they can and do pay large sums to these swindling agents, when they could get a better thing at their neighbor's nursery, and at one-fifth the price. The general diffusion of horticultural knowledge is the surest protection. Well informed men are not apt to be taken in with stories of borer-proof apple trees, blight-proof pears, and curculio-proof plums. They know that so long as a bug is a bug, and a plum is a plum, just so long will the bug bite the plum if allowed to, and the plum be worth the biting. While the remedy lies in the education of the people, comparatively few attend the horticultural meetings, or read our reports, and how are the people to be educated if we cannot reach them?

In closing, I will suggest briefly:

*First*—The establishment, by the State, of experimental stations, for the testing of varieties and other experimental work.

*Second*—The granting of such aid by the Legislature as shall enable the State Horticultural Society to send a competent man into the various fruit growing sections of the State to awaken an interest in horticulture, hold meetings and assist in organizing district and county societies, as auxiliary to the State Society.

Our nursery-men should endeavor to drive out the dishonest tree peddlers by putting honest men in their place, for whose acts they will be responsible and whose orders will be turned over to their employers to be filled direct from the nursery. The purchaser should, as far as possible, visit home nurseries and make his own selections, or, in making contracts through an agent, should require him to produce a certificate of agency from a reliable nursery, assuming the responsibility of

his acts. He should also see that the order is addressed to the principal, and not to the agent, and that when the trees arrive, see that they come from the nursery to which the order was addressed. By observing these simple precautions, the dishonest tree peddler will be forced to seek other employment, or leave the State, to the manifest benefit of our horticultural interests and the good of our people.

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MR. W. E. PABOR then followed with his paper on "The Cottonwood Tree," and while it was left out of the programme, it was accepted as a thoughtful courtesy of MR. PABOR by the audience, to be entertained by its poetical thoughts:

## The Cottonwood Tree.

BY W. E. PABOR.

Along the banks of the creeks and streams of our State the leaves of the cottonwood have fallen from their branches, and the trees, ragged and scrawny, stand out naked against the wintry sky. The once green leaves changed their emerald tints to yellow, crimson and brown, and beautified the landscape in their changing robes. But they have dropped from the sap-deprived stem, they have fluttered for a moment in the air, they have fallen upon the ground, for the wind, the restless wind, to toss them to and fro over the face of the earth. Born of the gentle spring time, nourished by the warmth of summer time, they faded away with the fading of the year.

But of the tree itself on which they hung, like dainty emeralds, this survives. The faded and the fallen leaf is but the type of other leaves that have come and gone, and of those that are to come and go. Only, under the

natural law of progress, there is to be a change in the variety, and the days of the cottonwood are destined soon to be over, as the sole representative of the forestal growth in our valleys. But, because of its going, we are not to despise its work, or the mission it was sent into the world to perform. The grades of nature are various, and the duties it assigns to its children of the wood fit into the circumstances by which they are surrounded.

Time was, in the economy of nature, when for ages the cottonwood was the tree of welcome to the weary traveler crossing the plain lands between the Missouri River and the Rocky Mountains. Desolation sat swathed in sage-brush and grease-wood, with cacti as the only adornment on her verdureless bosom, save only along the bank of the river, where a fringe of sheltering trees was shown, while the white waters, like a ribbon, ran between. The shadow of a tree was equal to the shelter of a rock in a weary land — doubly welcome as a source of comfort and repose. And co-eval with the tree was the denizen of the valleys and foot-hills—the dusky-faced Arapahoes and Utes, whose tepees were set under the umbrageous trees, whose pappooses climbed with glee the lower branches of the forest growth. Each was coarse in its nature, and cruel; the one a gross robber of the soil, the other a savage robber of the game abounding in the land.

For how many centuries — who can compare them? had the cottonwood and the Indian possessed this goodly land? Before the keel of the Mayflower grated against Plymouth Rock; before the first vesper bell of the monks of St. Augustine sounded upon the air of the land of flowers; nay, before the sturdy Northmen from Greenland landed on Nantucket Island, these dusky children of the plain and forest hunted game and slept beneath the sheltering branches of the cottonwood tree.

But the new is crowding out the old. It is so written in the history of civilization, both of man and nature. The new civilization of the race, as shown in the stalwart, intellectual Saxon, has even been crowding back and out of existence the old, as represented by the sturdy but savage races who once peopled the plains and drank the water of these streams, and watched, all unconscious of the glory of the scene, the rising sun and the setting sun cast its luminous lines of light and shadow upon mountain, hill and plain, with a glow and a glory, making the heart uplift itself with a delirium of delight. But not the savage heart. The untamed, untutored son of the forest saw in the rising sun only the face of the Great Spirit, and in its going the temporary triumph of the Evil Genius of his race. He saw in the cottonwood tree and the willowy under-brush only a hiding place for himself from his foes, or the lurking retreat of the beasts whose flesh gave him meat.

The green leaves of the summer, their golden tints in the autumn, had to him no other meaning than the marking of the coming and the going of the seasons. They flourished and they fell. On the squaw bushes they but tied the berries that dusky fingers of maiden and child were accustomed to gather. If on some bushes there were little discs of red—the wild rose of the wood, which later turned to round red berries that were not good to eat and therefore worthless—they taught no lesson to the eye, carried no moral to the savage soul. What to him was the running river? What the cottonwoods lining its banks? What the wild rose bushes hidden away in the willow thicket? Each was only a covert or a barrier holding the deer until his arrow could reach its heart. And, if it became necessary to burn the trees to drive the quarry within range of his weapon, what mattered it if the tree had seen the

storms of a hundred years, or only ten? It mattered not at all.

But the tree itself—it, too, is something of a savage. We know it as a gross feeder and despoiler of the soil of nourishment, that would nurture other and better trees. Long has it held sway in the valley lands, by the sides of the rivers and creeks on both flanks of the mighty Rocky Mountain ranges. Its leaves give shade, as will the leaves of other trees; but this is all; they are not of those that are for the healing of the Nation—rather for its hurt. The savage man. The savage tree. The savagery in the nature of both made them kin. They grew and flourished together. But both are passing away and a better race of men and trees are transforming the face of the earth from a wilderness to a garden. Is one going swifter and surer than the other? It is hard to tell; but that they are going, who that is a believer in progress can doubt? "In the cycle of the ages one eternal purpose runs," and this moves onward and upward in all the spheres of action.

There are to be Indian schools to civilize the young of the savage man; this on the score of humanity; but there will be no forestral schools to preserve and perpetuate the savage tree. It is to pass away. A newer type, combining usefulness and beauty, has already begun its civilizing work in our State. We are wiser now than we were even two decades ago, when the founders of the beautiful city of Colorado Springs could decide on nothing better than the native cottonwood with which to adorn its streets. To-day, were the work to be done over again, the maple and the elm and the catalpa would take its place. But the cottonwood, it must be admitted, is fighting bravely to perpetuate its existence. By every irrigating channel built by the hand of man, by every wind that blows in the autumn, it seeks to continue its kind. Its seeds rest in the oat

field, sinking into the soil with the water on whose breast it has floated. By the wayside, in the orchard, in the garden, in the field and on the farm, with the desperation of despair, it is endeavoring to lengthen out its existence. It seems to say, "we are old, but eternally young in our saplings." As we have wandered under the leafless trees, we have seemed to hear the murmur of the waters, as if the spirit of the stream was whispering to its brother spirit in the wood. The murmur was low and sad, as if sorrowing for something lost; or like a dirge for the departed grandeur of days that could come no more; a sigh for shades that only people the past. And why? Because it has come about that there are on the uplands and cliffs other streams and there are also other trees. These streams and these trees are not where nature placed them. They are under the inspiration of a new civilization which has centered on these pleasant plains and in these smiling valleys. The stream is born of the river, but wet-nursed, as it were, by the man; its progress mapped out for it by the hand of the skillful irrigator; and these waters, in their new channel, are as the waters of life; for they quicken the dead soil and it responds with blade of grass, stalk of grain, vines bearing clusters of purpling grapes, and trees whose fruit, fair to the eye as the golden apples of Hesperides, is an angel's food to mankind.

We take up a clod of soil and look at it—

> "What is it? Only a handful of earth; to your touch
> A dry, rough powder, you trample beneath your feet;
> Dark and lifeless; but think for a moment how much
> It hides and holds that is beautiful, good and sweet."

The water kisses it in the sunshine and in the starlight, and nature, at its benignant touch, abandons cacti, sage-brush and grease-wood and arrays itself in the green robes of alfalfa meadows, in the golden raiment of

the grain field and the stately plumage of the orchard lands. Where there was desolation, there is delight. Where there was silence, there is sound. And the sound?—ah, what is it? Like the singing of birds in Queen's gardens, or the sweet music of harps in the palaces of kings—resonant in sound, yet burdened with a sweetness born of perfect happiness. And the delight where once there was desolation? It is the dear delight born of contentment, centering in happy homes, where lights shine gleefully out of dark windows, through which look fearless eyes smiling at the darkness without. Wonderful change. This is not all. There are trees growing about these new houses that typify a like forestral transformation. It is no longer the cottonwood whose feathery bloom is upon the air; though it comes through the gusts, as did the one of old at the marriage feast, without its wedding garment on. Here are the white blooms of the apple; there, the pink blossoms of the peach; these come at each recurring season, and in them we read the promise, as from an open book, of the orchard lands of the future, in the sheltered valleys of the eastern and western slopes of the mighty hills above us. As surely as the new type of man has taken the place of the old, so surely are the trees of civilization—bearing fruit after their kind—replacing the tree of the savage; and by and by, by the side of the grain field will be found the orchard, and close to the kitchen garden the vineyard will flourish. Nor is this all. The squawberry and the wild rose will also disappear and the cacti yield to the seductive influence of civilization and cultivation. But in their stead, have already come those luscious fruits of the bush and vine, whose flavor give us hints of the nature of the fruits that grew where Adam and Eve walked in sinlessness "eating the fruits" of the Garden of Eden. And in such measure as we may, we are restoring in countless

thousands of places in this State, a Garden of Eden, wherein the sons and daughters of men may walk. In place of the wild rose, there are lilies, whose white faces smile up a welcome to the sun; there are also roses whose odors recall the perfume floating over the flower-bosomed islands of the Arabian Sea; there are pansies whose purpling bloom suggests the sweetest thoughts that can come to human kind, with memories of happy hours; and all the mighty sisterhood of flowers are to follow in their footsteps. Each cottonwood tree we root out, and, in its stead, plant another of a better type, be it what it may, for fruit, for nuts, for shade, is a step in advance—an onward movement of the wave of progress. Vine-clad cottage, gardens of bloom, grape laden vineyards, orchard lands—these are to dot the valleys shining in the sun of the new civilization, taking the place of the old. As with man, so with the tree. The old and the new have met, face to face; and the new conquers.

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It was moved and carried that a vote of thanks be tendered MR. PABOR for his excellent paper.

MR. MCCLELLAND read a paper by GEORGE H. PARSON'S, of Colorado Springs, on:

## Forestry in Colorado.

In any work, of whatsoever nature it may be, the good it effects, the results it accomplishes, and the influences it controls, are two-fold in their nature, direct or indirect. There is a result which is evident to our senses, and can be realized at once without any difficulty. And there is the result which is intangible, inevident to any bodily sense, working its effect upon the mind and spirit, and not upon the body, and appear-

ing in the future, when what is now indirect becomes direct.

The indirect work for forestry in Colorado is general in its nature, and cannot be shown in detail. It consists of spreading knowledge and creating interest by means of pamphlets, newspaper reports and editorials, and by the presentation of the subject at all times and seasons, by a few in different parts of the State. This work has been carried on to a greater or less extent since the formation of the State in 1876, when the framers of the Constitution of Colorado, inserted the clause: "The General Assembly shall enact laws in order to prevent the destruction of, and to keep in good preservation the forests upon the lands of the State, or upon the lands of the public domain, the control of which shall be conferred by Congress upon the State."

The Colorado Horticultural Society has appointed a forestry committee each year since its organization in 1881, and their reports, and the papers read on forestry, and the discussions incident thereto, have done much for the one branch of forestry—tree planting. As a result of this, thousands of forest trees have been set out, either for ornament or profit, and the trees best adapted to this climate have been demonstrated. A beginning has thus been made for the conversion of these treeless and desert-like plains into a blooming garden. May the work go on with increasing interest until it is fully accomplished.

But while the planting is an exceedingly important branch of forestry, especially on the plains, with its beneficial influences upon the climate, yet the most important part, and that referred to in the Constitution, the care and preservation of our sixteen thousand square miles of forests, received practically no attention until the fall of 1884, when the Colorado State Forestry Asso-

ciation was organized on the nineteenth of November. Since its formation regular annual meetings have been held, and the papers and reports and committee work at such meetings have given a great impetus to forestry in Colorado. Through their efforts the annual meeting of the American Forestry Congress was held in Denver this year, with representatives in attendance from Iowa, Illinois, Missouri, Kansas, Ohio, Nebraska and Wyoming, besides the chief of forestry from Washington. The congress was not large, many having been prevented from attending by the expense of traveling so far. But the interest was not less from the lack of numbers, and the papers read were of great value, while the necessary work required for the interests of forestry was so discussed and left in the hands of such committees, that benefit will no doubt result. Although its meetings have always been small, the American Forestry Congress has done a great and good work for the trees of the United States, and that in a more indirect way than directly. The comparatively few who gave their time and money to the meetings were fully alive to the importance of the work, and had given the subject much thought, so that the meetings never lacked interest and were full of interesting discussions and important practical suggestions. The hundreds of circulars sent out preparatory to these meetings, the interest excited in the regions where they were held, by public meetings, newspaper reports and comments every day throughout the session, the publication and wide circulation of the proceedings, all these carry the subject of forestry to many who would not have otherwise thought of it, and give a basis for the practical working out of the problems there presented.

One important work of the Congress was to appoint a committee of earnest workers to have charge of forestry legislation. In this way it is hoped that such

action may be secured by Congress as to preserve, care for and encourage the planting of forests throughout the United States. The direct work which has been done for forestry in Colorado, is the legislation secured, the care taken of the forests, and the tree-planting done. At the first meeting of the Colorado State Forestry Association, a bill was considered relating to the woodlands and forests of Colorado, which it was proposed to bring before the legislature that winter. Besides its consideration at two different sessions of the Association, it was printed and sent for criticism to all those who were known to be interested in the preservation of the forests. In this way a bill was finally presented to the Legislature representing the ideas of all those who had given the subject any thought. With this bill a memorial was also presented, calling attention to the urgent need of such a bill, and each member of both houses was seen and talked with on the subject. The bill was closely watched throughout its course, and without this care it would have been lost, not from any active opposition, but from the indifference of nearly all of the members. Finally it was successfully carried through its course, and became a law April 4, 1885. But it was rendered practically useless, and almost imperative, by the failure of the legislature, in a fit of economy, after a career of great extravagance, to grant an appropriation for the expenses to be incurred by the bill. The act as passed, was entitled, "An act relating to the woodlands and forests of Colorado, and to create a Forest Commissioner for said State." In general words, it provides for the appointment of a State Forestry Commissioner, who shall have care of all woodlands owned or controlled by the State, and shall report every year to the Governor. The County Commissioners and Road Overseers are made conservators of woodlands in their respective localities, and it is made their duty to

arrest any person who may be guilty of causing such fires, or of tresspassing upon the woodlands of the State, or of unlawful cutting or destroying timber thereon.

At the same legislature, two other acts were adopted. One was entitled, "An act to provide for the punishment of persons guilty of willful, malicious or negligent use of fire to the injury of others, and for the punishment of persons building camp-fires and failing to extinguish such fires." The other act made it the duty of the County Commissioners to cause to be erected in conspicuous places throughout their respective counties, notices requiring the extinguishment of camp-fires, and citing the penalties of failure to do so. Besides these acts of 1885, there are other laws relating to trees found in the statute books of Colorado. One provides for the exemption of land planted in forest trees from an increased valuation in the assessment because of any gain in value from the planting of such trees. Another provides that any one who shall plant forest trees in a certain way shall receive two dollars for every hundred trees on the fourth year after planting, and for each of the six succeeding years. Remuneration for injury done to trees by cattle, and otherwise, is also provided for.

The statutes relating to trees in Colorado are excellent, and if fully and energetically enforced, would bring great good to the whole State. But the lack of money rendered the principal act almost useless, and would have, indeed, rendered it altogether so, if there had not been a man whose love for the forests, and disinterested regard for the public welfare—virtues which are rare, indeed, in public officers—induced him to accept the office of "Forest Commissioner of Colorado," although there was no reward to be received for his services.

The State Forestry Commissioner, appointed by the Governor on April 6, 1885, was E. T. Ensign, of Colo-

rado Springs. In the exercise of his office, Mr. Ensign has devoted the larger share of his time, and has done much more than could have been expected of him under such adverse circumstances. His first official act was to collect and publish in pamphlet form, all the laws relating to the trees and forests of Colorado. It is entitled, "Forestry in Colorado," and every one should provide himself with a copy. He also put himself into communication with the Commissioners and Road Overseers of each county of the State, urging upon them the watchful care of the forests, and at the same time gathering such information as he could of the forest land of Colorado. He impressed particularly upon the County Commissioners the need of exercising great vigilance in preventing the outbreak of fires. In his report to the Governor for the year 1885, he states that "the law (regarding fires) has been quite generally observed. The County Officers, as a rule, have been zealous in seeking the enforcement of the forest laws, and, to the extent of their power, have cheerfully co-operated to endeavor to protect the forest laws of the State."

The direct work for the forests of Colorado, has been chiefly that of the Forest Commissioner, and to his report for this year, soon to be published, I must refer you.

Besides the work of the Forest Commissioner, thousands of trees have been planted during the past year in Colorado, for both ornament and profit, and the success of these will cause many more to be planted each year.

Thus much has been done, but much more remains to be done. More trees must be planted over the plains, until they can no longer be termed a desert—but a garden. New laws must be enacted, more complete and binding in their nature, and they must be enforced more strictly. The indiscriminate cutting of forests

must be stopped. They must be carefully watched to prevent fires, and only such wood cut as can be spared without injury to the forest. New forests must be planted and old forests renewed, especially at the heads of water-courses. The Government and State woodlands must be controlled in some way, so as to prevent the destruction by ignorant men. These are objects in which everyone is interested personally, and for the attainment of which everyone can do something. Of special benefit are they to the farmers and horticulturists, and to all land-holders, and it is their duty and interest, above all other things, to do all in their power and lose no opportunity to help on in this great work. A wall of prejudice, ignorance and indifference, must be pulled down, before the objects can be reached, and and in season and out of season we must earnestly hold this end in view. The benefit may not, will not, be found in our life-time, but the reward of a good action done will be ours, and the blessings of our children's children. To quote from Oliver Wendell Holmes: "You have been warned against hiding your talent in a napkin; but if your talent takes the form of a napkin, key, or an acorn, and your napkin is a shred of the apron that covers the lap of the earth, you may hide it then, unbalmed; and when you render in your account, you will find that your deposit has been drawing compound interest all the time."

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Following this paper was one on same subject, by A. N. HOAG, of Fort Collins, Colo., and it was thought proper to have the two read before discussion was entered into.

# Forestry in Colorado.

BY MR. A. N. HOAG.

It becomes necessary in the natural life of man to supply his wants of timber and fuel from the forests of the land. It is also necessary that he should obtain it from the dearest and most accessible timber, and we, as the first settlers of Colorado, were of necessity destroyers of trees; but as there has been a wanton destruction of our native forests by mill, tie and lumbermen, it is necessary for thorough legislation to act as a protection to our trees, or our vast forest lands will soon be denuded, and, as a natural consequence, the rain-fall will be decreased, our snows will melt and disappear before the season for irrigation commences. The ancient Greeks used the word "dendrokopein," to cut down the trees, to denote their utter ruin and devastation of the country. They were wise, for by the cutting down of the forests, more than by any other cause, many of the most densely populated regions of the Old World have been reduced to deserts. Palestine, when the Hebrews took possession of it, was a land of rivulets and fountains, being thereby distinguished from Egypt, which must be watered. In the palmy days of the Nation, this territory, not as large as Massachusetts, supported in plenty a population not less than five million, where now not more than two hundred and fifty thousand find but a scanty subsistence. Even the conquests of the Assyrians did not materially reduce the population, for under the Roman rule it was still densely populated; but during the wars which followed the result under the Vasparian and Titus, the Romans not only cut down the fruit trees but the forests, and in the course of a very few generations the

country was reduced to an almost waterless desert—which it now is. The channels of the rivulets still remain, but they are dry ravines, except directly after a rain, when they become roaring torrents; the only exceptions being those whose sources lie high up among the wooded heights of Lebanon.

Greece tells the same story. In a large part of it the forests which once clothed the hill-sides have long been destroyed. The famous fountains of antiquity now flow only in song, and rivers of historical renown are now scanty brooks, which the child may ford.

The United States Commissioner of Agriculture, in 1871, writes: "In upper Egypt the rains, which eighty years ago were abundant, have ceased since the Arabs cut down the trees along the Valley of the Nile, toward Libya and Arabia. A contrary effect has been produced in lower Egypt from the entensive planting of trees by the Pasha. In Alexandria and Cairo, where rain was formerly a rarity, it has since that period become more frequent."

A regular supply of moisture from some source is everywhere an individual and indispensable requisite of fertility, and there can be no doubt, from these and a hundred other cases of which we have notes, that under certain circumstances, the absolute amount of rain-fall is greatly influenced by the presence or absence of forests. Under almost all circumstances trees must have much to do with producing the more insensible deposition of moisture from the atmosphere. The reason is obvious. On a hot day the temperature of the leaves is considerably below that of the atmosphere, which is partly cooled when it comes in contact with them, and forced to give up a portion of the latent moisture which it had taken up in passing over the ocean, and which is deposited in the form of dew, often very abundantly; it

is just what occurs when one brings a jug of ice water into a heated room.

But of still higher importance, at least to us, is the influence of forests in regulating the melting of snows on the higher mountains and distributing their waters by percolation. Trees shelter the ground beneath them, and thus retard the melting of the snows on the mountain sides in early spring; also, allow the waters to penetrate the subsoil to the water-bearing strata, whence it finds its way by hidden channels, keeping the springs and fountains in perpetual flow, even in the dryest seasons. The interlacing roots of trees penetrate the soil, forming a sort of a sponge, which prevents it from being washed away by sudden showers, and gives out the water slowly and uniformly, thus equalizing the flow, preventing floods on the one hand and extending our irrigating season on the other. When the trees on our mountain sides are cut down, the snow melts fast, or more commonly, slides down in vast and terrible avalanches, carrying death and destruction to the valleys, where, in a few days or weeks at most, it is melted and carried beyond our reach at irrigating season; hence the supply, which should have been distributed over months, is exhausted in a few weeks, and that which should have bubbled up in springs and flowed by rivulets into the larger streams in June and July to make our meadows and wheat fields green, is carried in early spring to the ocean, to be taken up by evaporation, only to go through the same process, with little benefit to the land and often to our great injury. The absolute yearly discharge of our great rivers, the Mississippi, St. Lawrence and Colorado, may undergo no sensible change from generation to generation, for they are fed from a wide extent of country, and droughts in one part are balanced by floods in another. Smaller streams, such as the St. Vrains, Poudre and Big Thompson, are sensi-

bly affected, while the rivulets fail one by one, except immediately after a rain-storm, when they are greatly swollen. Thus, through the operation of one and the same law, we bring upon ourselves the two opposite evils of floods and droughts. The consumption of our forests by railroads, even, though coal should be mainly substituted for wood as fuel, must be enormous. We have a large mileage of railroads in Colorado, and as it takes two thousand five hundred ties per mile and a tree makes but about two ties; it takes one thousand two hundred and fifty trees to the mile, or one million two hundred and fifty thousand ties for every thousand miles of road, and they last only about six years. The effect upon the streams of Colorado, in that portion of the the State where this enormous destruction of forests has been carried on, has began to attract the attention of all careful observers.

"In many portions of the Mississippi basin," says a competent authority, "it is a common observation that the summers are becoming drier and the streams smaller, several rivers showing a considerable decrease of navagability during the last fifty years. The summers are hotter, and the winters are colder." This is to be attributed to the destruction of the forests along the tributaries of the Mississippi.

The Commissioners of Agriculture for the State of Maine, reported in 1869: "From all portions of the State come up reports of the diminished volume of the waters in the streams, occasioned by the clearing up of the forests, and denuding the hills of trees. The snows are not so heavy nor so frequent as they were twenty years ago, and there is less rain in summer. Many of the old trout streams of twenty or thirty years ago are now completely dry, and several parts of the State are suffering more than formerly from the drought."

In a word, we are doing for Colorado what man has done for so many other parts of the world by destroying the forests that hold our snows for irrigating crops. This we have no right to do, though our immediate interests would be served, for no generation has more than a life interest in the soil which it holds in trust for those who are to follow. The laws of nature are, in a measure, the servants of man, and will do his bidding —whether for good or for evil—and probably to a much greater extent than we now imagine. As for the forests, which, from their situation on the mountain, are of little or no immediate value, they should be rigorously preserved for the reason that upon them depends the perpetuation of most of our rivers and small streams. They require little more than to be let alone. They have perpetuated themselves in all the past, and if the axe and the fire-brands be kept away, will take care of themselves in the future, and will always remain the parents of perpetual streams. There can be no doubt that a judicious system of forest culture would be an important adjunct to our admirable system of irrigation. There is no doubt it would greatly augment the regular annual rain-fall and the insensible deposit. The planting of trees is open to every local community, and to every individual land-holder. With little effort, every farm and village, every highway, might in a few years be shaded with trees. It is wise advice I give you to plant trees. They will grow while you are asleep. Wherever on your farm you can spare a piece of ground, plant trees and let them grow. Preserve them as the apple of your eye. Plant them on every ditch bank, on every spot not needed for other use. When you go to the mountains for wood, don't wantonly destroy a tree. Spare every tree you possibly can. They are the noblest monuments of nature. Science lifts up her warning voice and tells us how manifold are the relations which

forests bear to human welfare. History has taught us, and observation and experience are still teaching us, that our woodlands stand between the death and the life of the land. Then, let us be up and doing. Let us nourish and protect our mountain forests. There is not a true friend of Colorado but takes pride in looking upon our grand old mountains, clothed in their perpetual mantle of green. It is so beautifully grand. But, denude those same hills of their green mantle, and the scene is changed. It would be still grand, but desolate. Then, let us unite, one and all, to preserve the forests, that future generations may "rise up and call us blessed."

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MRS. CARR'S article on "Progressive Horticulture," was called and responded to by the lady in a comprehensive consideration of the subject, and was listened to by the audience with much interest and pleasure:

## Progressive Horticulture.

BY MRS. M. L. CARR.

The length and breadth of my subject is so great, that I can not cover but a small portion of the ground in a paper like this, which, of necessity, must be brief. And I do not deem it necessary to go back to the earliest records of horticulture and descend, step by step, until the present time, in order to show the growth and development of the several different branches which come under this head. Suffice it to say, that the olive and the grape were the first fruits grown for profit.

"In eight hundred A. D., the apple, pear and cherry were grown in the south of Germany, and these fruits were also cultivated in Italy before that time."

In the year eleven hundred, the "government of Germany gave fruit growing protection, and every land holder was required to set out twelve fruit trees yearly."

As settlements were made in America, some attention was given to the cultivation of fruits, and about seventeen ninety-eight the first nursery was established in the United States for the raising and selling of fruit trees.

One thing which is noticable in the early history of horticulture is, that where the greatest variety of fruits could be grown with the least labor, there has been the least development.

This proves that energy, perseverance and intelligence must be applied to Horticultural pursuits, if we would make them a remunerative success.

The first meeting or organization of horticulturists was held in London, and who can estimate the benefit of that small beginning, from which have sprung like organizations throughout the world, which are spreading knowledge and practical experience broadcast over the land, thereby benefiting others who have neither time nor means for obtaining knowledge of fruit culture in any other way.

The history of fruit culture in Colorado, differs in some points from that of any other eastern State. The dry atmosphere, the artificial mode of watering the ground, and the peculiarities of the soil, served as a study for the most experienced fruit growers who came here to make homes and pursue the same business that they had followed in the east; but with all their knowledge and experience, they often found themselves at sea regarding fruit growing in this new and untried land.

Nearly sixteen years ago, when on the eve of starting for Colorado, I made inquiries in regard to fruit raising of a gentleman prominent in the founding of colonies. I was answered with a very confident air: "Oh yes; the climate is very mild. You can raise fruit; peaches

and pears will grow without doubt." Not having seen any growing, he surely must have been blessed with a prophetic mind. But when I saw the desolate, barren plains, and as I looked out over the great sea of unbroken, untilled prairie, devoid of any living plant, except cactus, I grew sceptical in regard to the possibilities of this "land of promise," which had been so beautifully portrayed to us by an emmigration agent.

Then came the "winter of our discontent." We waited for irrigating canals to be built; then the grasshopper scourge swept over us, and our fruits and flowers were blasted like our hopes; the "staff of life" was what all became interested in, and by many, fruit growing was voted a failure, and they turned their attention tn other industries.

As time passed on the people began to have more confidence in the country. The different varieties of fruit best adapted for our State, and even different localities in the State, were secured by the more progressive horticulturists, and though they met with many drawbacks and discouragements incident to successful fruit culture, yet their faith and courage never wavered, and to-day the thrifty orchards and vineyards which dot the valleys and hill-sides of our glorious State, and the display of golden fruit upon these tables, testify that their labor has been rewarded, and their faith made steadfast.

All this has been accomplished within the last fifteen or eighteen years. What, then, may we not expect in the next ten years from the numerous fertile valleys in the south, which are fast settling up with men whose first planting is the pear, peach and apple tree; from our eastern border, where the barren prairie has become well tilled farms within the last year, and from our own section which is awakening to the fact that our people can engage in industries which will prove more remunerative to them than growing wheat at present prices.

Let the people of Colorado awaken to the possibilities of her productiveness, and keep step in the march of progress with our eastern neighbors, until we can supply our own markets with wholesome and palatable fruits plucked from our own orchards and vineyards.

"Come let us plant the apple tree,
Cleave the tough green sward with the spade,
Wide let its hollow bed be made,
Then smoothly lay the roots,
And there sift the dark mold with kindly care."

* * * *

"A shadow from the noon-tide hour,
A shelter from the summer shower
When we plant the apple tree."

The estimated crop of apples for the present year in the State of forty thousand bushels, the bountiful crop of grapes, though not extensively cultivated, reaching eighty-five thousand pounds, with two hundred and twenty-five thousand boxes of the wholesome and fragrant strawberry, and one hundred thousand boxes of raspberries, fifty thousand boxes of blackberries, together with the trade in floral culture, amounting to forty thousand dollars per annum, demonstrates the fact that horticulture is surely and steadily progressing in the State of Colorado.

Michigan says that though she "boasts not of immense wheat fields, nor gold mines, nor extravagantly fertile soil, yet diversity of products, leading to a variety of industries, renders her capable of maintaining a large and prosperous population."

Colorado has her gold and silver mines, her immense wheat fields and her "cattle on a thousand hills," and with a full development of her agricultural and horticultural resources, who will not be proud to be a citizen of a State where all things combine to make us a prosperous and independent people.

Adjournment was taken until evening session, at 7:30 o'clock.

## EVENING SESSION.

After listening to music by PROF. RULE and others, MR. GIPSON announced the meeting of the State Horticultural Society to meet in Denver, January 13, 14 and 15, 1887, and invited all interested in the common cause to be present, after which the regular programme was taken up, and a paper, "Celery and the Cultivation of Asparagus," was read:

# Celery and the Cultivation of Asparagus.

BY MR. JOHN TOBIAS.

To put the first last, I will dispose of the subject of asparagus first, and in a few words, by saying I have not had enough experience to write on the subject, and could give no information not found in any seedman's catalogue.

As for celery, I have had both failure and success, from both of which I have learned a great deal for my benefit. David Landreth & Sons, Philadelphia, Pa., have published a pamphlet on celery culture, in which appears several essays, along with one by the present writer, written several years ago, in which the cultivation is gone into in detail. Presuming that most of you have raised celery, I deem it unnecessary to produce the article referred to, but will try and anticipate questions and point out wherein so many fail in raising first-class celery, and there is not very much profit in any other.

First, and most important, perhaps, is a suitable soil, very rich and moist, but not wet. A soil that will grow good cabbage or cauliflower, will generally do for this crop. If you can find water at a depth of two feet, all the better. A slight tinge of alkali on top will not hurt it. Such a soil will need scarcely any water after setting out. Perhaps the next most important thing, is good, stout plants. With the best of soil poor plants might do, but with good plants you could do much better. The seed is generally sown too thick. If left in seed-bed without transplanting, they should be evenly thinned, when large enough to handle, to not more than eight hundred to the square yard. Five hundred would be better. Transplanting is unnecessary if the tap-root can be cut off a month before setting out, and if a good sprinkling of fine bone-dust is spread over the surface of the bed, it will help the formation of fibrous roots near the surface. The tops of the plants will need shearing off about twice during their growth to make them stocky. A plant half an inch thick would be a good one, while one-half that size would be rather small. In planting they should be graded, each size being planted separately. To get good plants they want to be crowded by fertilizers and cultivation, and not by early sowing and hot air. Having the proper soil and good plants, see that you get a good stand in the field, and crowd them with good cultivation and no lack of moisture. Set them so the crown of the plant is an inch or two below the general level, but keep the soil out of the heart. Another mistake often made is in the time of handling (as we gardeners call it). Six weeks before marketing is about the right time to commence handling any to be sold before December. For late winter and spring, commence handling October first, and fill to the top before November. I find no cause to depart from the plan advocated five years ago, of tieing with cotton

yarn, rather loosely, and even wrapping with brown wrapping paper before drawing the soil around the plant, to keep the soil from falling into the heart. With a horse and small plow most of the first hilling can be done, much better than by hand. But be careful not to bank up more than about half the height of the celery. The second hilling should not be done until the heart of the plant has grown up pretty well, perhaps two weeks after first handling. The final hilling should reach nearly to the top, being careful to keep the soil out from the inside of the plants as much as possible. Will need at least five feet between the rows for single rows, and six feet for double. For winter use, leave out as late as safe, about November 10, but be ready to put it away in short order. Have trenches less than a foot wide, and a few inches deeper than the celery is tall; pack close without crowding; cover with two inches of manure, so as to leave an air-space over the tops of the celery; before very cold weather have the covering six inches deep. An inch or so of water in the trenches is an advantage, provided it gets no deeper than that very long at a time. To keep later than January, keep as cool as possible, without freezing, by giving plenty of air every day when the weather will permit. With many, perhaps, the critical time has come to keep the celery in good order until bleached ready for use. Remember, more celery is lost in the trench by keeping too warm than too cold, and govern yourself accordingly.

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Then followed a general discussion on "Celery:"

MR. MCCLELLAND: Did you ever raise self-blanching celery?

MR. TOBIAS: Yes, sir. In reality it is not always blanched when white. It is not a good keeper. The Golden Dwarf is my main crop; it grows very tall.

Good crops of celery are always profitable. Get one dollar a dozen in winter when others can only get twenty-five cents.

MR. MILLISON: What is the remedy for rust?

MR. TOBIAS: The only remedy is to keep the dirt out of the heart. All celery rusts a little. It takes a little different treatment in Colorado on account of irrigation, which I consider a decided advantage, as celery takes a good deal of water. The soil about Boulder is not good for celery. Sandy loam is best of all when rather damp. Must be well fertilized. If the outside leaves are hollow and the heart sound, you are keeping it too warm. If hollow when half grown, the fault is in the seed. Raised my seed but one year. Buy seed in large quantities.

The audience was then pleased to listen to a song, "The Ivey Green," by Fred Lockwood, before hearing MR. GALLUP'S closing paper on:

## Best Trees for Ornament and Profit.

BY MR. AVERY GALLUP.

Addison once said: "There is something unspeakably cheerful in a spot of ground which is covered with trees, and gives us a view of the most gay season in the midst of that which is most dead and melancholy." With what patness does that appeal to those of us who have lived for awhile on these bare plains of the western country, and have persistently planted trees and plants to change the face of nature and bear unto us their choicest treasures, and charm us with their rare beauties. Probably, in no part of the world have people begun the planting of trees under more unfavorable circumstances,

than right here in Colorado, and now we can look with pride at the successes that we have attained. I doubt if there is any part of the county can make any better showing for the work done in this line, considering the time we have been at work, than this, unless it be in Southern California, where the nature of the varieties planted, and the favorable climatic conditions, may possibly show better results. At any rate, we have met with enough of encouragement to warrant us in keeping on with the good work, until a fair portion of our desert places shall be made into garden spots, and until every farmer in this vast State will have about him, his garden patch of small fruits for home use, his orchard of fruit trees for home culture and for profit, his vines which will produce for him their luscious clusters, his varieties of shade trees about his house, along his ditches and roads, in groups about his pastures, to make useful windbreaks, the best of fire-wood and grateful shade for himself and his cattle, while his good wife will demand a few ornamental trees and shrubs, a cheerful bit of lawn, and a few beds of those showy old-fashioned garden beauties that take us back to childhood days, to the old homes where the June roses perfumed the air and the snap-dragons, pinks, holly-hocks, purple asters, ragged sailors, and a thousand others, cheered and satisfied us. As we are now living in a progressive age, when all about us is the wild rush of advancement, we must not now content ourselves with following simply in the ruts that others have made. We must be up and doing; looking about us to see wherein we can improve on the doings of our neighbors, whereby we can have the finest orchards, the best vineyard, the most tasty front yard, the most showy flower beds, and the best kept lawn.

From year to year, at these gatherings, such as we are now enjoying, we must relate our varied experiences, and try, if possible, to improve on what has already

been done, and urge upon our friends to work earnestly to accomplish the same. We have lived long enough in this country now, and see about us results enough to prove to the satisfaction of the most skeptical, that trees and plants, of variety enough, can be grown to perfection in almost every county in the State. We can, also, now begin to figure handsome profits from our orchards, if we plant the best varieties and carefully tend them—(that is, understandingly)—first, striving to learn the wants of the trees and plants we propose to plant. Others have accomplished this right in our midst, so why should not we? Having arrived at this point, where we are determined not to be outdone by what has been done previously, we are ready to begin the study of what is best to plant, and expend our energies upon it, so as not to throw away our labor and become disheartened.

First, we want some trees about our homes to beautify the property, protect us from gales and blizzards, relieve the desolateness of the landscape in winter, and please us with healthful and cooling shade during the summer heat. We have heretofore planted largely of the cottonwood and box elder, both native trees of a rapid growth, and I am glad to say each still have deserved merits, although one impoverishes the soil with its much rooting, and tickles our nostrils with its airy cotton, and the other becomes diseased with age, and its foliage seems a fancy salad for the festive worm; still, they have both been a friend to us in our time of need, and had we not planted these liberally in former years, and secured their protection from our trying sun and wind, I doubt if to day we should have been so far advanced in our horticultural pursuits as we are, for we would not have had our efforts crowned with success, as they have been. Look at the gardens that have demonstrated earliest what success small fruits, and even trees for fruit, could

be grown in this arid region; and almost every one of them was surrounded with cottonwood trees, which gave shelter to the choice pets of the garden. So, I say, even with the knowledge that I will doubtless be contradicted that the cottonwood and box elder still are of great usefulness, and there are many places on every farm where there is no better tree yet to plant, such as in groups in the pasture to shelter stock, in gulches and ravines, where a quick, large growth of timber could be grown without any cultivation, and also for a wind-break about corrals and barns.

I here mention the Carolina poplar as being a tree very similar to the cottonwood, and by some authorities it is considered identical, but from what I can learn from those who cultivate it in Nebraska, Dakota and Minnesota, it is as rapid in growth as the cottonwood, has a similar shaped and as glossy a leaf, but has peculiar white specks on all wood of more than one year's growth, and best of all, does not bear cotton. Certainly, it differs from the cottonwood, and that of the Missouri bottoms, judging from my experience of two years with it. I found it being planted very largely as a street tree, the past season, in Philadelphia, New York and other large eastern cities, and if it was a cotton producer, it would never have been adopted by them. It certainly is a rustler among trees, and ought to be tried thoroughly by all of us. By devoting so many words to the defense and recommendation of the cottonwood, box elder and Carolina poplar, I do not wish to be understood as placing them first on the list of shade trees for all purposes, but for shade and wind-break only, I do say they head the list.

The Balm of Gilead I would call attention to next, as being of very rapid growth, ornamental of leaf, pleasing in perfume when the buds first open in the spring, hardy, and generally of a good constitution—a really

first-class tree for many places on the farm and along the country road-side or the city street. To be sure, it suckers some, but many of our choicest trees will do this, and if we keep a proper lookout these need never get beyond our control, or large enough to disfigure its surroundings. We cannot expect to have any vegetation about us and be satisfied with it if we allow it to grow at its own sweet will, without care or check, and if we cannot afford the time to cut off a few suckers or unsightly branches, we have no right to anything except unbroken buffalo grass turf, cactus beds, an occasional soap-weed, and to be condemned to live above a ditch line, surrounded with barb wire fences, old empty tin cans and pure air, all of which are plentiful and cheap in Colorado.

Leaving that class of trees best suited for the purpose we have named, we will next consider those which are best entitled to our efforts in cultivating, for shade and ornament, and as trees for planting for living monuments for ourselves, and as an inheritance for future generations, such as will become landmarks hereafter.

First among these we place the American White Elm, a tree noted for its size, hardiness, grace and usefulness, throughout the length and breadth of our country; one which thrives well here in Colorado, if planted on good soil and given plenty of water, and at the age of twelve to fifteen years will become of sufficient size to add wonderful effect to our surroundings, and at twenty-five years will become a prominent feature to our home. The elm grows as fast as the soft or silver maple, but being of a more drooping and slender habit, with less wealth of foliage, it does not make the show at the same age as does the maple.

The White Ash is a glorious tree for shade, beauty, hardiness and profit. It stands almost any kind of treat-

ment—excessive drought or moisture—grows very fast, is never broken by our high winds, and at the age of fifteen to twenty years will produce merchantable timber for wagon work, tool handles, flooring, furniture and cabinet work. A grove of this tree will mature the quickest of any hard wood that I know of, and within fifteen years will render handsome profit per acre, with very little cultivation, and as a legacy for a farmer to leave his children, a ten or twenty acre grove of this tree twenty-five years old would suffice.

The Black or Yellow Locust will give the quickest profit of any tree I can recommend for northern Colorado, and as yet it has escaped the ravages of the borer in this State, so far as I have been able to ascertain; even this enemy has disappeared in many places in the east. This tree will make, at ten years of age, from six to eight good salable fence posts, which for durability are even better than red cedar, and will command as good a price in the market, besides making many fine stakes for vineyard use, and also valuable in wire fence construction.

In all the central and southern parts of the State, save at extreme altitudes, the Catalpa Speciosa is a very valuable tree, as well as being very ornamental; of rapid growth and great durability of wood. But about Denver and the northern part of the State, it hardly grows fast enough to warrant extensive planting for commercial purposes; only for shade and adornment.

The wild Black Cherry is a No. 1 tree, of more rapid growth than the Ash, giving a fine shade, very ornamental when fruiting, and producing most valuable timber for furniture and cabinet work at from twenty to twenty-five years of age. It will make a fine tree in fifteen years on strong ground.

Black Walnut, Chestnut and Butternut thrive admirably with us, and for their nuts alone are worthy of extensive cultivation, coming into bearing at eight years of age, and producing valuable lumber at twenty-five to thirty years of age.

The American Linden, or Basswood, for shade—handsome foliage, and being especially desirable for the bee culturist when in bloom, renders it a very valuable tree, and should be found extensively in every man's planting.

Soft, or Silver Maple, is probably as popular a tree for street and yard planting as any we know of—its beautiful foliage, gracefulness, and exceedingly rapid growth, rendering it much sought after, and were it not liable to be so badly damaged by our winds, it would doubtless stand high up in our list of desirable trees.

The Lombardy Poplar is always a great favorite, and were it just a little larger and longer lived, no fault could be found with it; but, having these faults, it is most useful for wind-break purposes around orchards or vineyards, as it draws less than most trees from the fertility of the soil, and from its upright habit it shades the ground less.

White and Yellow Birch, English Alder, Cut Leaf Maple, Cut Leaf Birch and Mountain Ash, are all very desirable trees, but are cultivated for pleasure and ornament almost wholly.

Before leaving the subject of shade trees, we must call attention to the Norway Maple, as being fully as promising as any tree we can recommend, more hardy than Sugar or Rock Maple—a hard-wooded variety, foliage very large and handsome, of moderately rapid growth, not easily broken by winds; a tree of long life, like the Elm and Ash.

I am experimenting with several varieties of Russian Poplars, which have lately been introduced into the United States from Rhigi and Siberia. In growth they are somewhat similar to the cottonwood, and seem perfectly hardy. Another year or two of trial will tell whether they are to be generally recommended or not.

Leaving the subject of shade trees, we find ourselves among the fruits. No farmer who is at all progressive can afford to pass the subject of fruit tree planting. An orchard is as much of a benefit to a farm as are its other improvements, and it would not be five years before one of the first questions asked by our intending purchaser, would be, "Let me see your orchard." Ten acres of ground, planted out with two or three-year old apple trees of the best varieties for profit, will, in five years, produce at least a bushel of apples to the tree, and ought to produce a barrel, and with 100 trees planted to the acre, and well cared for, the gross receipts from this ten acres, in a good fruit year, ought to be $1,000, and at ten years of age ought to be $5,000, even if apples decline in price to $2.50 per barrel. What will pay better, and can be more easily grown? Apples are the staple fruit for orchard planting, so far as experience has gone thus far, but we predict that pears, plums, and the sour cherries, will find equal favor in the next few years, and wherever conditions of soil are favorable, we would now recommend the planting of some of these, if only to produce enough for home use.

Time forbids us to enter the list of ornamental plants and shrubs, of which there are myriads, all having their sphere of usefulness and beauty.

If, through our influence, a greater interest is created for tree planting among our farmers, we assure them that they will never regret the money and labor expended, when they realize the additional value they have created about their homes.

The paper of MR. GALLUP'S completed the programme.

The Committee on Final Resolutions then presented the following:

*Resolved*, That the thanks of this society be tendered to the Commissioners of Boulder county, for the use of the County Court rooms for the purpose of holding their meeting iu; to the railroad company, for reduced rates to members in attendance; to the different parties that furnished the music for the occasion; to MRS. O. H. WANGELIN, for the able manner in which she has reported the proceedings of the meeting; to MESSRS. BRIERLEY and HUBBARD, for their display of plants and flowers; and to the citizens of Boulder city, for their interest taken in the success of the meeting, and their liberal donation to defray the expense of the banquet.

Respectfully submitted,

P. D. GOSS,
A. E. GIPSON,
J. S. MCCLELLAND,
*Committee.*

The meeting then adjourned to meet in Fort Collins one year hence.

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List of varieties of apples on exhibition at the meeting of the Northern Colorado Horticultural Society:

Fameuse, Roxberry Russett, Ben Davis, Winesap, Little Romanite, Summer Baldwin, Haas, Wealthy, Pewaukee, Rhode Island Greening, Rambo, King of Tompkins County, Perry Russett, Russett, Northern Spy, Sweet Pear, Bailey Sweet, Pippin, Johnathan, Maiden's Blush, Jeanette, Talman Sweet, Shaker Pippin, Autumn Strawberry, Walbridge, Golden Pippin, Limber Twig, Large Romanite, Fall Orange, Blue Pearmain, Plum Cider, Fall Stripe, Willow Twig, Wagoner, Seek-no-Further, Duchess of Oldenburg, Northern Spy,

Baldwin, Fameuse, Utter's Red, Bellflower, Brier Sweet, Sweet Romanite, Turner's Sweet, Sweet Winter, Vandever Pippin, Winter Wine, Shaker Pippin, Lawrence, Wolfe River Seedling, Fall Pippin, Snow Apple, Roman Stem, Sweet Cider, Lady Finger, Seedling Pippin, Frazier Seedling, and twenty-five varieties not named.

# LIST OF MEMBERS

OF THE

# Northern Colorado Horticultural Society,

## FOR 1887.

| | |
|---|---|
| Amos Bixby | Boulder |
| W. R. Earhart | Boulder |
| J. Cope | Boulder |
| Lon Newland | Boulder |
| W. J. Iredale | Boulder |
| Jno. A. Ellet | Boulder |
| W. H. Jester | Boulder |
| G. W. Rust | Boulder |
| E. M. Tarvin | Boulder |
| Thos. R. Owen | Boulder |
| M. J. Smith | Boulder |
| P. M. Housel | Boulder |
| T. B. Stalker | Boulder |
| Mrs. H. Barker | Boulder |
| Jno. Jackson | Boulder |
| Eugene Wilder | Boulder |
| C. A. Maxwell | Boulder |
| B. M. Williams | Boulder |
| C. S. Faurot | Boulder |
| E. S. Walker | Boulder |
| Geo. Savory | Boulder |
| Mrs. G. Savory | Boulder |
| J. W. Goss | Hygiene |
| Mrs. J. W. Goss | Hygiene |
| Jas. Ackerman | Hygiene |
| P. A. Leyner | Canfield |
| Hiram Prince | Canfield |
| Benj. Woodbury | Canfield |
| Jas. Millison | Denver |
| Alex. Shaw | Denver |
| H. G. Wolfe | Denver |
| David Brothers | Denver |
| P. D. Goss | Loveland |

A. L. Washburn . . . . . Loveland
Mrs. W. W. Taylor . . . . . Loveland
W. B. Osborn . . . . . Loveland
A. N. Hoag . . . . . Fort Collins
W. L. Scott . . . . . Fort Collins
W. F. Watrous . . . . . Fort Collins
L. H. Dickinson . . . . . Longmont
Mrs. B. L. Carr . . . . . Longmont
A. M. Hunter . . . . . Valmont
Cora B. Hunter . . . . . Valmont
G. W. Webster . . . . . Longmont

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HONORARY MEMBERS.

A. E. Gipson . . . . . Greeley
Jas. Cassidy . . . . . Fort Collins

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LIFE MEMBER.

J. S. McClelland . . . . . Fort Collins

# REPORT

OF THE

# NORTHERN COLORADO

## HORTICULTURAL SOCIETY,

FOR THE

## YEAR 1888.

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### OFFICERS FOR 1888.

PRESIDENT,
E. MILLISON, Denver.

SECRETARY,
JAMES CASSIDY, Fort Collins.

TREASURER,
L. H. DICKSON, Longmont.

EXECUTIVE COMMITTEE,
P. D. GOSS, Loveland.
C. S. FAUROT, Boulder.

COUNTY VICE-PRESIDENTS,
DAVID BROTHERS, Jefferson.
DR. ALEX. SHAW, Arapahoe.
JAMES ACKERMAN, Boulder.
W. B. OSBORN, Larimer.
A. E. GIPSON, Weld.

## NAMES OF MEMBERS

OF THE

# Northern Colorado Horticultural Society,

## FOR 1888.

| | |
|---|---|
| Harris Stratton | Fort Collins |
| Mrs. E. L. Stratton | Fort Collins |
| James Ackerman | Hygiene |
| David Brothers | Denver |
| W. F. Watrous | Fort Collins |
| T. W. Garrett | Fort Collins |
| Lizzie Emigh | Fort Collins |
| Mrs. H. McClelland | Fort Collins |
| Robert Stephens | Longmont |
| Peter N. Spohn | Fort Collins |
| H. T. Short | Fort Collins |
| P. C. Black | Fort Collins |
| R. C. Nesbit | San Louis Valley |
| Z. C. Plummer | Fort Collins |
| W. D. W. Taft | Fort Collins |
| Mrs. A. L. Washburn | Loveland |
| J. K. Howard | Fort Collins |
| E. Millison | Denver |
| C. Golding-Dwyre | Fort Collins |
| Geo. Wyman | Boulder |
| E. A. Lee | Fort Collins |
| Chas. H. Terry | Fort Collins |
| W. H. McCrery | Fort Collins |
| Frank J. Annis | Fort Collins |
| Mrs. Lucy A. Kinnison | Fort Collins |
| Mrs. B. L. Cane | Fort Collins |
| P. D. Goss | Loveland |
| C. S. Faurot | Boulder |
| J. S. McClelland, (life member) | Fort Collins |
| Mrs. W. W. Taylor | Loveland |

# PROCEEDINGS.

The annual meeting of the Society convened at the Opera House, Fort Collins, December 13, 1887.

The meeting was called to order by PRESIDENT FAUROT, of Boulder.

The report of the Secretary is as follows:

RECEIPTS.

| | |
|---|---|
| Membership fees | $ 19 50 |

DISBURSEMENTS.

| | |
|---|---|
| Paid for order and receipt book | $ 50 |
| Paid for type writing on report | 15 00 |
| Paid for stationery | 30 |
| Paid for express charges | 1 05 |
| Paid for postage stamps | 1 50 |
| Total | $ 18 35 |
| Balance in hands of Secretary | 1 15 |

P. D. GOSS, *Secretary.*

The report of the Treasurer was then read as follows:

*To the President, Officers and Members of the Northern Colorado Horticultural Society:*

The undersigned begs leave to make the following financial report:

| | | | |
|---|---|---|---|
| 1886. | Cash on hand at last report | | $ 10 00 |
| Dec. 11. | Received from P. D. Goss, Secretary | | 27 00 |
| | Total receipts | | $ 37 00 |
| Dec. 11. | Paid Order No. 1 | $ 5 00 | |
| Dec. 11. | Paid Order No. 2 | 1 50 | |
| Dec. 11. | Paid Order No. 3 | 18 75 | 25 25 |
| | Balance on hand | | $ 11 75 |

All of which is respectfully submitted,

L. H. DICKSON, *Treasurer.*

The delegates and members were welcomed to Fort Collins by MAYOR BRISTOL, in a suitable address, which was responded to by PRESIDENT FAUROT.

DR. SHAW, of Arapahoe, was then called on and delivered an excellent address on "The Possibilities of Fruit-growing in Northern Colorado."

A general discussion then followed:

DR. SHAW: I believe there is more money to the acre in the culture of suitable varieties of the apple, than there is in the culture of any other crop. I prefer not to grow any other crop among the trees.

MR. BROTHERS: Said he could see a positive advantage to the young trees by cultivating low-hoed crops among them for a few years. The really valuable varieties of the apple for Colorado are the Wealthy, Ben Davis and Duchess of Oldenburg.

MR. MCCLELLAND: Said the Rambo is a tender variety. The Gennetin should be in every orchard; it blooms and gets in leaf late in spring.

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## MORNING SESSION.

WEDNESDAY, December 14, 1887.

The meeting was called to or derby PRESIDENT FAUROT, and the regular programme taken up, by calling on DR. O'BRIEN, of the State Agricultural College, for his paper on "Horticultural Chemistry."

This paper was discussed as follows:

MR. STRATTON: Does plaster benefit crops in any way?

DR. O'BRIEN: Yes. It furnishes plants directly with lime and magnesia, but its value to crops on Colorado soil has yet to be determined. The alkali in our soil is suphate of soda.

DR. SHAW: How do the fertilizing properties of the waters of irrigation compare with rain-fall?

DR. O'BRIEN: Not so enriching to crops as rain-fall.

The following paper was then read, on

# Strawberry Culture.

BY MR. A. N. HOAG.

If luscious fruit you would endure,
Dig deep and mulch
And strew manure.

In the cultivation of the strawberry, I find, in my experience, that the ground should be thoroughly cultivated by putting in some kinds of those crops for at least two years before setting out the plants, so that the old, noxious weeds may be eradicated from the soil, as well as to get the soil thoroughly pulverized. In preparing the ground where irrigation is required, I throw three furrows together, which makes a ridge, on which I run a light harrow so as to pulverize all the lumps, at the same time have a grade sufficient to run the water for irrigating purposes, after which I take good plants and set the rows. I have set one row on the ridge, twelve inches apart, and I have set two rows, twelve inches in the row, sixteen inches apart, letting the water run between the rows as soon as set, so as to settle the soil to the roots so a small per cent. of the plants only will fail to grow, and then let them grow in matted rows.

The matted row system I think to be more remunerative, as they bear more abundantly, or more quarts on the same amount of ground. In choosing your plants, get such varieties as are best suited to the climate and soil, as well as to the market qualities. I would recommend for heavy soils such as the Cresent and Wilson seedling for early; and Jucunda, Manchester, Sharpless, Bidwell and Glendale for medium and late; to which I might add a great many other varieties, but would not recommend one's having too many kinds, unless he has them for experimental work or for his private use.

In cultivating the strawberry, I use the hand-hoe for finishing up. In irrigating, I find it necessary to irrigate often, at the same time using good judgment when to do so. Strawberries require more water when they are ripening than at any other time, and on my ground more than any other berry. Any neglect in irrigating will bring smaller berries as well as less money to the purse. In picking time, have your picking stand made to hold from four to six quarts. Baskets having legs so as not to crush the berries when being set down, having your pickers pick clean and carefully, and as soon as the quart baskets are properly filled, take them to the crate to a cool place. After picking time is over, go through them, plow and hoe, removing all surplus plants. Do the work thoroughly, keeping the plants well matted up till fall, and when the ground is well frozen put on a good mulch of manure to keep the frost in the ground, instead of keeping it out. Work in plenty of manure, as in this lays the one great secret of success, as well as in keeping the ground well cleaned from weeds.

There is a more desirable way of raising strawberries, *i. e.*, take a dish of good, ripe berries, smothered in sugar and cream, and raise them with a spoon.

Then followed a general discussion on "Strawberry Culture:"

MR. STRATTON: Believed that success in strawberry culture, as in most things horticultural, lay largely in giving close attention to the details of practice. He thought the "Bidwell" unsuited to this region.

MR. WATROUS: I thoroughly believe in the most careful preparation of the soil for this fruit. I plant in rows three feet apart; give good culture; but do not disturb the roots in spring. It is important to secure strong young plants to begin with.

DAVID BRONTHERS: No doubt high culture, with an abundance of well decomposed manure, is the secret of heavy crops anywhere. The Jucunda brings five cents a quart more than any other variety in the Denver market. This variety needs a heavy soil, and the Captain Jack a light one.

At the close of this discussion MR. STRATTON offered the following resolutions:

*Resolved*, that the Northern Colorado Horticultural Society heartily endorse the U. S. Postal Improvement Association, and requests every member of this society to write to their friends in congress and urge upon them the importance of working and voting for any measure looking toward a reduction of the postage on seeds, bulbs and plants.

*Resolved, further*, That the secretary be, and is hereby requested to forward a copy of these resolutions to HERBERT MYRICK, of Springfield, Mass.

MR. JAMES ACKERMAN'S paper on "Fall Planting," was next read by MR. MCCLELLAND.

# Fall Planting.

BY MR. JAMES ACKERMAN.

The first subject assigned me, "Diseases of the Apple and Pear," I could give you nothing practical or profitable, and I declined, hoping that I should not be called on; but your Executive Committee assigned me another subject of which I have had no practical experience. I say none, but about eight years ago a friend of mine persuaded me to set two elm trees in the fall, which have done very well, but still I am not convinced that fall planting (and particularly fruit trees) should be recommended in Colorado.

I very much dislike to treat upon any subject theoretically, but upon this topic I am obliged to do so.

I am so much opposed to fall planting that I send customers away empty, and will not sell them stock to be set in the fall.

I have made a few exceptions to those whom I knew to be careful, experienced men.

And now, very briefly, for a few reasons:

Fruit trees, such as apple, pear, plum and cherry, do not fully mature (or ripen off) until on or about the fifteenth of November, which I think too late for planting in this dry climate.

Again, I never have been successful in transplanting without water, and by the middle of November there is no water in the ditches, and if there was, you all know that I am opposed to late watering.

Our friend, MR. WEBSTER, would tell you water late in the fall or early winter, but it has always been a detriment to me. I never have lost a tree from fall drouth, and I never water after the fifteenth of September. But still I think that on bottom lands, on lands underlaid with soap-stone, perhaps late watering would be beneficial.

A few years ago there was an agent traveling through the St. Vrain valley selling Colorado-grown stock, and claiming to have had a great deal of experience in fall planting in Colorado, and claimed that it was successful —was better than spring planting. What was the consequence? He sold large bills, and the farmer lost from fifty to seventy-five per cent. of his stock. And now I think the upper St. Vrain farmer would as soon think of planting his corn or potatoes in the fall as his fruit trees.

Again, our high winds of winter and early spring would certainly loosen the tree and allow the dry air to penetrate to the root; which means—good-bye tree.

In regard to small fruits, I presume the currant and gooseberry might do to plant in the fall, as they mature a little earlier, and are easily mulched and kept from drying out. Raspberry and blackberry are a little later, and would not do as well. The strawberry may be set as early as the first of September; but I have yet to see a good stand from fall planting.

Our friend, MR. FAUROT, two years ago, had two beds side by side, one planted in the fall, the other in the spring. The fall planting about two-thirds of a stand—the spring planting a full stand. And I have no reason to think that MR. FAUROT was any more careful with his spring planting than his fall planting.

Now, let me ask a question: Why plant in the fall? What is there to be saved or gained by so doing?

I will answer for myself, so far as I am concerned. My fall work drives me harder than my spring work. With line fences, stables, sheds, cellars, ice-houses and repairs on house, together with covering raspberries, blackberries, grapes and pears, I am hurried almost to death until nearly Christmas. Now, if I had more time in the spring than in the fall, why take any chances? for chances there certainly are. My observations are that the sap from fall planting is at least four-fold more than spring planting.

My advice would be: Plant in the spring; discard fall planting and tree peddlers.

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DISCUSSION.

DR. SHAW: Moved that it is the sense of this meeting that "fall planting," except for the small fruits is

undesirable. This motion, after a long discussion, was carried.

MISS WHITE next read a well written paper on "Landscape Gardening."

DISCUSSION.

DR. SHAW: Colorado has certainly taken a very decided stand in favor of the culture of the ornamentals in horticulture. Their brilliant colors and redundant fragrance is due largely to the clearness of our atmosphere, and hence abundant sunshine.

PROF. CASSIDY next read a paper entitled "Causes of Diseases in Plant Growth." This paper has been published in an eastern journal, hence the manuscript is not at hand.

DR. SHAW: What is the cause of apple-twig blight?

PROF. CASSIDY: Prof. Burrell, an eminent mycologist, has investigated the subject, and his conclusions are that it is caused by the same fungoid growth that induces blight in the pear. The reason why it does not affect more than the twigs of the current season's growth of the apple tree, is because the wood of the latter is more dense than that of the pear.

The conditions favoring the growth of these minute germs are a humid condition of the atmosphere in the early part of June, and a very sheltered location, preventing a free circulation of air among the trees.

Rather elevated situations should always be chosen, where a free circulation of air can be obtained, but with a sufficiency of tree-growth at some distance from the orchard, to break the force of violent winds from the north-west.

KEEPING APPLES.

This subject was discussed by DAVID BROTHERS in a very intelligent manner.

He keeps late apples without trouble until the following spring in a cool, moist cellar. Sufficient moisture in the atmosphere of a cellar is a chief requisite. He handles all fruit carefully, for, if bruised, its keeping qualities are impaired. Apples may also be kept perfectly if buried in pits in the ground like potatoes, placing straw under and over the fruit, and finally covering all with a thick layer of earth.

PRESIDENT C. L. INGERSOLL followed next with a well considered address on "Horticulture," which was well received by the largest audience of the session.

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PRESIDENT FAUROT next delivered his annual address, which was listened to with the closest attention. He spoke as follows:

## President's Address.

*Members of the Northern Colorado Horticultural Society, Ladies and Gentleman:*—Again we have convened to deliberate upon the interest, the progress, and the prospective possibilities of the horticulture enterprise of Colorado. This implies, or at least should imply that we have come prepared to consider all that may come before us, carefully and intelligently, and I hope, with a kind feeling toward all.

When I undertake to express in a clear and definite form, an address worthy of the cause we represent, I can but wish that the task had fallen to some other member better qualified for the work than I am. But I hope you will not accuse me of flattery when I characterize the labors of this society as heroic, and well may we say heroic, when we look back and see what the horticulturist of Colorado has had to contend with. Few can comprehend the many obstacles the horticulturist has

had to meet and overcome, to stand where we do to-day; it is the highest type of heroism, it is a persistent struggle toward a definite end, which is to be fruitful of good to humanity, regardless of failures, disappointments and losses. You who have never experienced the pang, can have no conception of what it is to lose by some sudden climatic freak, a favorite tree, one which you tenderly planted, carefully nursed; a tree which each succeeding year bore a rich crop of hope, as it neared the time for bearing the more material product, then came the full fruition, the red, ripe fruit plucked from the gracefully bending boughs, the first-born of the holy wedlock between your intelligent labor and patient waiting. As the first lisped "papa" or "mamma," is the mystic password which admits your babe into hitherto unoccupied recesses of your heart, so does a taste of the first fruits of the tree you have planted tended and watched, introduce to you a sensation new and strange, and inspired you with an affection you never believed you could bestow upon an inanimate, and so common place a thing, as a tree. As time goes on, the tree flourishes and grows in size, beauty and fruitfulness you begin to regard it as a part of yourself; with much satisfaction you contemplate that each additional wrinkle on your aged face has its fellow in an annual circle within the trunk of your favorite tree, you feel that it is not going to be a solace to you in your old age, a comfort and a joy to your posterity, but a monument to yourself, of which you will be vastly more proud than of the tallest shaft of nicest marble.

But now comes a frost, a "killing" frost, and when you think, good, easy man, that surely your tree is an "iron-clad," it is nipped and falls, as do your hopes, and the well directed labor of a life-time.

Who can blame you if you exclaim as did Wolsey: "Vain pomp and glory of this world; I hate ye." Or,



like Lear, for one awful moment you will rebel against Omnipotence, and curse the elements.

But the faithful, sturdy horticulturists of the Rocky Mountains are made of sterner stuff than this. The fate of one tree, I have noted, has been duplicated a good many times; the effect upon the heart, the sentiment and the resolution has been multiplied a good many times, yet it did not discourage nor daunt the spirits of many of the old soldiers of the orchard, vineyard and garden, who had enlisted for the war and knew not the bugal call of retreat; nor recognized the sensation of defeat. Old men, whose whitening hairs and failing strength, proclaimed the probability of their never tasting the fruits of their present labor, again plant with the enthusiasm of youth, thankful if they could have it said of them after death: "He was one of the grand old workers to whom we are now indebted for our glorious heritage of fruit."

In my last address to you, I spoke of the necessity of preserving our forests along our streams and water courses, and I should like to call your attention to this subject again. This is a matter of great importance to every tiller of the soil, and with our experience of last summer still fresh in our memories, I hope you will think of the suggestions that I may offer. In my judgment, the lack of water in our irrigating ditches is largely due to the destruction of the forests along our streams that supply us with water for irrigating.

The lack of water is not, as many think, a decrease in the amount of snow, but in removing the forest. We admit the sun and warm west winds to the deposits of snow that nature has so wisely placed in our mountains. It is melted much faster and earlier and we get the main flow of water at a time it is not needed; and unless there can be some means devised whereby we can protect and

stop the wantonous destruction of our forests, it will prove a very serious drawback to one of the greatest industries of our State.

Our railroads should not be allowed to take timber from our mountains and ship it out of the State. This they are continually doing, in the form of ties and bridge timbers. Mill men should not be allowed to cut timber within a certain distance of a stream. But, some one says, we must have lumber for building houses and outbuildings for our stock. I will say to those, you better by far ship your lumber from the east than destroy what little timber we have in the mountains. The influence it has on the climate alone is well worth our protection. There is, however, a marked improvement in the amount of timber destroyed by fires. I think it is the duty of every tiller of the soil to try and preserve the forests of the Rocky Mountains, for in so doing you are fostering your own interests. I should like to see every farm of one hundred and sixty acres in Colorado have at least ten acres of timber growing upon it. You would find it to be the most profitable piece of ground on your farm; it could be set for a very small outlay in cash, not to exceed a cost of $50, and the influence it would have on the climate would more than pay you for your trouble and expense.

The growing of trees in Colorado is, in my judgment, the key to success in fruit growing.

At our last meeting you voted to dispense with the various standing committees on meteorology, entomology, orenethology, geology, forestry, pomology, vegetable culture, floriculture and ornamental gardening; and I should like to add to this a committee on experimental horticulture, and I hope you will at this meeting reinstate that part of our Constitution that created these committees, for a report from such a committee

would be of great interest to us all; and I would suggest that if you see fit to have these committees appointed, that they should keep themselves diligently on the outlook for new ideas, new discoveries and new improvements in the various branches of horticulture pertaining to their respective allotted fields; for such committees to keep convenient memorandum books and jot down, in season and out of season, items which seem to be worthy of special mention in their reports. In this way you would obtain good reports with but very little time or trouble.

I should like to say a few words in regard to gathering and marketing our fruits. We hear a great deal of complaint from producers about the way they are treated by commission men and other dealers that are handling the fruit consigned to them. The producer claims that he is not treated fairly, that he does not get just returns. I will admit that there is a good deal of trickery practiced by the middle men in handling fruit, but I think as a rule the producer is more to blame than the merchant.

The main trouble lies in the way the fruit is picked and packed for the market. Most producers gather fruit too ripe. Especially is this so with the softer fruits, such as the strawberry, red raspberry and blackberry. If you are shipping to a market any great distance, the strawberry should be picked when quite green and with great care. Be sure to have them picked with the stem so that the calyx will remain on the berry; for I care not how fine a berry you may have, if they are not picked and packed with care, you can not expect to get them to market in a good condition. The boxes should be well filled, and never, under any circumstances, top-out your boxes. What I mean by this is to have all the nice, large berries on top, but let the berries run as evenly as you can through the box;

nothing hurts the sale of your fruit so much as this. Never mix the small berries through a crate of large, fine ones, for in so doing you will not only get the credit of being dishonest, but you will lose the price of your fine fruit. I often think if some shippers, who complain most about dishonest merchants, could see their fruit after it had gone for a hundred or two miles over our rough railroads and in the close, hot cars, they would not recognize the fruit as theirs, and would not blame the merchant for not getting top prices for their fruit.

It is to the interest of the merchant to get all he can for the fruit consigned to him; but I do not wish to be understood as trying to shield the commission man; he is at fault as well as we are many times; they too often allow the fruit consigned to them to be handled very carelessly. I have seen men employed by commission men, and railroads in transferring fruit from the car to the trucks and wagons, toss the boxes from one to the other, and let them drop from four to six inches; this has a very demoralizing effect on the fruit. Is it a wonder, then, that our fruit is not in a very saleable condition by the time it gets to its destination? I presume you have men that you are shipping fruit to, that find a good deal of fault with the fruit you are sending them about the condition it comes in. As a rule these are the men that are kicking your fruit about as though it was a foot-ball, and my advice to you is when a merchant begins to find a good deal of fault, and claims he cannot get top prices for your fruit, to drop him at once, for he is the one in the fault. One will ask how can we remedy the evil in case of the railroads? It can be done by unity of action. Let every shipper make it his business to see that his fruit is properly handled. I find the railroad officials very willing to do all they can, if we but tell them what we want of them. In my

judgment the producer makes a very great mistake in trying to get too high a price for his fruit at the beginning of the season.

Take for instance the strawberry when it first makes its appearance on our market; we try to get from 30 to 35 cents per box for them. Now I think a better way to do would be to write to the different points you expect to ship to and ascertain through men you expect to sell your fruit to the condition of the market at those points, and put your berries on the market at such prices as you can afford to sell at, and at such prices as the consumer can afford to pay. Let the producer and the merchant understand each other and there will be no trouble about getting good prices all through the season. It is much better to start your berries at 20 cents per box and hold them at that than to get 35 cents at first and then drop to 15 cents. For when you commence dropping on the price of berries you must continue to come down until they are so low you cannot afford to grow them. I have pursued this course for the last three years and I find I get much better prices through the season than I did when I tried to get big prices in the early part of the season.

I can not close this address to you, brothers and members of this society, without urging upon you, once more, the great importance of taking some action in regard to the insects that are becoming so numerous in our State. Colorado, with its dry climate, is and will be, in time to come, the home of the insects, and as this is the last time I expect to have the opportunity of urging this all-important subject upon you, as the presiding officer, I hope you will take some action on this question that is of such vital interest to us all.

Entomology is closely related to the interests of all classes of producers from the soil. It teaches us how to

guard our crops from the attacks and depredations of all insects, as well as the benefits to be derived from our insect friends. Entomology, when considered in its true relation to agriculture and horticulture, becomes a subject of vital importance. A question of profit and loss, of success or failure, of dollars and cents. Very few persons realize the immense loss annually caused by insects' depredations. Every crop in our orchard, garden or farm, is more or less subject to their ravages. Gardening and fruit growing has become a battle against insects, just as much as it has been against weeds. The farmer has not been troubled, as yet, to any great extent with many insects that destroy the wheat and corn, and many other crops in the States to the east of us, but it is a mere matter of time when you will have the chinch-bug in all his glory, as well as the hordes of other insects that are so numerous in other States.

While a great many are ready and willing to work if they but knew what to do, the agricultural classes need a more thorough knowledge of practical entomology.

A simple text-book on this subject should be introduced into our public schools, giving an outline of the classification of insects. While this step would lay the foundation for more intelligent action in the future, our present necessities demand more prompt and decided action. We need and should have a State Entomologist. You all remember when our stock interests were threatened by pleuro-pneumonia, and the cry went up from our stockmen for the State to take some action in their behalf, how quickly was their slightest wish granted. And what is the stock interest of the State as compared to our agriculture and horticulture? It is nothing. And yet the wants of the tiller of the soil are ignored by the law-makers of our State.

I would recommend that this society appoint an entomologist, and provide him with suitable books, that he may fit himself for his work.

And now, as I am about to lay off the mantle of office which you have honored me with for the last two years, I wish to thank you all for the confidence you have shown that you had in me, being, as I am, one of the youngest members of this honorable body. I can assure you I appreciate the honor you have bestowed upon me, and my heart's desire is to see this society grow and become a power for good in our State; and we can but try. There is nothing but what we can overcome; no obstacle too great for us to sweep away with our energies and determination to win.

When we look back over the few years that have passed since the organization of this society, and see what we have accomplished, and what obstacles we have met and overcome, we should be encouraged to press forward to still greater achievements in this noble work. For this society was organized at a time when the opinion was almost universal that we could not grow fruit in Colorado, and the evidence of nature seem to verify this statement of man. But we have persisted in our work, and have demonstrated, beyond a doubt, that we can grow fruit, and we are to-day growing successfully a greater number of varieties of apples than any other State in the Union. And the day is not far distant when we will be shipping apples to the East in place of drawing from there to supply our markets as we are now doing.

There is no reason why we shall not be a strong competitor to California in the production of grapes. Our foot-hills all along the eastern slope of the Rockies are well adapted for the growth of the grape. Then let us

be persistent in our labors and we will yet see our work crowned with success.

Now, in conclusion, I want to say that such persistent efforts in the face of disappointment, such indomitable courage, such intelligently directed labor, such patient waiting, can never find full and complete fruition until Colorado stands at the head as a great fruit-producing State.

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## MORNING SESSION.

THURSDAY, Dec. 15, 1887.

The meeting was called to order by PRESIDENT FAUROT and the regular programme taken up by calling on MR. MILLISON for a paper on:

## Stone Fruits of Colorado.

This subject is one of importance to every horticulturist in the State of Colorado. It is one that but few have had an extensive experience in. I hope that the future fruit grower will be more successful than we have been in the past in this particular.

The peach orchard has been an entire failure in northern and middle Colorado, but there is no doubt of its success in the southern and south-western parts of the State. In any locality where trees three years old, raised from the seed, will produce fruit, as has been the case in several localities in the south-western part of the State, we need have no fears as to the result. There is no better quality of peaches grown anywhere than those grown in the south-west part of our State. But the

country is new, and we do not know how extensive the territory will prove to be. Apricots have been grown and have produced fruit in Denver. One tree, about seven years old, has been bearing fruit for three seasons. It had on the third crop about one-half bushel; the fruit was good in quality. There is no doubt in my mind but the apricot will be grown in the southern peach belt, but not in the northern part of our State.

The nectarine, so far as I know, has never been fruited in this State but in one instance, and that of course, is in the south. I have trees two years growth from the seed, dwarfish yet healthy, and may produce fruit.

The cherry is one of our most uncertain fruits in this State as well as almost everywhere else. It has been grown and fruited in almost every locality where a good variety of trees have been planted; but about once in every five years is as much as can be expected of a cherry tree. But where the tree does fruit it has always been excellent, both in quality and in quantity.

The plum is one of the stone, or pit fruits, that can be grown in every county of our agricultural districts. It has proven itself to be adapted to everywhere that other fruit will grow. But we will have to make our selections with very great care, when we plant eastern stock. It will be wise for us to look to our own native varieties for our plum crops until we can establish some few varieties that can be depended on, but I do not deem it best to enter into detail of my own experience in this particular variety of pit fruits. I will say, however, that no one need go without plums more than two years after planting a few two-year-old trees.

Now, in conclusion, I know that there are some that have been experimenting with eastern stock. I expect and hope we will hear from them, as to their past

season's crop. My plum crop of the past season was excellent, all from trees grown from seeds of my own planting. Many of the trees, three years old, were so full that they lay on the ground and I put boxes under the tops to let the fruit rest on, always placing something soft under the fruit, such as an old carpet, sacks or anything to protect the fruit. I can show some two-year-old plum trees that are one inch or more in diameter, four to five feet high, with nice tops and as full of fruit-buds as such sized trees will be able to carry.

I hope and expect that what I have written will bring out the experience of others in this particular, and thereby, at least myself will be benefitted by this interchange of experiences.

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Then followed a general discussion on "Stone Fruits."

MR. GIPSON: I can endorse all that Mr. Millison has said. I have over forty varieties of the plum on my place. The best of the native sorts are the DeSoto and Forest Garden.

DR. SHAW: How close do you plant plums?

MR. GIPSON. Varieties of red plum I plant in clumps; others in rows twelve feet apart.

DR. SHAW: Do you think it necessary to plant different varieties close together to secure the setting of the fruit?

MR. GIPSON: I do, as in the case of the Weaver and Wild Goose.

MR. BROTHERS: I would ask if there is any difference between the varieties Forest Garden and Forest Rose?

MR. GIPSON: There is a marked difference in the growth and habit of the kinds mentioned.

MR. BROTHERS: Forest Rose promises well; Weaver next in value; Wild Goose a failure with me.

PRESIDENT FAUROT: Recommended planting selections from the native varieties; in this way some new and valuable kinds may be secured from among the native species.

MR. W. L. PORTER next presented a paper entitled:

## The Relation of Birds to Horticulture.

"Kill not the birds,
The pretty birds,
That fly about our door."

As a general thing we do not encourage our little friends, the birds, to the extent that they deserve. There are a number of varieties that follow civilization and are not found in localities until man has prepared the way.

The early settlers of Colorado inform me that it was several years after the first settlement before the robin made his appearance, and seven years ago they were very scarce compared with the present. They are very numerous now and we are very glad to see them, when they come with their welcome note to tell us that spring has arrived.

The larks, though homely in appearance, fill a place that we very much appreciate, and we welcome their thrilling notes with gladness, as the spring approaches.

Colorado is the home of the mocking-bird and there should be a sympathetic feeling between it and the horticulturist, from the very fact that like the true horticulturist he is up with the dawn, gladdening the approach of day with his melodious sounds. It thrills the heart and makes the coming burden of the day

seem lighter. It quickens our step and strengthens our better resolution, and we resolve then and there, henceforth, we will put as large strawberries on the top of the box as we do in the bottom.

We might divide the birds into three classes, the ornamental, the beneficial and the destructive. The ornamental we need to brighten our pathway; they help us to look above the mere drudgery of life; they are an index to the thousands of healthful things in nature that may so easily be overlooked. While they are most of the time busy seeking food for the little brood at home, they never forget to speak a pleasant word as they flit by, throwing in a little song or a pleasant greeting as they hurry on through life.

Under the second class come the real workers, and there are many favorites. They are constantly searching our orchards and vineyards seeking those insects that are so detrimental to fruit. There are a great variety under this head, all of them good in their way. I will make special mention of only a few that can be cultivated to a great extent. First, the wren, a special favorite of mine, and a great destroyer of small larvæ and insects; the codlin moth and curculio alike are vanquished. Its quick, searching habits enable it to find insects in all their abiding places. It goes under boards and boxes, and through dense foilage, sparing not the worms. It is also a great friend of the apiculturist, going over and under the hives in diligent search for the wax moth. Not only is it valuable for its insect destroying qualities, but it is also one of the finest songsters. It delights in a bird house, and will raise two broods in a season. A small box, four by five inches, and six inches deep, with an inch and a quarter auger hole bored about three inches from the bottom, with a lighting board in front; this put on a pole eight or ten feet high, or nailed against a tree makes a desirable

home for the wren, and is almost sure to be occupied the first season. The merry song and chatter of the male birds will repay you for all trouble.

One of the most beneficial birds in the orchard is the small woodpecker (species perbescent). It may be seen running up and down the bark of the apple tree, and with its sharp, hard beak it can take the larvæ of the codlin moth from its difficult hiding place. I have seen paper bands literally riddled with holes where this bird has taken the larvæ through the band.

What shall we do to encourage the birds? Destroy their enemies? First, the bird dog must not be allowed to run at large, they destroy many of the nests and adult birds of those that build on the ground. Second, the cats that roam the country over, destroy many of the small birds. I am sorry to say that there are a good many boys who go about in search of bird's nests for the purpose of destroying them. Great pains should be taken to teach children the beauty and usefulness of birds. A great war should be made on the hawks, and they should be killed whenever possible.

In Colorado, the great pest of birds is yet to come—the English sparrow. It will soon be here, and when it comes our congenial climate will cause it to increase very fast. I think a bounty should be offered in advance, for woe to our grain fields and small fruit gardens when it once gets a foothold.

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MRS. KELSO, of Longmont, next read a paper entitled "Books and Reading," which was followed by a paper on "Decoration of the Home," by MRS. CARR, of Longmont. Neither of these papers are in our possession for publication.

MR. WARD, of Fort Collins, read a practical paper on

# Market Gardening.

About the first thing to be considered before starting a market garden is, have you any real liking for the business? Because, if you have not it is probable that you will not follow it for any great length of time. There are so many disappointments and partial failures that none but an enthusiast will have patience to keep on; for to make it foot up satisfactorily one has to count on the pleasure of growing the vegetables as about half the profits; while those that go into it for the dollars and cents alone, soon get discouraged to find that the cash profit is not nearly so large as they expected. In writing this essay I will not enter into a description of the different methods of doing the work, but simply describe that followed by myself, and try to point out a few of the causes of failure in selecting a location for a market garden. Nearness to town, or a shipping point, is of great importance, for it will easily be seen that the difference in the cost of hauling five hundred loads of manure and about three hundred loads of vegetables one mile, or five miles, is great. The soil for a market garden should be a light, sandy loam, as deep as possible, and an even surface gently sloping toward the east or south, as crops will mature much earlier on such soil than on a heavier clay, and early vegetables being most profitable, it is of importance. Beside the cost of tilling is much less on sandy soil than on clay.

Land that contains so much alkali that it is useless for other crops, will grow celery or late beets to perfection if manured with coarse litter or even straw. The ground should be irrigated in the fall, as soon as previous crops have been taken off; then in about a week it will be dry enough to put on manure. It must be put on freely, as much as can be plowed under, for it is useless

to try to grow early vegetables on poor soil, and it is safe to say that success will be in proportion to the amount of manure used. I have used coarse, fresh manure on nearly all kinds of vegetables and always with good results, although well-rotted manure is the best. The ground should then in the fall be plowed as deep as possible and left until spring, when it will be found in fine condition to fit early for seeds. My plan is to take an Acme harrow, and a smooth harrow made of heavy plank, using alternately until the ground is thoroughly pulverized. Then, if for onions, or in fact any small seeds, it is hand-raked, as it is necessary in Colorado where we have to irrigate that the land should be level, otherwise it would take double the amount of work to irrigate.

The seed is thin sown, if onion, radish, etc., about sixteen inches apart for the rows and one and one-half inches deep, for which purpose I use a Matthews' seed drill. As soon as the plants appear is the time to begin to cultivate. The "Buhlman hand cultivator" is indispensible at this time, as in careful hands it will do the work of five men, and leave very little weeding to be done. Four pounds of onion seed is about right to sow to the acre.

The crops must not be neglected in the early part of the season, as I have found that if a crop of onions, or in fact any crop, is neglected, then it is never so good. It is a common error which nearly everyone falls into, trying to grow too much; the result of which is poor vegetables and half a crop. Thinning out the plants when necessary, should always be done as soon as the plants are large enough to get hold of. Beets, parsnips and carots should always be sown at sufficient distance apart to allow a horse and cultivator to be used, as the cost will be less than one-tenth, and the work will be

better done than if a hoe was used. Late cabbage should be set so that it may be cultivated both ways, if a large crop be grown, as it will then be unnecessary to use the hoe. About 2½ feet each way is right.

All root crops are best sown on ridges about four inches high, as longer and smoother roots can be grown that way than by flat culture. I take a small, one-horse plow and turn two furrows together, which leaves the ridges about twenty inches apart and that gives room to use a horse and cultivator. A light roller is then run over the tops of the ridges, which makes it easy to run the drill on the top of each ridge.

I have found the following plan of irrigating to be satisfactory, and if the crops have been put in on ridges as advised, it is the easiest way to do the work as it does not require a man to be in constant attendance, as when flooding is practiced:

A small stream is turned into each furrow and allowed to run several hours, when it will be found to be thoroughly irrigated, leaving the surface loose and porous; the latter part of the day is the best time to irrigate as the water is many degrees warmer than it is in the earlier part, when it is cold and would check growth. In about two days it will be found in good condition to cultivate, which should always be done as soon as possible after irrigating. Care must be taken in irrigating carrots, parsnips and oyster plants, as they are easily ruined if water is near them too long a time. The best way to prepare land for either plants or seeds later in the season, is to thoroughly irrigate about a week before it is needed.

In plowing and fitting, only a small patch should be fitted at one time, which must not be allowed to dry in the hot sun, but fitted and planted as quickly as possible. If plants are set, water should be turned into the

furrows as soon as set, long enough to wet the ground around each plant. In about two days, it will be necessary to run the water through the rows again, if the weather is hot. As soon as plants are established, the cultivator should be started.

When the vegetables are to be shipped to a distant market by rail, it is necessary to keep on hand a good supply of barrels and boxes of different sizes to fit large or small orders, as the package should be filled, otherwise the contents will be tumbled around and broken. In packing cauliflower, each head should be wrapped in white paper, or it will be discolored and almost unsalable. Early cabbage should always be shipped in crates to hold from 100 to 200 pounds each. In the hot summer months all barrels should be notched by cutting three or four holes in the side about an inch wide and six inches long. In packing mixed lots of vegetables, the heavier kinds must be put in the bottom, lettuce, etc., on top, all should be dry and as cool as possible when packed; string beans and peas must never be packed when wet, as it takes but a short time for them to heat and spoil.

In growing vegetables in winter, under glass, the beginner is sure to get more experience than money out of it, at present prices. Hot-beds, though, are indispensible for growing early plants. The time for sowing seed in hot-beds is about February 1, for cabbage, etc. The first of March is early enough for sowing tomatoes, celery and egg plant. The management of hot-beds can only be learned from experience, but I will try to point out a few of the greatest troubles that a beginner would experience. The greatest is overwatering when the bed is newly made; another is too little air. Air should be admitted on every bright day, otherwise the plants would be drawn and worthless. As

soon as plants are two inches high they should be transplanted to a cold-frame, but not watered for several days, as they would be more liable to damp-off if watered at once.

I will add a list of what has been found to be the best varieties of some of the most important crops:

*Cabbage*—Early Wakefield; for late, Premium Flat Dutch.

*Cauliflower*—For early or late, Snowball, Erfurt Extra Early.

*Beets*—For early, Egyptian; for late, Dewing's Turnip.

*Tomatoes*—Beauty, Acme and Cardinal.

*Peas*—Improved Dan O'Rourke.

*Onions*—Yellow Globe, Danver's.

*Carrots*—Half Long Scarlet Stump Rooted.

*Celery*—White Plume.

*Spinach*—Long Standing.

*Turnips*—Extra Early Milan.

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A long discussion followed on the above paper, which was participated in by MESSRS. FAUROT, SHAW, GIPSON and MILLISON.

MRS. E. L. STRATTON next read an interesting and valuable paper on:

## Canning and Preserving Fruits.

The detail of the art of "canning and preserving fruits," are they not written minutely in the records of the Horticultural Society of 1886, by MRS. G. I. SAVERY, of Boulder? If my directions should be different, it might be said, "who shall decide when doctors disagree?" But, that it is essential to understand canning

and preserving fruits, the pioneer woman of Colorado will not dispute. They had a "realizing sense" of the necessity of it. They had to depend so long entirely upon them for fruits that the canned and preserved articles were a necessity, not a luxury, as the State's housekeeper esteemed them, only to be used for extra occasions to help out an abundance of everything fresh in its season. Here, in the sixties and seventies, fresh fruits, except the wild articles, were unknown, or unattainable, except for the purse of a Fortunatus. The first fresh apples I saw after coming to Fort Collins (then a fort in reality), was a wagon load driven through from Utah, selling readily to soldiers and citizens, at fifty cents apice. One can judge then how greedily we canned and preserved in every shape, everything we could get, to retain as much as possible for future use. Also, there was a home flavor to our own work, very acceptable after the long length of time we were obliged to be restricted to the marketable article, which, however much to be praised for its usefulness, has a wonderful monotomy in flavor to old timers. Our wild fruits offered the first opportunity to test our skill. The wild currant, sarvice, or juneberry, and chokecherry, were used as they came, but when the season of red raspberries came we had a luxury which we fully appreciated. Large parties would form to go to the mountains with camping appurtenances, together with tin cans which we could get made, and an iron to solder them, after heating in our camp kettles, and no more delicious can was ever opened. We could also take sugar and make the fruit into jam in the mountains, rich enough not to ferment in the jolting necessary to bringing home. The enjoyment of a camping outing was much enhanced beside, by a splendid supply of the fresh fruit, after such a dearth as generally reigned. The raspberries, found nearer home, in the foot-hills, we used for jelly, the finest I ever made of any fruit.

Later the wild plums gave us a treat, but were a little chary, not every year to be depended on. The plums then, when settlers were few and plum trees thick along the foot-hills, were something the citizens of Colorado to-day know nothing. Along the streams and in cañons, where they received plenty of water, they grew large and fine-flavored by being allowed to remain on the trees until fully ripened. Then we had plums in every shape. The jelly was not excelled by the finest *States* currants; the marmalade and butter as nice as one need wish for. The largest and finest ones were selected for preserves. My way was to let them stand a short time in a hot soda water, which prevented hardening, and also took away the puckery taste given by the skin. Last, cook in a syrup of sugar equal in weight to the fruit. The main supply then, was put in a keg as large as needed, after picking over carefully to remove poor ones, covered with boiling water, and kept weighted down so that the fruit was all covered. They kept perfectly and were used all winter; stewed for sauce or pitted for pies, and pronounced *good* by the father and big boys.

Very soon the cultivated currants and other small fruits made their appearance, and as the novelty of utilizing wild fruits was exhausted, we found it infinitely easier to take the fruits and prepare for future use in the comforts of our own kitchens.

Our old craving for home fruits still held us so strongly that we were insatiable in our craving to keep as much as possible.

The result, which in my case, that as an old-timer, when my husband decided to enter for the "sweepstakes display of best farm products," I was able to assist to the extent of fifty or sixty entries of canned and preserved fruits, jams and jellies. That is only one Colo-

rado housekeeper's experience. Many others much excel my list, and if our county fair could see the advantage of offering adequate and extended premiums for canned and preserved fruits, I think the display would astonish eastern people as much as the display of other agricultural products does.

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MR. GIPSON'S paper on "Irrigation" was next read by the author. He spoke as follows:

# Irrigation.

Artificial irrigation is a subject that is attracting very considerable attention at the present time. With each recurring season of drouth and floods, renewed interest is directed towards the problem of how we may best arrest the waste of waters and conserve them for use in times of need. Neither is the consideration of this important question confined to those regions outside the limits of the "rain-belt."

Repeated losses and disasters by reason of too much water, or too little moisture, at the critical time, have caused a feeling of insecurity and uncertainty among the producers of the great farms, fruit gardens and staples over a large portion of our country.

Water is king.

The author of what is termed the "New Agriculture" heads his book with the significant title, "The Waters Led Captive," and an enthusiastic biographer of this author says: "And so it is that to a man who never had to exceed three years of education at school has been left the discovery of the fundamental loss governing the movements of the waters upon and beneath the soil,

which many unite in believing will effect a revolution in the present system of agriculture."

Referring to the waste of waters and torrid drougths, Mrs. Stewart, the eminent writer on agriculture, declares this the obstacle to success which meets the farmer, rather than the impoverished soil, a condition, indeed, mainly due to a poverty of water. To remove this obstacle to successful cultivation, it is only necessary that a system of irrigation be adopted.

An adequate supply of water ready for use in case of emergency will render the farmer, the gardener or the fruit grower, to a very large extent, independent of the necessitudes of the season, and secure, beyond accident, a full reward for his labor.

Mr. Hinton, the author of a recent work on irriga- in the United States, asserts that "the problem of water supply is one for serious consideration."

Orange Judd, Mr. Johnson and other well-known writers are likewise giving prominence to the discussion of topics pertaining to irrigation.

Although we usually associate the term irrrigation with the artificial application of water to the surface of the land, it properly implies any means of applying moisture to vegetation, and some of these various methods, in one form or another, antedate history.

"To irrigate economically and successfully, however," says Mr. Stewart, "is a business which requires a large amount of technical knowledge and skill, and the expenditure of a considerable amount of capital, either in money or labor. Irrigation belongs, in fact, to a highly advanced condition of agriculture, and can only be applied to land of high value or capacity, in the hands of intelligent owners."

Every person who has had experience with the application of water to growing crops, more especially of the

orchard and garden, knows that the statements just quoted are not exaggerated. Some years ago I wrote the following upon this subject, which my latter experience has fully confirmed:

The successful cultivator must know *how* and *when* to apply water to his crops. To the grower of fruits, the ability to *command* this element when needed is of manifest advantage. That the yield may be largely increased by the judicious application of water, there is little doubt. That the fruit may also be increased in size and made more attractive, is equally certain. At the same time judgment is required for the best results. Indeed, positive harm may be done by untimely irrigation, harm not only to tree and plant, but to the land as well. Incessant watering without regard to the condition of the soil or the needs of the plant, will often force a growth of wood at the expense of the fruit product and fruit flavor. It may likewise cause a growth to be made which the succeeding winter finds immature and unable to withstand its tests. This will almost certainly be the result with any tree or plant that has a tendency to make a strong and succulent growth. I have known great injury to result from this cause alone. I have also known the quality of small fruits, particularly strawberries, to be seriously impaired by too frequent watering. This, by way of illustrating the point, that there is danger in careless irrigation.

The condition of the soil and needs of whatever is growing upon it should be carefully studied. My own view is that too much water is used by a majority of irrigators in the orchard and garden, and that more harm results from a too free use of it than from too little. In a word, everything beyond a *legitimate* use is an *abuse*, and this will be better understood in a few years than it is now. This much is certain, that the continuous soaking of land or crop is sure to result in

injury. On account of the difference in soils and location, no very definite rule can be given for the application of water. Some lands require more than others, this is also true of trees and small stock.

Again, much depends on cultivation. Often a thorough stirring of the soil is as good, if not better, than an irrigation. Seasons also differ; during some the rain-fall is sufficient to carry trees well into the summer without irrigation. One method of attracting moisture which is most effective, but which is often lost sight of, is by means of a thorough stirring of the soil. Deep plowing, too, means protection against drougth frequently, where shallow turning of the soil would mean failure. In fact, judicious cultivation calls to aid the two great forces operating in the distribution and diffusion of moisture, namely: Gravitation and capillary attraction. How often have we seen certain growing crops that were parched and shriveled by lack of moisture, fully restored by a thorough stirring of the soil. The error is often made of assuming that the sole object sought by the hoe and cultivator, is to arrest the growth of weeds. The statement is not infrequently heard, that this or that crop is free from weeds and hence needs no cultivation. The person who grows his crop with this understanding, is pretty certain to be disappointed in results. Except in rare cases and under unusual conditions, nothing can compensate for the lack of good cultivation.

But to irrigate judiciously, one should know the soil he is working. Different soils manifestly require different treatment. Moisture is diffused and retained in some soils much better than in others. In California, orchardists have found lands continuously moist, (not wet) where the subsoil was even porous, and where artesian water could not be secured at the depth of hundreds of feet. In other cases, where the subsoil was compact clay, and water to be found at the depth of eight or

ten feet, yet this soil required more irrigation than the other. Again, there will be instances where from long continued irrigation the water has filled up the underlying strata, and even encroached on the subsoil, and can be found at the depth of four or five feet, or even less. Such land with proper cultivation, should require little, or no surface irrigation. Capillary action should operate here to supply the moisture. Still it would depend, even in this case, somewhat on the character of the soil. This much ought to be known and kept clearly in view, that every tree, shrub and plant needs moisture, and an abundance, too, cannot be denied.

Sir J. B. Lows, the experimenter of world-wide fame, found that most plants exhaled during the four or five months of their growth, more than two hundred times their dry weight of water, drawn up from the soil in which they grew, and Sir John Gilbert "estimated that the amount of water given off by plants during their growth might be approximated as equal to a depth of three inches of rain for every ton of dry substance grown."

The greater the growth the more rapid the evaporation, hence, whatever stimulates plant growth likewise stimulates evaporation.

The amount of moisture that is lifted from earth and sea by this process is simply wonderful. Some person with a genius for mathematics, has made the computation that two hundred thousand cubic inches of water are raised each year from the ocean alone. No one seems to have had either the patience to computate or the confidence to exert, in exact figures, the evaporation from the earth's surface, but it would certainly go well up among the thousands of cubic miles.

Professor Mead, of our Agricultural College, gives us an idea of the extent of evaporation in this section in

the estimate that during the months of June and July the atmosphere takes from the surface of the Poudre district at least one thousand cubic feet of water per second.

This is something of a digression and is only mentioned to show the forces operating in the distribution of moisture. From what has been stated alone, it will be clearly seen that water should be applied to growing crops of every kind, with a reasonable amount of care and discrimination.

A neighbor of mine ruined a large planting of cabbage this season by too much water. Another seriously injured corn and beets. And still another, at one time, actually killed a portion of his stand of alfalfa by flooding his grounds. I have seen gardens and fruit trees served very badly in the same way. In fact, scarcely a crop can be named but is not liable to serious injury by the careless use of water to surface irrigation. This statement applies especially to the proper time and manner of applying water; this depends largely on conditions.

It is useless to attempt to be specific in this particular, further than to say that experience will teach the careful cultivator when he ought to irrigate, better than any rule can possibly enlighten him. Any crop growing on land with gravely subsoil will need more water than the same crop on land with a stiff clayey subsoil. So, likewise, the plant or tree, the roots of which strike deep down into the earth, will thrive with less frequent waterings, than will one whose roots are nearer the surface. I have a field of alfalfa several years old, which I have never irrigated; but at the time of sowing, the soil was moist and the subsoil has been kept in this condition ever since, by reason of a canal running along the side hill above.

The nearest one can come to giving rules of general application in regard to irrigation, is that in this land of perpetual sunshine and rapid evaporation, nearly every product of the orchard and garden should be watered in some manner as soon as planted. The exceptions to this are rare.

During the fruiting season water the small fruits, such as the strawberries, raspberries and blackberries, after each picking. See that the currants and gooseberry bushes, and I will add grape-vines, have plenty of moisture while maturing their fruit. I mention grapes in particular, because the popular impression seems to be that water should be kept from the grape-vine almost the year 'round. My more recent experience does not confirm this assertion. I say again, see that your grape-vines have moisture while developing the fruit. If one thorough soaking of the soil will keep the ground sufficiently moist to carry them through, (and it will do this in some localities), all right; but several irrigations may be required on light, sandy soil. Under such conditions, don't be afraid to apply water.

California grape culturists find that the yield has been more than doubled in many cases by either thorough summer or winter irrigation, or perhaps both.

So I will repeat again, see that your orchard or garden, whether fruit or vegetable, is not permitted to dry up while developing its annual crop.

One more general rule. See that your fruits go into "winter quarters" with an abundance of moisture. If from any cause you find the soil thoroughly saturated, then don't irrigate. Otherwise give them a generous watering and they will be better prepared to resist the "drying-out process" so fatal to fruit stock in this climate. As to the best system of irrigation, this is a matter that time must demonstrate.

I have felt for some years that the plan of surface irrigation in practice with us was wasteful, clumsy, untidy and often unwholesome. That it will be very generally modified or superseded I have little doubt. Sub-irrigation in some form I regard as most desirable. Where water is to be conveyed from the main canal, piping or tiling is far better than the open lateral.

What is known as the "Asbestine system" or the "Hamilton process" impresses me as being correct in principle, whatever defects it may in fact have in practice.

Mr. Gravestock of Cañon City writes me under date of December 5: "This is my fourth season with this system. I have tried it and cannot speak too highly of it. I have only about a thousand feet, but enough to satisfy me that when properly applied it is a grand success."

As for conducting water long distances the cement-pipe cannot be beaten, neither for durability, cleanliness nor cheapness. Sub-irrigation is away ahead of surface irrigation. I would put it almost as far ahead as surface irrigation is of the old hand watering-pot we used to use with our wet legs and tired arms and back."

My own experience with sub-irrigation has been limited, but quite satisfactory. It is certainly a great saving of water as well as of labor, and when properly arranged is neat and expeditious. From a sanitary standpoint it would seem to be worthy of attention. The flooding and continual soaking of land, without proper drainage, is often a source of danger to health as well as of inconvenience and pecuniary loss. Time will not permit a discussion of the merits of sub-irrigation by parallel trenching, as contemplated by the "New Agriculture," or of the other means of conserving the waste waters by reservoirs, storage, etc.

I must, however, not fail to refer to the scheme of a San Francisco doctor, at once audacious in its inception and gigantic in scope, which contemplated drawing waters from the heavens for the purposes of irrigation. A huge balloon-like condenser with an electric cable, is to be used to corral the myriads of vesicles or dew-drops floating in the air from three to five thousand feet above us, and force them to give up their moisture, which is to be precipitated upon the earth to make glad its waste places. The doctor expects to see the deserts of the great west blossom into beauty under his process, and says, that should the Government adopt his patent, "by its use there need not be an acre of waste land on the continent." A condenser of about 200 feet in diameter is to bring down something like 25,000,000 gallons a day—enough to irrigate several good sized farms. It must be confessed that the scheme is an attractive one. The thought of being able to command at will, the clouds above us, and bid them yield their moisture in times of need, is something almost beyond the conception of the poor average mortal, in the regions of perpetual conflict with drougths and torrid wastes. If Dr. Cohill succeeds, nature will be out-done, and patent condensers will be the hand-maids of agriculture in all its departments. Surely wonders will never cease.

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DISCUSSION.

PRESIDENT FAUROT: I do not agree with Mr. Gipson in regard to irrigating after the fruiting season is over. I water plentifully while the grape is in bloom and the fruit is swelling. I irrigate strawberries twice a week, and as late in the fall as I can.

MR. STRATTON: I believe that no rule in regard to irrigation holds good on all soils.

MR. MCCLELLAND: My rule is never to let the plants get dry. I apply liquid manure by putting ordinary manure in the irrigating ditches, and then allow water to percolate through it.

PROFESSOR MEAD, of the Agricultural College, then read a paper on:

## Under-draining.

The topic which has been assigned to me in your programme is one of the *new* questions which our agricultural progress has developed. While four or five years ago the subject of drainage was occasionally broached at our Farmers' Institutes, it was not a matter of very general consideration out of them. Unless I am very much mistaken, however, the topic is now a live one, to which a large percentage of our farmers are now giving considerable attention and making dilligent inquiry as to the methods; their cost and results. I base this belief on several facts. There is more being written on the subject in our home papers; there is increased inquiry through the mails; and last, whatever work is being done is watched with a closeness which testifies popular interest. Half the farmers who cross the College ditch now being dug are watching the result almost as closely as we are.

The reasons for this increased interest are apparent. With the increase of canals and the extension of the irrigated area, a larger part of the lower bottoms along the streams, and the depressions elsewhere, are each season flooded by the surplus surface water from irrigation and the seepage waters beneath. With each succeeding summer the boundaries of sloughs have been extended, the cat-tails have grown higher, and the

musical mosquito more numerous and aggressive. The railroad from Ft. Collins to Greeley passes through what was formally some of the most valuable lands of this district; but the traveler who now makes the journey between the two towns in the irrigating season, rides along part of the way through a sea of rushes and flooded meadows, the area of which every season becomes larger. The same results are manifest on all the older settled irrigation districts, and I look within the next five years to see a general effort made to stop this action, and that within that time a large percentage of our wet lands will have been drained, either by open ditches or covered tile.

In talking to you about the latter, I do not intend to go over the ground of specifying the advantages of under-draining. The subject has been worn smooth already, and I take it for granted that the benefits are pretty well understood and appreciated. There is, however, one claim of superiority of tile drains over open ditches, which has a peculiar interest and importance to us, and which it may be well to consider. In our sloughs and swamps it is not the surplus water alone which prevents the growth of crops. The evaporating water soon deposits an excess of alkalies. It is claimed that by under-draining these soluable alkalies will be carried downward into the drains and removed. That however great the quantity where the drains are put in, it can be removed by flooding, and that the action of the drain thereafter is such as to permit their again accumulating. I have had no personal experience in this matter, but have had some correspondence with parties in California, who have either tried it or know of its being tried, and the reports are uniformly favorable. I have also been informed that an experiment was made to test this on the Big Thompson with beneficial results.

If, then, we are agreed as to the necessity of drainage and as to the efficacy of under-drains, the next question is as to the cost; as to whether it is cheaper to abandon the injured lands for the present, or to reclaim them by this means. Every consideration affecting the public welfare is certainly in favor of the latter course.

Every marsh or slough is a blot on the landscape, a reproach to our agricultural methods and a menace to the general health; and its removal should be as much an exercise of public spirit as a consideration of dollars and cents.

In discussing the cost of under-draining, I only propose covering a limited field, leaving out of consideration the drainage of our productive fields. The cost as yet being prohibitive against that, I only intend to consider the reclamation of the waste places. We must begin with those, and here again I must make some preliminary statements. In the practice of under-drainage in other sections of the country, where the water to be removed comes from rain-fall and is equally distributed over the surface, it is necessary that the drains should be placed very much in the same fashion under the surface. This is usually accomplished by having a main outlet into which empty a regular system of parallel tributary drains, the angle at which they enter the main drain depending on the character of the ground, but should always be less than ninety degrees. The distance apart of the tributary drains varies from twenty to four hundred feet, being the extremes for clay and sandy soil, respectively. With us the conditions are somewhat different. The majority of our marshes and sloughs have well defined sources of supply, which if tapped and an outlet provided, will obviate the difficulty. These sources of supply may be seepage water from ditches or points of overflow from irrigated fields. All that is required for their drainage being an adequate

main outlet following approximately the lowest ground, with tributary ditches to tap the main source of supply. In many cases the outlet alone is sufficient for the reclamation of large areas. It is not necessary, therefore, for me to discuss systems of drainage, because circumstances cause so wide a variation in the practice in each case.

The digging of ditches for tile drains is an art in itself, and an experienced workman provided with proper tools can make surprising progress. The tools consist of a spade eighteen inches long and six inches wide, with a curved point that takes out the spit or last shovel full at the bottom, without permitting the earth to fall off. The bottom of the trench is finished with a tile scoop or bottomer, which plains off the bottom by being drawn toward the workman as he stands on the last spit sixteen or eighteen inches above the bottom of the ditch. Usually the cost of digging the trenches for tile less than eight inches in diameter is regulated by the depth, the amount of work for all sizes less than that being about the same. Tile in this locality should be placed at least three feet below the surface to escape the destructive action of frosts. For this depth in Indiana or Illinois the price at present is twenty-five cents per rod, or about one and one-half cents per running foot. The cost here would be somewhat greater. We are paying twenty cents per cubic yard for the excavation of the College drain, which is about equivalent to two and one-fourth cents per foot for a trench for a six-inch tile drain. The principal material in use for under-drains has heretofore been clay tile. There is only one factory in this State which manufactures these. They have kindly sent me a price list for car load lots which I quote:

GOLDEN, COLO., November 20, 1887.

MR. ELWOOD MEAD, Fort Collins:

*Dear Sir*—We have your letter of the fourteenth in regard to drain tile. Enclosed please find price list of sewer pipe. On sewer pipe we would deduct forty per cent. from enclosed list per car load on sizes from three to nine inches, f. o. b. at Golden.

On drain tile f. o. b., Golden, car load net prices:

| | |
|---|---|
| 3-inch per 1,000 feet . . . . . | $ 30 00 |
| 4-inch per 1,000 feet . . . . . | 45 00 |
| 5-inch per 1,000 feet . . . . . | 60 00 |
| 6-inch per 1,000 feet . . . . . | 70 00 |
| 8-inch per 1,000 feet . . . . . | 100 00 |
| 9-inch per 1,000 feet . . . . . | 125 00 |
| 10-inch per 1,000 feet . . . . . | 150 00 |

Yours truly,

CAMBRIA TILE AND BRICK CO.
*Per* HODGES.

For a six-inch tile under-drain the cost per thousand feet would be about as follows: Digging and filling the trench, $35.00; tile, $75.00; total, $110.00; or, $580.80 per mile, for ten-inch tile. The cost for digging and re-filling the trench would be about $50.00 per thousand feet, which, added to the cost of the tile, would make the cost per thousand feet, $200.

There is one serious objection to the use of clay tile for under-drains, this is the danger from disintegration being caused by the alkaline water. With tile thoroughly burned, and laid deep enough to not be subjected to heavy frost, little danger need be anticipated. The danger would come from a half-burned tile slipping in. There is an excellent substitute, however, from which nothing of the kind need be feared. I refer to cement tile. There is a company in Denver engaged in its manufacture, and which offers it in all sizes, the same as clay tile. They have also a process by which the tile can be manufactured and laid in the trench as a continuous

pipe. They sell farm rights for the manufacture of this. I am not informed what is the charge for the royalty. The cost of their cement tile is almost double that of ordinary clay tile, four-inch pipe selling for fifteen cents per foot. The continuous pipe is extensively used in California for sub-irrigation, and bears an excellent reputation.

A company in Omaha also make a cement tile by hydraulic pressure. Wishing to know something of the cost of this, I wrote to the company recently enclosing a list of questions to be answered, and will read the questions and replies.

*First*—Give cost of machine?

"We place machine on the royalty plan."

*Second*—Number of feet of tile to be made in one day with it?

"Fifteen hundred to two thousand feet per day."

*Third*—Number of men required to work machine?

"One man and three boys."

*Fourth*—Average cost of four-inch tile per thousand feet, in Omaha?

"We do not make tile. Cost depends on price of Portland cement and sand."

*Fifth*—Any additional facts concerning the making of the tile, which your time will permit?

"We will say that the outside cost of four-inch tile will not exceed clay tile, and the larger sizes run from fifteen to fifty per cent. lower in cost. Cement tile is rapidly coming to the front for irrigation. Its porosity admits of its use for this purpose as well as drainage."

ELWOOD MEAD, ESQ., *Fort Collins, Colo.*

DEAR SIR:—In addition to the answer to the enclosed inquiry, I will say that by our process of packing we

use one-tenth cement and nine-tenths sand. My partner is now in California closing a contract for that State to use our machines; we do not sell our machines. This tile is used in California for under-ground irrigation. It is only a question of a very short time when surface irrigation will be a thing of the past. The tile is now made in California by hand, and I understand that an expert can make 200 feet per day. While we make a claim of 2,500 feet per day for our machine. If you think favorable of cement tile, and also think a stock company could be organized to operate in your State on favorable terms, I will be pleased to consider the advisability of investigating it, and will confer with Mr. A. R. Souer, president, on his return from California. Any further information that I can furnish you will give pleasure.

Yours Truly,

JEFF. W. BEDFORD, *Secretary.*

The grade of under-drains may be made as small as 3 feet per mile, and yet achieve good results. The size, of course, will vary with the inclination and the area to be drained.

I give below a table prepared for the portion of the eastern states, and is so arranged that no water will stand on the ground 30 hours after two inches of rainfall.

TABLE.

| INCLINATION OF DITCH. | 4″ tile. | 5″ tile. | 6″ tile. | 7″ tile. | 8″ tile. | 9″ tile. | 10″ tile. | 12″ tile. |
|---|---|---|---|---|---|---|---|---|
| 1 foot in 100 | 22 | 38 | 35 | 85 | 120 | 170 | 250 | 360 |
| 1 foot in 200 | 19 | 30 | 37 | 65 | 85 | 130 | 165 | 285 |
| 1 foot in 300 | 15 | 25 | 34 | 55 | 72 | 110 | 135 | 235 |
| 1 foot in 500 | 11 | 20 | 27 | 45 | 58 | 90 | 110 | 195 |
| 1 foot in 1000 | 8 | 14 | 20 | 30 | 42 | 64 | 80 | 140 |
| 1 foot in 2000 | 6 | 10 | 16 | 20 | 34 | 45 | 60 | 110 |

Allow me to say, in conclusion, that no work or improvement in which you can engage will add more to

the appearance of our farms than the removal of all surplus moisture. Nothing will do more to impress strangers favorably with our country than to have pointed out to them the fact that we have no waste lands. Every farmer who drains a slough not only rids himself of a nuisance, but places his neighbors under obligations to him by his exercise of public spirit.

PROF. MEAD, in answer to a question, said that boards might be substituted for tile; they are practically indestructible in water.

PROF. BLOUNT followed with a paper on "Desirable Grasses for Colorado." We did not get this paper for publication.

MRS. TAYLOR, of Loveland, next read a well-written paper entitled:

## Ethics of Horticulture.

A few moments application to the definition of this term has developed the idea that the science of the laws which govern our actions as moral agents, in so far as it relates to the culture of the garden, is a topic of which a mind enveloped in the intricacies of household duties in mid-winter can form but a few crude thoughts, although its general principles may be deeply imbedded in the mind.

However, we may find an opening thought in the words of Charles Dudley Warner, who thus reflects upon the affinity existing between man and the soil: "The love of dirt is among the earliest of passions, as it is the latest. Mud pies gratify one of our first and best instincts. So long as we are dirty we are pure. Broad acres are a patent of nobility; and no man but

feels more of a man in the world if he can have a bit of ground that he can call his own. However small it is on the surface, it is four thousand miles deep, and that is very handsome property."

Hence, we see that to the young mind, more especially, the culture of the earth, the digging and delving, the turning and sifting, consequent upon the arrangement and planting of our first garden, brings the mind in such affectionate familiarity with its particles, that we imbibe, with the free air overlaying its surface, a love of the whole face of the earth, which develops the grand instincts of love of country and of home, the patriotism which calls men from their pursuits and pleasures of home to lay down their lives, if need be, for its preservation.

The operation of controlling and cultivating a portion of the earth, ordinarily leads to the closer binding of the ties of brotherhood between men, as their interests must lie as closely together as the pinch of dust on this side of the government line which defines the limits of each, is to the other pinch on that, and still their independence and individuality must remain as intact as the molecules of the universe, which yet move in unison.

Comparing the occupation of horticulture to other pursuits, one is forced to admit that the thoughts are brought in contact with the limitless expanse and beauties of nature, more than when bending over the ledger in the sordid air of the banking room, calculating with a precision worthy of a better cause, the exact per cent. to be derived from other men's labor; more than when measuring and weighing to needy mankind the fruits of other men's efforts and inventions, sometimes with a leaning toward horticulture which leads to too great an intimacy between white sand and the sugar barrel; more than when placing the firm foundation

and lofty pinnacle of the city's pride and the capitalist's satisfaction; more, also, than when bending over the tubful of family wearing apparel, studying the complex conformations of the human knuckles to the alternating elevations and depressions of that instrument of feminine torture—the wash-board, and anon inhaling the mingled oders of alkali and salsoda; and even more than guiding the mind of the juvenile over alphabetical shoals, mathematical quicksands and up rhetorical steps, to the eminence from which he views the world with unveiled eyes.

From all these callings, filling the niches of the structure of earthly occupation, mankind turns to find health and happiness in close communion with mother earth, coaxing from her elements the only products which can wholly sustain and appease the physical demands, and can the nearest succeed in satisfying the love of the good, the true and the beautiful.

We can readily imagine that the purest thoughts, the highest aspiration, the brightest hope, comes from the soul whose earthly tenement is sustained by the finest quality of food and most wholesome exertion, and such are the results of horticultural effort and application.

Mark, if you please, the similarity of methods with which the conscientious gardener trains his choicest vine and his precious child! How he selects for the one the richest soil and sunniest exposure, and for the other the happy surroundings and warm love of home; to the one he gives loose, open culture, calling forth all the latent powers of growth and development possessed, and to the other the opportunities of study and observation, encouraging the natural ability to discover and judge for himself; when the vine sends out its slender branches and sensitive tendrils, he directs and controls, nipping out those tending to go wholly astray, ere their size and

strength has robbed the main stalk of its vigor, meantime providing the proper support; and at the same time guides and restrains the strengthening will of the child, that it may not expend its force in wrong directions, nipping out the bad habits at their first budding, and placing in his way the principles and objects in life to which he should cling and with which he may entwine his capabilities till they become as inseparable as the vine and its wire trellis.

Every man's work is the index to his life and character, if we can but read it aright. We sometimes see a door-yard embellished with many elegant specimens of man's handiwork and ingenuity, but it does not embody his ideas, his thoughts or his labor. They are the product of another's labor, bought and paid for with wealth which may not have cost him an effort.

But if you see the home built and adorned by the hands of its owner, though it may be long in reaching its completion, it shows in its details the ambition, education, taste, perseverence and love of its founder and executor.

The convenience and stability of the dwelling, showing that the wife, too, has had her "say" in its construction, will indicate respect for the wishes and judgment of others; the comfortable apartments for employés assure us that he will "render unto Cæsar the things that are Cæsar's;" the selection and setting of tree, shrub and vine confirm the opinion that utility and good appearances may be combined, and the irregular posey-bed in the fence-corner shows that even the tiny daughter of the house has been gratified in her desire for a garden too, where dainty bachelor-buttons, tall hollyhocks and brazen marigolds rear their plebian heads, every one of which is a delight to her happy heart. Back of the row of bee-hives we may see the

bed of vegetables, the care and concern of the shy young son, where he spends his leisure hours in communion with each thriving plant, sorrowing in their downfall and rejoicing in their growth.

Do the reckless, desperate characters which we see bringing ruin and desolation to themselves and their dear ones come out from such houses as these? Does the young man or woman willingly leave these firesides to find more congenial homes and occupations in the great cities? There is hard labor, there is disappointment, trial and grief in this rural life, but there is also affection, satisfaction heartfelt and pure, which throws the balance in favor of the work that is near to nature's heart.

At the opening of the evening session of the last day of the meeting the retiring president, MR. FAUROT, was presented with a valuable clock, as a token of esteem on part of the members of the society, for valuable services rendered since its organization.

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MR. MCCLELLAND, of Fort Collins, read a timely paper on "Needed Legislation." It was discussed in a spirited manner.

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## Needed Legislation.

It has been very forcibly said that the best thing after knowing a thing, is to know where to find it. So in the effort to procure legislation it is of the first importance to know where to find your legislators. If you expect such legislation as is needed to foster and protect the just interests of the horticulturists without making any effort in that direction, you are doomed to disappointment. We cannot even blame our law makers for not

giving us what we do not ask for. When nine cases out of ten the simple asking is not enough to secure what we need and what we are entitled to. Do not for a moment think that because our wants are few, and our cause is just, that a mere asking is enough to secure that to which we are entitled.

We must be alive, we must be active, we must be aggressive to succeed. Attend the caucuses of your party and see that mere politicians are not nominated for legislative positions, but that true friends of the horticulturist, the farmer and the toiler are. Should you be defeated, and an enemy to our interests succeed, do not support him, but have the courage, if your convictions are right, and help elect a man who will honestly and ably represent you. There is, there can be, no excuse for voting for corrupt men, or those who neither represent your interests nor principles.

First of all, it is necessary for a voter to know what he wants, and then have the courage to see that he gets it. Just as long as you can be wheedled, bluffed or coaxed into the support of improper candidates because they are on a certain ticket, or for any other reason, just so long will you be misrepresented in our legislative body.

Did you ever know a man who was elected by a corporation influence to vote for what the people wanted? I guess not. But you have all known many who were chosen to represent the people, who went over, bag and baggage, to the monopolists. Why is this? Well, the power of money is great, it is true, but corporate monopolies watch their servants very closely, stay by them, work with them, and are always by when an important vote is to be taken.

"Eternal vigilance is the price of 'proper legislation' as well as of liberty." Corporations generally hold to

the view that it is cheaper to have one of their men nominated and elected, than to depend upon buying him after he is elected. Then they go systematically to work to get their men nominated on both tickets if possible, where the result is likely to be close. Whether he be Republican, Democrat or what not, they do not care. They work for a purpose, and do not let sentiment stand in their way. When stockmen, merchants, brokers or lawyers desire special legislation, do they select candidates from among their own class or from amongst those whose interests are opposed to theirs? A mere statement of the question is its best answer. So it should be with the horticulturist. We ask nothing but what is right and just, and we should, aye, we *must*, support no man who will not give it to us. Monopoly has no greater foe than the true horticulturist.

While other toilers are claiming that eight and nine hours shall be the limit of a day's toil, the enthusiastic and zealous horticulturist labors from twelve to sixteen hours a day, and then lies awake a great portion of the night while his busy brain is planning how to secure large or better wealth, how best to avoid the latest failure of some of his most cherished plants, or, perchance, how to overcome some new insect enemy.

After spending all this labor and anxiety, and thousands of dollars in money, in his experiments to find what fruits and vegetables are best suited to our peculiar soil and climate under irrigation, he gives the knowledge thus laboriously, patiently and expensively obtained, freely to the public, without fee or hope of reward.

Each year we hold one or more meetings, to which the public are cordially invited, at which all who are successful in any line of effort are asked to come before the society with a carefully prepared article, giving the whys and wherefores of their success.

Not only this; but after reading their well digested essays, they are placed upon the witness stand, and any who wish can ask them questions concerning this special line of effort, thus obtaining that knowledge which, perchance, has cost the experimenter many years of labor and large expenditures of money.

Their dearly bought facts are freely given to the public, and the experimenters pay most of the cost of these meetings, as well as their personal expenses in attending them. This is true of no other line of business with which I am acquainted. Taking these things into consideration, it is not strange that the first legislation I would ask is the restoration of the appropriation of $1,000 a year by the State, to aid experiments in horticulture and in disseminating this knowledge among the people of the State.

Next should be an attempt toward the extinction of monopolies. The appropriation should not be again granted, coupled with the condition that the society to which it be entrusted would be compelled to hold its meetings in any one of the many towns of the State, but should be left free to hold them at any point where they would do the most good.

All laws favoring monopolies of every kind, be it railroads, ditches, or what nots, should be repealed. We have no more sympathy with monopoly than its twin vice—anarchy.

The Goulds and the Vanderbilts, with their gigantic schemes of plunder, are almost as great enemies to society as the Spies' and the Parsons'. The former are sapping the very life of the republic, corrupting our legislative bodies and driving the poor to desperation, while the latter plan murder and destruction to test a hair-brained scheme devised for the purpose of escaping from all Governmental control and making their own

sweet will, whether it be for good or evil, without regard for the rights of others.

The horticulturist has sympathy with neither class. The terrible ravages of insect enemies reminds us that we shall have to take additional means for fighting them. We cannot intelligently do this unless properly directed by experience and science. We should have a State Entomologist who will make a study of these great foes of horticulture, and teach us how best to wage a relentless war upon them. All the insect foes of the Eastern States are marching upon us.

The advance guard is already here, and when the main body arrives, if we do not know some means of fighting them, as we do of our native foes, we shall be overwhelmed. Each horticulturist cannot devote time from his daily toil for a study of this all-important subject, even if he was qualified to do it. So you will see the absolute necessity of having a competent entomologist employed by the State. It is a matter of most vital importance. A proper enabling act should be passed by the legislature to enable us to have one good society organized for the entire State, which should include all branches of horticulture, which would act as a parent society to all like societies in the State, instead of a rival as at present.

This parent society, then, might build up horticulture instead of tearing it down. With such a society, with practical fruit growers and gardeners at the head of it, a real advance could be made. Our irrigation laws sadly need revision. Ditch companies do not appropriate water, and are but common carriers, and the waters of our streams should not be divided among them, but among the users, the people, as contemplated by our Constitution. Reservoirs should be established

by the State or National Government (and not by corporations), so as to conserve the waters of our streams. With a proper system of reservoirs, we should always have an abundance of water for all the irrigable lands of the State.

Stealing, or maliciously destroying either fruit or vegetables should be meted out as severe punishment as is administered to offenders against other species of property. There is no good reason why theft from horticulture is not as serious an offense as from a merchant or dealer. Stealing apples, or destroying a melon patch is as serious an offense as the pilfering of a till, or the smashing of a window, and should be punished accordingly.

The present outrageously, unjust attachment law, by which a creditor can, on a note, or even book account, tie up a debtor's property and ruin his business, should be wiped off our statute books. This law works great hardships to the enthusiastic experimenter in horticulture, who, in his enthusiasm for his specialty, frequently gets himself in financial straits. Debtors should have some rights, even in Colorado. Let us remove from our statute books all laws which have a tendency to make the rich richer and the poor poorer.

Is there no escape from railroad extortion? Must we always submit to the outrageously unjust descrimination and tyranny of these gigantic corporations? Although rates are not as high as formerly, they are more unjust than ever. Recently, I had some freight brought up from Louisville, 20 miles this side of Denver, which cost me ten dollars, and an equal amount of similar goods brought from Denver which cost me twenty-five cents, and the latter was too high. What excuse can be given for such injustice? Or still, for charging from four to forty times as much for carrying freight *to* Denver, as

for bringing it *from* there? What right have these corporations, then, to descriminate in favor of some towns and against others? Or, what excuse, possibly, can representatives of the legislature from sections thus wickedly descriminated against, have for voting against compelling such companies to deal justly with their people? The people should mark such representatives, as well as such corporations, and see that the former men do not misrepresent them again.

Freight and passage rates are still too high, and will never be properly reduced, nor this gross descrimination stopped until compelled to do so by law. You and I are responsible for this extortion and injustice just as long as we continue to vote for legislators who permit it. The present extortionate express rates should be reduced about two-thirds. So long as California fruits can be shipped even a thousand miles almost as cheaply as our fruit for fifty miles, to our home market, just so long will our profits be unjustly curtailed, and our markets be occupied by parties who have no interest—and pay no taxes in our State. The express companies should be compelled to furnish properly ventilated cars, instead of the little, dirty, close boxes in which we now have to ship our perishable fruits. We, who are compelled to pay such extortionate rates are as much entitled to properly constructed cars and fair treatment as our California competitors, who are charged such low rates. Our only hope of relief is through a wise State law. Horticulturists, as a class, are honest, sober, industrious, God-fearing people, and believe in doing what they can to benefit their neighbors and make the world better for their having lived in it. They are a busy, active class, and have no more sympathy for the idler who struts the street in dudeish clothes, dandling his cane, and expecting to make his living by his wits, or in gambling in stocks, or at the gaming table, than they

have for his counterpart, the idle and worthless tramp, who, too lazy to work, traverses the length and breadth of our country, begging of our industrious people the wherewithall for his subsistance.

Believing that the manufacture and sale of strong drink retards the well being of society, and causes additional crime and destitution, we should like to see laws enacted which would curtail or prohibit this monstrous evil of the age.

Horticulture has been defined as "intense agriculture." All laws which affect the agriculturist, but not always in a like degree, the horticulturist. I have thus hastily sketched some little of the legislation we need, nearly all of which affects both classes, but have endeavored to speak most of those interests we are most interested in. The points which I have ommitted can be brought up at the close of this paper by those who are more familiar with the subject than myself. I did not intend at the beginning to be considered exhaustive, but rather suggestive, or to make mention of some of our wants which occurred to me.

In conclusion, however, let me conjure you to discuss these matters, here and elsewhere, in a candid manner, to the end that, for these laws upon which we are united, we may present a solid front, and if we take early and prompt action in securing the nomination and election of proper men, we may look forward confidently to securing the legislation we need. Let us banish bickering and personal animosities amongst ourselves, and press onward with determination and vigor for what we desire. Asking nothing but what is upright and just and proper, we should be able to attain it. Remember, next fall all of the Representatives in the Legislature and half of our Senators have to be elected, and then you will appreciate the necessity and importance,

as well as the timeliness, of the matter I have thus briefly and hastily brought to your attention.

MR. MCCLELLAND moved that a committee, consisting of two members, be appointed from this society, to act with a similar committee from the State society, to deal with necessary legislation in the interest of horticulture. Carried.

Committee: J. S. MCCLELLAND and DAVID BROTHERS.

PROFESSOR O'BRIEN, of the Agricultural College, then read a paper, as follows:

*Mr. President, Ladies and Gentlemen:*

Your secretary has given me the subject of "Horticultural Chemistry." In order to understand horticultural chemistry we must know something about the formation and composition of the soil and of the plants that grow upon the soil. Here we must call to our aid the geologist, the botanist and the chemist. The geologist questions nature, and reasoning from the geological changes that are taking place about him now, he judges of the causes that have produced like effects in past geological ages. Although these causes, in most instances, operate with extreme slowness, you must remember, in the language of Lyell, "Past time is the cheapest thing the geologist has." The causes thus far known are atmospheric causes, chemical action, organic agency, aqueous, aqueo-glacial and igneous action. To explain these would take more of your time than would be profitable on this occasion. Therefore, only the broadest generalities can be hinted at.

Of the atmospheric causes, the effect of oxygen stands pre-eminent. Here it is the great geological agent, because it is the great chemical agent, and these geological changes are chemical changes. The rocks

that contain iron are changed from the proto to the sesqui oxide, thereby increasing their volume and consequently chipping off pieces, and is the cause of the rapid disintegration of many kinds of granite. Also in the rocks that contain sulphide of iron ($Fes_2$) in contact with moisture and the oxygen of the air, the sulphur is changed into sulphuric acid that is soluble and dissolves off; but this is not all, for this sulphuric acid is capable of dissolving limestone and the feldspar of the granite. You can see that it only requires time, that bleak and narrow isthmus between two eternities, to accomplish great changes in this respect. Carbonic anhydride ($Co_2$) is another constituent of the atmosphere which operates as a decomposing agent. The $Co_2$ forms with the limestone a bi-carbonate of lime that is soluble. This is the reason why caves are confined to the limestone formations. In the feldspar the lime is first removed then the potash (K) and soda (Na) as carbonates. There are many other agents, notably the moisture, variations in temperature, winds, mechanical action of rain. It is from a combination of these atmospheric causes that a large part of the sediment is formed which rivers carry away. And when cohesion is not entirely overcome, it is so far weakened that other causes are much more effectual than they would have been.

One of the most important is chemical action, all those changes in which the action is molecular, that is between the molecules as such, and not between the atoms. Under the control of these molecular forces the crystalline rocks have taken their form. The most prominent are divisional planes that give a slaty structure, the concretionary formations that are so abundant in Fossil creek. It is thought by many that mineral veins are caused by its action.

The effects of all organic causes in producing geological changes are inconsiderable, compared with

those of inorganic causes, with the exception of the coral formation, the most important of these effects, and the most produced by human agency. We find examples of this agency in the distribution of animals and plants beyond the region where they are indigineous; in the increased number of certain species, and in the diminution, if not extinction, of others; in the modification of climate, dependent on the destruction of the forests and the cultivation of the soil; in controlling the course of rivers; in arresting, by embankments, the encroachments of the sea; in breaking up and changing the place of great quantities of rock by mining and engineering operations; and in the increased quantity of sediment furnished to streams by cultivating the surface, and thus preventing the protecting influences which the matted roots of trees and the smaller vegetables would otherwise have. Such effects, though attributed mainly to man, are produced, in some degree, by all other animals. The records of the climate of each geological period, of the physical geography, of the vegetable productions, and of the animal forms by which the earth was peopled, consist in the remains of the living beings of these several periods, imbedded in the contemporaneous rock formations. The vast extent of the coal beds and the coral formation attest its importance, and we might include in this a great deal of the limestone formation.

*Aqueous Causes.*—Almost all of the minerals which occur in the geological formations are, to some slight extent, soluble in water. The leading facts in connection with aqueous causes are, (1) furnishing of sediment, (2) transportation of sediment, (3) deposition of sediment, and the character of the formation thus produced, the details and figures of which would be out of place in this paper.

Water has been an important geological agent in the past, and it has lost none of its usefulness in the present. Then as now, it is the common carrier of creation. It dissolves the elements of the soil, and climbing as sap up through the delicate capillary tubes of the plant, furnishes the leaf with the material of its growth. It washes down the mountain side, levelling its lofty summits, and bearing mineral matter to fertilize the valleys beneath. It passes through the arid sands, and the desert, forthwith, buds and blossoms as a rose.

Taking it aside from its geological agency, it limits the bounds of fertility, decides the founding of cities, and directs the flow of trade and wealth.

The action of glaciers and icebergs is quite important. (Gulf-stream).* Also the action of internal heat in producing volcanos, and the geological phenomina referable to volcanos, the elevation of mountains and continents is of vast importance.

To recapitulate, then, omiting the causes and stating the facts: All soils, (with the trifling exception of a thin stratum of vegetable mould which covers the ground in certain localities), are formed from the disintegration of rocks. Sometimes the sods are formed in *situ*, and therefore rests on its parent rock, while at other times it is removed as fast as formed, and deposited at a distance more or less remote from the parent rock. In the first case it is often easy to trace every stage of gradation between perfect rock and perfect soil. On examining such a section, we find near the surface perfect soil, and this passing by imperfect gradations into rotten rock and finally into perfect rock.

In the case of drift, where the soil has been transported by the action of water or ice, the soil bears no

* Here the influence of the Gulf-stream on the climate was explained.

relation to the underlying rock. The depth to which the soil will accumulate will depend upon many causes.

*First*—Transported soil may be deeper than soil formed *in situ*.

*Second*—Upon the nature of the rock and the rapidity of the decomposition, if this decomposition is taking place quite slowly it may be carried off mechanically by the wind or other elements as fast as formed, or leaving but a slight excess.

*Third*—Upon the slope of the ground, the deepest soil being at the base of the hill; and last but not least, upon the climate, the dry being unfavorable to the formation while the wet being more productive.

The next question is: What is a soil? A soil is finely divided mineral matter, mixed with more or less decomposed organic matter; the excess of the mineral matter gives it its name—if an excess of silica, a sandy soil; if an excess of alumina, a clay soil.

It is thought by geologists that as soon as the earth appeared above the water, the soil commenced to form. The large quantities of coal that you have in your State is but a remnant of a flora that once covered our earth.* Plants preceeded animals. We find the algae in the Archæn time, and the first animal life in the Silurian. How did the soils form? Here we must trespass again upon the geologist, and pursuing his reasoning, judge the past by the present. If we take the island in mid-ocean that has been raised by volcanic action, and we examine the streams of lava that have flowed down from its summit, in a few years the melted mass cools and the surface disintegrates by the action of the elements, and in time is covered by lichen that leave hardly a stain

* Here the formation of the coal was explained.

behind them, but by their decay a soil is prepared that will in time support herbaceous plants, and finally shrubs.*

If there is any one thing more than another impressed upon our minds by the course of the geological history, it is, that the same laws and conditions of nature now apparent to us have existed throughout the whole time, though the operations of some of these laws may now be less conspicuous than in the earlier ages, from some of the conditions having come to a settlement and a close. The seas ebbed and flowed, the winds disturbed their surfaces, and even the fall of the wind-slated rain is shown upon its rocky pages to-day, and it is reasonable to suppose that the seed, that emblem of man's immortality, though buried in the soil of a carboniferous age, spurned the clods of the valley and climbed to a soul in grass and in flower. The important part of the soil is the humus or vegetable matter that is formed by the decay of successive generations of plants and trees. The falling leaves, seeds and stems of vegetation do not in general waste away as fast as they are formed, but accumulates upon the surface. Here it might be well to notice the office of the leaves, for the decayed leaves constitute a great part of this mould. The leaves are the representative of the lungs of the plant, in the presence of sunlight the chlorophil of the leaf decomposes the carbonic anlydride ($CO_2$) of the air, takes to itself the carbon (C) to build up its woody tissues, and liberating the oxygen (O). But the leaves have another office, a cesspool office, if you please, that rids the parent tree of the refuse that is not required for its use, and after performing their office they fall to the ground. In most instances, every year. In the language of the poet:

"The forest has been rifled by the gusty thieves,
And the book of nature is getting short of leaves."

* Here the development of plant life was explained.

By the decomposition of this vegetable mould, a number of organic acids are formed that assist in the disintegration of the rocks and the formation of soil.

We can now examine the growth of the plant, and the office performed by the several parts, here we must call to our assistance the aid of the botanist.

From the air plants get carbonic anhydride ($CO_2$) that is utilized by the leaves as before described. The nitrogen and water with the soluble salts come from the earth. In the case of nitrogen, its salts are taken up by the roots, although (N) and its compounds have been formed in the air.

It is not by any means a decided question how the nitrogen is obtained, a *small* part from the air, and the bulk of it from the soil. It is thought to come from the ammonia ($NH_3$) and the nitrates. The chemist estimates the nitrogen as "albuminoids." I have selected a few cases of analysis of albuminoids.

Apples, 22 to 52 per cent.
Winter Wheat, 13 "
Cabbage, 1.5 "
Beans, 25.5 "
Carrot Root, 1.5 "

It is commonly estimated that one-sixth of the albuminoids is nitrogen, which leaves the actual amount very small. The nitrogen in a crop of 28 bushels of wheat and 1.5 tons of straw, is about 45⅓ pounds. In 2.5 tons of meadow hay it is 56 pounds. In the same amount of clover hay, 108 pounds, quantities that can not be furnished by the atmosphere, but must come from the soluble salts. The estimated amount of nitrogen supplied by the atmosphere, has been estimated at one pound per month, being greater in summer, and less in winter, with a range during the year of from two to 20 pounds. Nitrogen is a necessary food for the plant

being found in the chlorophyll of the leaf to about five per cent.

The seed is properly placed in the ground with a temperature from 15°c to 30°c (or between the limits 0°c to 50°c.) The starch is thought to be changed to soluble starch or sugar, this nourishes the germ, and leaves and roots come forth. I may be permitted to state a few facts about leaves and roots. An average size leaf of *Helianthus Annus* contains about 13,000,000 minute openings (stomata) on the under side of their leaves.

The green coloring matter, chlorophyll, decomposes the carbonic anhydride ($CO_2$), liberating the oxygen and and taking to itself the corbon. The chlorophyll exists in two forms: chlorophyll pigment and chlorophyll granules; this is supposed to be differentiated protoplosm. It is a disputed question if leaves can absorb water, while the transpiration is from one-third to one-sixth of the ordinary evaporation, when similarly exposed, the quantity being from one to five times greater for the upper than the under surface of the leaf.

A fruit tree absorbs, transports through the stem and transpires from the leaves one hundred quarts daily. Sachs has shown that the physical properties of the soil influences transpiration. The transpiration is more uniform from the foliage of the plants grown in clay than from plants grown in sand. The former soil is much more retentive of moisture, and thus the supply of hygroscopic water is given up more gradually to the roots of the plants. Senebier, in 1800, and Sachs, in 1859, have shown that the chemical properties of the soil effects transpiration to a certain extent; a little free acid in water hastens, while an alkali retards transpiration. Light, changes of temperature, age, (explain).*

*Here the action of light, temperature, etc., on the plant were explained

The effects of transpiration upon the plant: (1) it transfers dilute solutions of mineral matters to the cells where assimilation or the production of organic matters takes place; (2) the concentration of these dilute solutions by evaporation.

A few plants have sensitive leaves as the *mimousa pudica* (sensitive plant). The weight of the *ash* of the leaf increases from May to September, its weight becoming in most instances double.

The roots serve a double purpose as mechanical supports and as organs to absorb the nourishment from the soil, of which water is by far the largest part. It has been thought by some that plants have the power to decompose water into its elements H and O, and that they may enter into direct combination with the carbon to form starch, sugar, cellulose, etc. Here is when the botanist has to confess his ignorance, but he can say with Tennyson, "It is better to have loved and lost, than never to have loved at all." There is an office which we do not know that water performs. It dissolves the mineral and other matters near the roots so as to be accessible to the plant. It is the medium of all the circulation in the plant, and the force by which it is absorbed directly influences the enlargement of the cells, and, in a great measure, the direction of their expansion.

The part of the root that does the absorbing is called the *root-hairs*, and the number of these depends largely upon the amount of moisture to which they are exposed. The number of hairs to the square inch is 10,625, on the root of (zea mais), Indian corn. It has been found that the whole root system, in a vigorous stalk of barley, is not far from forty yards in length, and all this can be packed in a small volume of fine soil (about $\frac{1}{40}$ of a cubic foot). The roots of many trees extend a great distance,

as in the elm; it has been known to extend its roots one hundred and fifty feet. Darwin has shown in "the formation of vegetable mould through the action of worms," that the common earth worm is a co-laborer with man. By burrowing and tunneling they have exerted a vast influence in changing the physical character of the soil in which they thrive, thus fitting the soil for the easy introduction of the roots. There are certain conditions under which the root-hairs can abstract matters from the soil that are requsite for the plant. (1) A certain temperature, (2) free oxygen, (3) the presence of saline matters in an available form in the soil.

When the leaves and roots have performed their office the plants take water and salts from the soil, and ($CO_2$) from the air, and from these *inorganic* substances *organic* substances are produced generally from some form of carbohydrates. The assimilation of food takes place under the following conditions: (1) Water and carbonic anhydride ($CO_2$) must be furnished in proper amount; (2) rays of light of a certain kind must fall upon the flower; (3) the proper temperature; (4) a small quantity of some compound of potassium; (5) assimilating organs that must contain living chlorophyll or its equivalent. The raw materials, the apparatus, and the products of manufacture (starch, etc.) are known; but the intermediate processes by which chlorophyll granules under the influence of light can cause the dissociation of carbon from the oxygen with which it is combined in $CO_2$, and bring about the synthesis of an organic substance from materials wholly inorganic are not at present known—electrical relation (explain) heat.* Experiments have been instituted to ascertain the different mineral ingredients necessary to the proper growth and development of the plant. When *potassium* is withheld there is little of any *starch* formed even in the chlorophyll-granules.

* The electrical relation of plants in the stages of growth were explained here.

The best form is the chloride KCl, next nitrate $KNO_3$, the sulphate and phosphate are less favorable.

*Calcium* and *Magnesium* are nearly always associated together in nature, but these elements cannot replace each other in the plant. Calcium is an important factor in the formation of the cell wall, as it is always found there, generally as carbonate. It also combines with cellulose and carbohydrats. The development of the seedling is completely checked if calcium is withheld. It is thought by Sachs to serve as a vehicle for sulphuric and phosphoric acid in the absorption of food material, and in fixing the oxalic acid which is poisonous to the plant, thus rendering it harmless.* (Explain sugar-sand).

*Phosphorus* as phosphoric acid is found in the plant, but it is not clear what office it performs. It has been often found associated with soluble albuminoids, and it has been thought to take part in the diffusion of these difficultly diffusible substances.

*Iron* is found in the plant. When it is withheld, the chlorophyll granuels fail to attain complete development, and do not have the characteristic green.

*Chlorine* appears to be necessary to some plants (buckwheat), but not required for others (Indian corn). By experiment made with it, that it is required for the transfer of starch, we can see how chlorine and potasium assist each other in this respect.

*Sulphur as Soluble Sulphates.*—It is thought that the calcium sulphate is decomposed by the oxalic acid, and calcium oxalate is thus formed. The sulphuric acid thus set free is reduced, the sulphur entering into the constitution of the albuminoids. Sulphur is very abundant in the oils of cruciferous and alliaceous plants, as

* Here was explained how sand is formed in maple sugar.

mustard and garlic. *Sodium* cannot wholly replace potastium salts in the plant, though this can be done to a large extent.

The mineral substances are obtained by burning the plant and making an analysis of the *ash.* The amount of ash can vary with the supply of food, being in larger amount when the food is in greater abundance. The following general conclusions can be made from the analysis of the ash:

(1). The lower the plant is in the botanical scale (as moulds), the fewer the elements found in the ash.

(2). Plants which closely resemble each other in structural characters, have substantially the same proportion of ash constituents.

(3). The proportion of the ash constituents in any part of a plant may vary within certain limits; and these limits may differ at different periods of growth.

(4). The proportions may vary widely for different parts of the same plant.

(5). The following elements are thought to be essential to the growth of plants: potassium, calcium, magnesium, phosphorus, iron, sulphur, and probably chlorine. Besides the ordinary ash constituents always present in plants, there are other elements occasionally found in varying quantities.

*Silicium* is abundant in the ash of many grasses. Sachs has reduced the amount of silicic acid in the ash of Indian corn from 18% to .7 without injury to the plant.

*Zinc* has been detected in many plants grown on soil containing it in considerable amounts.

*Aluminium* occurs in traces in many plants, while in species of lycopodium (complanatum) it is present in large amounts.

*Manganese* has been found abundantly in the ash of *trapa natans*, *quercus robur*.

*Cassium* and *rubidium* have been found in the ashes of many plants by the spectroscope.

*Iodine* and *bromine* are found in marine *algæ* (*zostera*) and in minute quantities in plants grown far from the sea.

*Flourine* has been found in the ash of *lycopodium clavatum*.

*Barium*, *Stronteum* and *silver* has been found in the ash of fucus.

*Mercury*, *lead*, *copper*, *cobalt*, *nickel*, *tin*, *thomium*, *slenium*, *titanium* and *boron* have been found in minute traces, as has been detected in some few cases.

I have tried to explain how the soil was formed, how the plants grow, what they require for food, and under what conditions they attain their greatest development. If the farmer knows that every 1,000 pounds of fat animals that he sells off his farm he takes away:

| | Pig. | Ox. | Sheep. | Milk. | Unwashed Wool. |
|---|---|---|---|---|---|
| N . . . . . | 17.57 | 23.18 | 19.60 | 5.25 | 73. |
| $P_2O_5$ . . . . | 6.92 | 16.52 | 11.29 | 2.03 | 1. |
| $K_2O$ . . . . | 1.48 | 1.80 | 1.50 | 1.80 | 40. |
| CaO . . . . | 6.67 | 19.20 | 12.80 | 1.56 | 1. |
| MgO . . . . | .35 | .63 | .50 | .16 | .7 |

Here I would like to add the amount the farmer would take away from his farm by selling 1,000 pounds of small fruits, but the ash has not been worked out, at least I have not been able to find the data:

| Apples. | Pears. | Gooseberries. | Grapes. | Peaches. | (Parts in 1,000.) |
|---|---|---|---|---|---|
| 830 | 840 | 860 | 800 | 850 | . . . . Water |
| 4 | 3 | 4 | 7 | 5 | . . . Albumin |
| 68 | 70 | 70 | 13 | 18 | . Sugar-Glucose |
| 10 | 1 | 15 Citric Acid. | 8 Tartaric Acid. | 7 | . . Malic Acid |
| 52 | 46 | 19 | 31 | 80 | . Pectose & Gum |
| 32 | 37 | 27 | 20 | 34 | . . . Cellulose |
| 4 | 3 | 5 | 4 | 6 | . Mineral Matter |

I am in hopes that in a few years I can tell you more about this *ash*, thanks to the bounty of the General Government in establishing experimental stations. Knowing the analysis of the soil, and also how much of it is removed every year by the crop or stock, it becomes an easy matter to compute how much and what ingredients are to be added to keep the soil in the best condition.

### I.—RED CURRANTS.

(*a*)

| | I. | II. | III. | IV. | V. |
|---|---|---|---|---|---|
| Dry Veg. Matter | 13.76 | 13.61 | 15.72 | 12.95 | 13.86 |
| $H_2O$ at 100° C. | 86.24 | 86.39 | 84.28 | 87.05 | 86.14 |
| Ash in Dry Matter | .45 | .45 | .48 | .41 | .45 |

(*b*)

Ash analysis of the fruit with stems:

| | I. | II. | III. | IV. | V. |
|---|---|---|---|---|---|
| $Fe_2O_3$ | 1.84 | .99 | .95 | 1.20 | .75 |
| $K_2O$ | 54.35 | 56.12 | 54.32 | 47.68 | 59.34 |
| $Na_2O$ | 5.42 | 2.35 | 2.56 | 4.02 | 4.04 |
| MgO | 4.10 | 5.08 | 5.49 | 6.23 | 4.61 |
| CaO | 15.96 | 17.21 | 17.68 | 18.96 | 14.69 |
| $H_3PO_4$ | 18.33 | 18.25 | 19.00 | 21.91 | 16.57 |
| S, Cl, $SiO_2$ | Not determined. | | | | |

### II.—ASPARAGUS.

| | | Stems. | Roots. |
|---|---|---|---|
| (*a*) | Moisture at 100° C. | 5.53 | 4.85 |
| | Dry Matter | 94.47 | 95.15 |
| | N in Dry Matter | 1.98 | 1.48 |
| | Insoluble in Acids | .08 | 3.67 |

One hundred parts crude ash contains:

| | | Stems. | Roots. |
|---|---|---|---|
| (*b*) | $K_2O$ | 42.94 | 56.43 |
| | $Na_2O$ | 3.58 | 5.42 |
| | CaO | 27.18 | 15.48 |
| | MgO | 12.77 | 7.57 |
| | $P_2O_5$ | 12.31 | 15.09 |
| | $Fe_2O_3$ | 1.22 | Not determined. |

III.—ONIONS.

One hundred parts of dry contain:

| | | |
|---|---|---|
| (*a*) | Moisture | 89.200 |
| | Dry Matter | 10.800 |
| | N in Dry Matter | .212 |
| | S in Dry Matter | .048 |
| | Crude Ash Matter | .436 |

One hundred parts ash contain:

| | | |
|---|---|---|
| (*b*) | $K_2O$ | 38.51 |
| | $Na_2O$ | 1.90 |
| | CaO | 8.20 |
| | MgO | 3.65 |
| | $Fe_2O_3$ | .58 |
| | $SiO_2$ | 3.33 |
| | $P_2O_5$ | 15.80 |

441-442 bushels (fifty-two pounds each) of air dry contain:

| | | |
|---|---|---|
| (*c*) | $K_2O$ | 38.51 lbs |
| | $Na_2O$ | 1.90 lbs |
| | MgO | 3.60 lbs |
| | CaO | 8.20 lbs |
| | $Fe_2O_3$ | .58 lbs |
| | $SiO_2$ | 3.33 lbs |
| | $P_2O_5$ | 15.80 lbs |
| | $H_2SO_4$ | 29.81 lbs |
| | N | 48.63 lbs |

IV.—GRAPES.

Ash—$Na_2O$, $SiO_2$, etc., not determined.

| | | Wild Purple Grape. (unfertilized) | Concord Grape. (unfertilized) |
|---|---|---|---|
| (*a*) | $K_2O$ | 52.54 | 67.70 |
| | CaO | 22.93 | 13.39 |
| | MgO | 5.77 | 3.67 |
| | $Fe_2O_3$ | .81 | .47 |
| | $P_2O_5$ | 17.95 | 14.77 |
| | | 100.00 | 100.00 |
| | Sugar | 8.22% | 13.89% |

| | | Wild Purple Grape. (fertilized) | Concord Grape. (fertilized) |
|---|---|---|---|
| (*b*) | $K_2O$ | 66.35 | 69.68 |
| | CaO | 15.08 | 9.84 |
| | MgO | 4.15 | 3.91 |
| | $Fe_2O_3$ | .57 | .54 |
| | $P_2O_5$ | 13.85 | 16.03 |
| | | 100.00 | 100.00 |
| | Sugar | 13.67% | 15.43% |

V.—PEACH.

| | | |
|---|---|---|
| $K_2O$ | 26.01 | 74.46 |
| $P_2O_5$ | 11.37 | 16.02 |
| MgO | 7.58 | 6.29 |
| CaO | 54.52 | 2.64 |
| $Fe_2O_3$ | .52 | .58 |
| | 100.00 | 100.00 |

VI.—STRAWBERRIES.

Ash—4.38%.

Pounds per acre (water free):

| | Plant. | Fruit. |
|---|---|---|
| Organic Matter | 4268.4 | 1053.5 |
| N | 88.5 | 16.0 |
| $SiO_2$, Fe, Mn, Oxides | 43.3 | 5.3 |
| $P_2O_5$ | 35.3 | 5.4 |
| CaO | 102.7 | 7.9 |
| MgO | 16.1 | .7 |
| $K_2O$ | 89.1 | 19.7 |
| $Na_2O$ | 6.4 | .9 |
| Other Substances | 120.9 | 8.8 |

Ash:

| | |
|---|---|
| $K_2O$ | 40.3 |
| $Na_2O$ | 1.8 |
| CaO | 16.7 |
| MgO | 1.5 |
| FeO | 7.8 |
| $P_2O_5$ | 11.1 |
| $SiO_2$ | 3.1 |
| Cl, $CO_2$, $H_2SO_4$ | 17.7 |

COMPARISON ONE TON OF BARN-YARD MANURE AND ONE TON OF STRAWBERRIES.

| | Barn-Yard Manure. | Strawberries. (fruit) |
|---|---|---|
| $K_2O$ | 11 lbs | 39 lbs |
| $P_2O_5$ | 8 lbs | 11 lbs |
| CaO | 16 lbs | 16 lbs |
| N | 12 lbs | 32 lbs |

Farming is a science that few have mastered. A knowledge of botany will enable him to select his grain to a better advantage, and also to regulate the depth of his plowing. A knowledge of medicine will teach him to take better care of his stock, and make him more particular in their selection. A knowledge of chemistry will teach him what crops are best adapted to his soil, and the best order of their rotation. Of all the sciences chemistry stands pre-eminent in importance to the farmer. Looking at the subject from a material point of view alone, chemistry is one of the great agents in the transformation of nature, and its subjugation to the wants of man. The earth yields her treasures to its skilfully conducted processes; the condition of mankind is elevated and the world advanced by its progressive triumphs; agriculture is indebted to its discoveries; it opens to us mines of agricultural wealth in what would otherwise have passed for worthless refuse; it clothes exhausted fields with new fertility by the addition of some failing constituent whose absence its subtle processes have detected; it carefully investigates the laws and conditions of vegetable growth by which earth and air are converted into food for man and beast, and thus places us on the highway of sure and rapid improvement.

The use of manures to restore the exhausted soil is possibly as old as Adam. Theophratus tells us the Greeks used manure, and Columella and Pliny tell us the same story about the Romans. The use of manure

is based upon this fact: that there is nothing destroyed in nature, the elements may be transformed or enter into new combinations, but nothing can be obliterated—what a thought to contemplate!

The hard granite crumbles and moulders into dust. The stout oak takes in the air and solidifies it; takes up the earth by its roots and vitalizes it; changes all this into its own structure; and proudly stands the monarch of the forest. But here again we are taught a lesson of our own mortality, for everything that lives must die. The leaves turn yellow and sere; its branches crumble, and soon it totters, falls and disappears in mother earth from which it came. The elements have been used thousands of times by those that have preceded us, and will be used equally as often by those that are to follow us. In this sense there is nothing common or unclean. Our homes are lighted and heated by the bottled sunlight of some old carboniferous day. Then all honor to modern science. Through its instrumentality the farmer restores the worn-out fields to their former productiveness, and he looks forward with pleasure to the genial spring, "filling the heart with joys renewed and the hopes of an abundant harvest," the golden summer marshaling its gorgeous retinues of successive glories, and the mellow autumn pouring from her horn of plenty the ripened treasures of the year with gratification and delight."

Adjourned *sine die.*

# REPORT

OF

# PUEBLO DISTRICT HORTICULTURAL SOCIETY.

## Constitution and By-Laws.

SECTION 1. This organization shall be known as the "PUEBLO DISTRICT HORTICULTURAL ASSOCIATION."

SEC. 2. The officers of this Association shall be a President, Vice-President, Secretary, Treasurer and Executive Committee, whose term of office shall be for one year, or until their successors are elected; said election to be held at the regular January meeting of each year.

SEC. 3. The President should preside at all regular and special meetings of the Association, preserve order; shall have and exercise all the duties usually conferred on presiding officers of similar organizations; sign all papers and documents requiring the signature of the presiding officer, and attend to such other duties as pertain to his office. As the executive head of the Association, he shall have a general supervision and control of all exhibitions, subject to the advice and assistance of the Executive Committee.

SEC. 4. In the absence of the President, the Vice-President shall fulfill and perform the duties of the President.

SEC. 5. It shall be the duty of the Secretary to be present at all meetings of the Association, keep a cor-

rect record of its proceedings, attest all papers and documents, when issued and signed by the President.

SEC. 6. The Treasurer shall receive and keep an accurate account of all moneys of the Association, and disburse the same only upon the written order of the President and Secretary, which he shall retain and file as vouchers; he shall make an annual report of the receipts and disbursements, which shall have been audited and passed upon by the Executive Committee.

SEC. 7. The Executive Committee shall perform all the duties required of them by the Association. They may appoint such standing and special committees as they may deem advisable.

SEC. 8. The meetings of this Association shall be held on the third Saturday of each month, at the hour of 2 o'clock p. m.

SEC. 9. Producers, dealers, and all interested in the matter of horticulture, floriculture, gardening, etc., both ladies and gentlemen, are eligible to membership.

SEC. 10. The fees for membership in this Association shall be $1.00, and $1.00 annual dues, payable at January meeting.

SEC. 11. The President or Executive Committee, on the petition of three members, shall, at any time, call a special meeting.

SEC. 12. These by-laws may be altered or amended by a two-thirds vote of all members present, notice having been given at a previous regular meeting.

SEC. 13. All elections of officers for this Association shall be by ballot.

ORDER OF BUSINESS.

The following order of business shall be observed at all meetings of the Association:

1. Reading the minutes of the previous regular and intervening meetings.
2. Reports of Executive Committee.
3. Reports of committees.
4. Report of the Secretary.
5. Report of the Treasurer.
6. Unfinished business.
7. New business.
8. Remarks for the good of the Association.

This order of business may be suspended at any time, by a vote of the majority of the members present.

GEO. B. BOWMAN,
L. M. SPERRY,
JACOB HAVER,
*Committee.*

---

# Proceedings.

PUEBLO, COLO., Feb. 4, 1888.

Meeting for the purpose of organization.

Meeting called to order. MR. JACOB HAVER was called to the chair and GEORGE B. BOWMAN elected Secretary.

It was thought advisable not to make a permanent organization, as many who were expected to be present were not on hand.

MESSRS. BOWMAN, BARTHOLOMEW and SPERRY were appointed committee on constitution and by-laws.

By motion the ladies of Pueblo county who are interested in horticulture, floriculture, etc., be invited to attend our meetings and participate in the proceedings of this Association.

It was moved and carried that when we do adjourn, we adjourn to meet one week from next Tuesday, the fourteenth of February.

MR. HADEN and JACOB HAVER were added to committee on constitution and by-laws.

Adjourned.

GEORGE B. BOWMAN, *Secretary.* JACOB HAVER, *President.*

---

PUEBLO, COLO., Feb. 14, 1888.

Meeting called to order at 2:30 by TEMPORARY CHAIRMAN HAVER.

Minutes of previous meeting were read and approved.

Committee on constitution and by-laws made report, which was received and committee discharged.

The constitution and by-laws were read and adopted by section, as follows: (Constitution and by-laws as adopted enclosed.)

It was ordered that an amendment to the constitution be added, making it the duty of the Association to elect all officers by ballot.

The election of officers being in order, the name of JACOB HAVER was presented and he was unanimously elected to the office of President.

MRS. L. M. SPERRY was elected Vice-President by unanimous vote.

For Secretary, A. R. PIERCE was elected.

MRS. M. V. SWORD elected Treasurer.

Those elected on the Executive Committee were MESSRS. HADEN, BOOTH, BOWMAN, MRS. LATSHAW and MRS. ORTON.

Adjourned.

A. R. PIERCE, *Secretary.* JACOB HAVER, *President.*

---

PUEBLO, COLO., March 17, 1888.

Meeting called to order by the President, in the A. O. U. W. Hall.

Minutes of previous meeting read and approved.

The Secretary reported nine dollars received as membership fee.

Moved and seconded that the Secretary be instructed to correspond with the experimental stations, of different States, and get their reports and place them on file.

Carried.

C. STONAKER, Secretary of the Board of Trade, kindly offered the use of what reports he had for the use of the Association.

Moved and carried that this Association is in favor of a city market, and that a committee be appointed to petition the City Council to establish a city market place. The President appointed MESSRS. SPERRY, SWORD and BOWMAN.

On motion of MR. SWORD the names of MESSRS. HADEN and PIERCE were added to the committee.

MR. BAKER moved that each member present constitute a committee of one to get two new members.

G. B. BOWMAN gave a very interesting lesson on insects that injure cabbage and other plants, fruit trees and shrubs, and how to destroy them.

Adjourned to meet at next regular meeting.

PUEBLO, COLO., April 21, 1888.

Meeting called to order by the President in the A. O. U. W. Hall. Minutes of previous meeting, (March 17) read and approved.

Mr. G. W. BOWMAN of the Executive Committee said they had no report to make, but would try and have a room secured in time for the Secretary, and give notice where we would meet at next regular meeting.

The committee appointed by the President at last meeting to bring the matter of a market-place before the City Council, asked for more time, as the Council was just organizing and could not give it the attention that the subject required.

SECRETARY'S REPORT.

As requested at last meeting, I wrote to eight States for their experimental reports, and have received bulletins from Wisconsin, Dakota and Ohio; also have received State horticultural reports which are very valuable for reference, and should be in such keeping that members could have access to them.

Moved and carried that the Secretary's report be accepted, and that he procure a suitable desk or cupboard in which to place the reports as received.

Treasurer reported $16 on hand, and no disbursements.

Moved and carried that the Secretary acknowledge receipt of experimental reports, and thanks for same.

*Resolved*, That the Pueblo District Horticultural Association recommend to our Governor that some earlier day be appointed for "Arbor Day," our trees are so far advanced at the present time that it is useless to set out trees on "Arbor Day" this spring.

Under head of remarks, MR. HAVER spoke of the benefit that would be derived from a reduction on post-

age of seeds, bulbs and plants; also, the general desire for fractional currency to send through the mail, instead of postal note or money order, and thought some action should be taken by this meeting to place the sentiment of this Association before our Representatives in Congress.

Mr. BOWMAN read an article sent out by the advocates of the bill now before Congress for the reduction of postage on seeds, bulbs and plants through the mail.

The Secretary was instructed to write our Representatives, also to the House Committee, that we favor the bills to reduce the postage on seeds, bulbs and plants.

Mr. HAVER brought up the subject of camp fires, and stated the duties of our county commissioners in regard to the matter.

MR. HADEN thought they had complied with the law.

MR. SPERRY said that a few years back while he was road overseer in his district, he had notices sent him to post, but had not seen any since.

MR. HADEN asked if old strawberry plants were desirable to set out.

MR. SLATER stated that he had had thirty years' experience, and he had found out that by drawing the earth up around old plants it seemed to give them new life. He thought by proper treatment old plants were good property.

MR. BOWMAN had had the same experience with old plants; also, that plants set out in the fall produce a fair crop next season.

MR. HADEN wanted to know how many leaves should be cut away when planting.

MR. SATER advised cutting all the leaves except the smallest, but when there were no small leaves it would not hurt them to cut all off.

After a general discussion of the peach, its care and cultivation, meeting adjourned to meet at next regular meeting.

JACOB HAVER, *President.*

A. R. PIERCE, *Seeretary.*

---

NEPESTA, COLO., May 2, 1888.

MR. A. R. PIERCE,

*Secretary Pueblo District Horticultural Association:*

*Dear Sir:*—I will try and tell you in as few words as possible. I started a few trees twelve or thirteen years ago, and my neighbors thought I was insane for putting out fruit, but I was satisfied this was a fine fruit valley. Well, the best fruit I have raised so far is the R. I. Greening. I have some trees, especially one, that has averaged over two barrels each year, and has never failed since they commenced bearing. Red Astrachan has been full every year, and last season my Bellflowers were loaded. I weighed some that weighed three-quarters of a pound. Maiden Blush, Ben Davis and Dutchess of Oldenburg, also do well, as they do in any country.

I have some blue California plums that were loaded, also my cherries. I would recommend the Black Morrello Cherry, as it is hardy; the Early Richmond is too tender.

What few pears I have in are doing well, but am in hopes in a few years that I will show my neighbors that this is a fine fruit valley. My Russian Mulberry raspberries and strawberries do well.

I would like to join your Association, but am afraid I could not attend regular.

Yours respectfully,

R. A. GILMORE.

NEPESTA, Pueblo county, Colo.

2 Tablespoonfuls London Purple To 3 gallons
water for Codling moth. P. 60.

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